Detlef Mader

Biogeography and Migration of the Mud-Dauber *Sceliphron destillatorium* (Hymenoptera : Sphecidae) in Poland and Surrounding Countries in Europe

Biogeographie und Migration der Mauerwespe *Sceliphron destillatorium* (Hymenoptera : Sphecidae) in Polen und umgebenden Ländern in Europa

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Dr. Detlef Mader, Hebelstraße 12, D-69190 Walldorf, Germany
dr.detlef.mader&web.de

Authors of Title Photographs :
III above : Damian Sudoł
III below : Mariusz Szwed
IV above : Piotr Bilański
IV below : Paweł Ryba

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Adresse des Autors - Author's address :
Dr. Detlef Mader, Hebelstraße 12, D-69190 Walldorf/Baden, Germany, dr.detlef.mader&web.de

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Kurzfassung

Die Hauptwanderungsstraßen der Mauerwespe *Sceliphron destillatorium* in Europa sind vom Schwarzen Meer, vom Kaspischen Meer und vom Mittelmeer ausgegangen. Vom Schwarzen Meer ist die Mauerwespe *Sceliphron destillatorium* entlang der Täler von Donau, Dnestr und Dnepr in stromaufwärtiger Richtung gewandert, und vom Azowschen Meer, welches ein Anhängsel des Schwarzen Meeres darstellt, ist die Mauerwespe *Sceliphron destillatorium* entlang der Täler von Don und Kuban in stromaufwärtiger Richtung vorgedrungen. Vom Kaspischen Meer ist die Mauerwespe *Sceliphron destillatorium* den Tälern von Wolga, Ural und Kura in stromaufwärtiger Richtung gefolgt. Vom Mittelmeer ist die Mauerwespe *Sceliphron destillatorium* entlang der östlichen Küsten von Ionischem Meer, Adriatischem Meer, Tyrrhenischem Meer und Ligurischem Meer sowie entlang des Rhônetales in stromaufwärtiger Richtung gewandert. Die biogeographische Auswertung der Lokalitäten des Vorkommens der Mauerwespe *Sceliphron destillatorium* im südöstlichen Teil von Polen sowie in der Slowakei und in der Ukraine ergibt zwei Einwanderungsstraßen. Entlang der Podolisch-Volhynischen Route von Osten ist die Mauerwespe *Sceliphron destillatorium* vom Schwarzen Meer über das Dnestrtal in stromaufwärtiger Richtung nach Lviv und von dort über die schmale Wasserscheide zwischen dem Quellgebiet des Dnestr südwestlich Lviv und dem Oberlauf des San bei Przemyśl sowie dem Quellgebiet des San zwischen Ustrzyki Górne und Ustrzyki Dolne südlich Przemyśl nach Westen und Nordwesten gewandert. Entlang der Transkarpathischen Route von Süden ist die Mauerwespe *Sceliphron destillatorium* hauptsächlich von Roznava, Turna, Kamenany, Sobrance, Drahnov und Malé Ozorovce in der Slowakei sowie von Uzhorod und Mukaceve in der Ukraine über den Tylicz Pass, den Dujawa Pass, den Dukla Pass, den Łupków Pass und den Uzok Pass über das Karpathengebirge in die Quellgebiete der Ropa, der Biała, der Wisłoka und der Nebenflüsse des Dunajec südlich und südöstlich Nowy Sącz sowie in die Quellgebiete des San und seiner Nebenflüsse südlich und südöstlich Sanok gewandert. Die Podolisch-Volhynische Route von Osten ist die Einwanderungsstraße für die Ankunft der Mauerwespe *Sceliphron destillatorium* in Przemyśl und Czesławice westnordwestlich Lublin sowie möglicherweise auch im Bieszczady Gebirge, wohingegen die Transkarpathische Route von Süden die Einwanderungsstraße für die Ankunft der Mauerwespe *Sceliphron destillatorium* in Ropa, Szymbark, Muszyna und Nowy Sącz sowie möglicherweise auch im Bieszczady Gebirge ist.

Abstract

The main migration streets of the Mud-Dauber *Sceliphron destillatorium* in Europe have started from the Black Sea, the Caspian Sea and the Mediterranean Sea. From the Black Sea, the Mud-Dauber *Sceliphron destillatorium* has wandered along the valleys of Danube, Dnestr and Dnepr in upstream direction, and from the Azov Sea which is an appendix to the Black Sea, the Mud-Dauber *Sceliphron destillatorium* has advanced along the valleys of Don and Kuban in upstream direction. From the Caspian Sea, the Mud-Dauber *Sceliphron destillatorium* has followed the valleys of Volga, Ural and Kura in upstream direction. From the Mediterranean Sea, the Mud-Dauber *Sceliphron destillatorium* has migrated along the eastern coasts of Ionian Sea, Adriatic Sea, Tyrrhenian Sea and Ligurian Sea as well as along the Rhône valley in upstream direction. The biogeographical evaluation of the localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland as well as in Slovakia and Ukraina reveals two immigration streets. Along the Podolian-Volhynian route from the east, the Mud-Dauber *Sceliphron destillatorium* has wandered from the Black Sea via the Dnestr valley in upstream direction to Lviv and from there across the narrow watershed between the source region of the Dnestr southwest of Lviv and the upper reach of the San near Przemyśl as well as the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl towards west and northwest. Along the Transcarpathian route from the south, the Mud-Dauber *Sceliphron destillatorium* has wandered predominantly from Roznava, Turna, Kamenany, Sobrance, Drahnov and Malé Ozorovce in Slovakia as well as from Uzhorod and Mukaceve in Ukraina via the Tylicz Pass, the Dujawa Pass, the Dukla Pass, the Łupków Pass and the Uzok Pass across the Carpathian Mountains into the source regions of the Ropa, the Biała, the Wisłoka and the tributaries of the Dunajec south and southeast of Nowy Sącz as well as into the source regions of the San and its tributaries south and southeast of Sanok. The Podolian-Volhynian route from the east is the immigration street for the arrival of the Mud-Dauber *Sceliphron destillatorium* in Przemyśl and Czesławice westnorthwest of Lublin as well as probably also in the Bieszczady Mountains, whereas the Transcarpathian route from the south is the immigration street for the arrival of the Mud-Dauber *Sceliphron destillatorium* in Ropa, Szymbark, Muszyna and Nowy Sącz as well as probably also in the Bieszczady Mountains.

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Summary

The occurrence of the Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Hymenoptera : Sphecidae) (which has formerly also been called *Pelopaeus destillatorius*) in the southeastern part of Poland has up to 2000 only been confirmed at 17 isolated localities which are dispersed in a large area and are separated by considerable distances from the neighbouring places, whereas 79 additional localities of occurrence have been discovered after 2000. An overview mapping of nesting sites in the triangle between Nowy Sącz in the west, Ustrzyki Górne southsouthwest of Przemyśl in the south and Lublin in the north in 2000 has revealed the presence of mason nests of the Mud-Dauber *Sceliphron destillatorium* on the walls and below the roofs of individual buildings in Ciężkowice northeast of Nowy Sącz,

Krosno, Nowy Sącz, Przemyśl, Ropa east of Nowy Sącz and Tarnów, whereas in abt. 50 other towns and larger villages, I have searched without success for mason nests. In addition to Ropa, the capture of specimens of the Mud-Dauber *Sceliphron destillatorium* in Czesławice westnorthwest of Lublin, Łubne southsouthwest of Przemyśl, Szymbark east of Nowy Sącz, Muszyna southsoutheast of Nowy Sącz; and Ustrzyki Dolne, Ustrzyki Górne, Nasiczne, Berehy Górne and Wetlina southsouthwest of Przemyśl has already been reported in the literature up to 2000, and further captures of specimens in Mików and Zatwarnica southsouthwest of Przemyśl have been contributed by unpublished information up to 2000. While the Mud-Dauber *Sceliphron destillatorium* has been recorded for the first time in Poland only abt. 50 years ago, it is already known from Lviv (formerly Lwów or Lemberg) and various other places in the Dnestr valley and its surroundings between Lviv and Kamjanec-Podilskyj (formerly Kamieniec Podolski) in Ukraina as well as from Trencín (formerly Trencsén), Zlatovce, Roznava (formerly Rosenau or Rozsnyó), Turna, Kamenany, Sobrance (formerly Szobráncz), Drahnov (formerly Deregnyö) and Malé Ozorovce (formerly Kisazar) in Slovakia and from Uzhorod and Mukaceve in Ukraina since more than 50 - 150 years, with the oldest reported finds of the Mud-Dauber *Sceliphron destillatorium* in these areas deriving from Kamjanec-Podilskyj in 1856, from Lviv in 1862, from Volcynec and Kalinovci in 1868, from Dzvenihorod in 1869, from Skala-Podilska in 1874, from Sobrance in 1875, and from Roznava in 1878.

The biogeographical evaluation of the localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland as well as in Slovakia and Ukraina reveals two immigration streets. Along the Podolian-Volhynian route from the east, the Mud-Dauber *Sceliphron destillatorium* has wandered from the Black Sea via the Dnestr valley in upstream direction to Lviv and from there across the narrow watershed between the source region of the Dnestr southwest of Lviv and the upper reach of the San near Przemyśl as well as the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl towards west and northwest. Along the Transcarpathian route from the south, the Mud-Dauber *Sceliphron destillatorium* has wandered predominantly from Roznava, Turna, Kamenany, Sobrance, Drahnov and Malé Ozorovce in Slovakia as well as from Uzhorod and Muaceve in Ukraina via the Tylicz Pass, the Dujawa Pass, the Dukla Pass, the Łupków Pass and the Uzok Pass across the Carpathian Mountains into the source regions of the Ropa, the Biała, the Wisłoka and the tributaries of the Dunajec south and southeast of Nowy Sącz as well as into the source regions of the San and its tributaries south and southeast of Sanok. The Podolian-Volhynian route from the east is the immigration street for the arrival of the Mud-Dauber *Sceliphron destillatorium* in Przemyśl and Czesławice westnorthwest of Lublin as well as probably also in Ustrzyki Dolne, Ustrzyki Górne, Nasiczne and Zatwarnica, whereas the Transcarpathian route from the south is the immigration street for the arrival of the Mud-Dauber *Sceliphron destillatorium* in Ropa, Szymbark, Muszyna and Nowy Sącz as well as probably also in Mików, Łubne, Wetlina, Berehy Górne and Ustrzyki Górne. If Mików, Łubne, Wetlina, Berehy Górne and Ustrzyki Górne would have been reached by the Mud-Dauber *Sceliphron destillatorium* along the Transcarpathian route from the south, then its arrival in Ustrzyki Dolne, Nasiczne and Zatwarnica would have been accomplished by subsequent spreading from these places towards north and northeast, whereas if Ustrzyki Dolne as well as Ustrzyki Górne, Nasiczne and Zatwarnica would have been reached by the Mud-Dauber *Sceliphron destillatorium* along the Podolian-Volhynian route from the east, then its arrival in Mików, Łubne, Wetlina and Berehy Górne would have happened by further progradation from Ustrzyki Dolne, Ustrzyki Górne, Nasiczne and Zatwarnica towards southwest and northwest, respectively.

Particularly the direct connection of Ustrzyki Dolne to the Dnestr valley by the Strwiąz which originates northwest of Ustrzyki Dolne and terminates into the Dnestr eastnortheast of Sambir southwest of Lviv and southeast of Przemyśl accentuates the probability of the arrival of the Mud-Dauber *Sceliphron destillatorium* in Ustrzyki Dolne by immigration along the Podolian-Volhynian route from the east. The shortest connection to the San valley and its tributaries via the Podolian-Volhynian route would be the overstepping from the source region of the Dnestr southeast of Ustrzyki Dolne across the narrow watershed of only abt. 5 km width to the source region of the Ruka that terminates into the San, whereas the shortest connection to the San valley and its tributaries via the Transcarpathian route would be the overstepping from the source region of the Uz east of Uzok across the narrow watershed of only abt. 5 - 10 km width to the source region of the San northnortheast of Uzok, with the migration along the San valley in downstream direction as well as the subsequent entering of southwestern side valleys of the San valley and the wandering along southwestern side valleys of the San valley in upstream direction then having guided the Mud-Dauber *Sceliphron destillatorium* to Ustrzyki Górne, Nasiczne and Zatwarnica as well as probably even to Berehy Górne, Wetlina, Łubne and

Mików. The nesting sites of the Mud-Dauber *Sceliphron destillatorium* in Ciężkowice and Tarnów as well as possibly also in Nowy Sącz have most probably been reached by continuing expansion from Ropa, Szymbark and Muszyna after the original immigration to these places along the Transcarpathian route from the south, whereas the nesting site of the Mud-Dauber *Sceliphron destillatorium* in Krosno could have been founded as a result of subsequent spreading after the original immigration to Ropa, Szymbark and Muszyna or to Mików, Lubne, Wetlina, Berehy Górne and Ustrzyki Górne along the Transcarpathian route from the south or to Przemyśl, Ustrzyki Dolne, Ustrzyki Górne, Nasiczne and Zatwarnica along the Podolian-Volhynian route from the east.

In contrast to the utilization of passes for crossing the Carpathian Mountains, the Mud-Dauber *Sceliphron destillatorium* could also have arrived in Nowy Sącz by advance from Roznava, Turna and Kamenany to Poprad and then by wandering along the Poprad valley which provides a narrow gate through the Carpathian Mountains via Muszyna up to the termination of the Poprad into the Dunajec at the southwestern border of Nowy Sącz. The Mud-Dauber *Sceliphron destillatorium* has so far only been found in the southeastern part of Poland and has up to now not been verified in the southwestern part of Poland, but the assemblage of a suite of localities close to the Moravian-Silesian gate southsouthwest of Ostrava (formerly Ostrau) in Moravia in Czechia allows the postulation that the Moravian-Silesian route is a realistical immigration street which will probably direct in future or has even possibly already directed the Mud-Dauber *Sceliphron destillatorium* from Moravia in Czechia to Silesia in the southwestern part of Poland.

The main migration streets of the Mud-Dauber *Sceliphron destillatorium* in Europe have started from the Black Sea, the Caspian Sea and the Mediterranean Sea. From the Black Sea, the Mud-Dauber *Sceliphron destillatorium* has wandered along the valleys of Danube, Dnestr and Dnepr in upstream direction, and from the Azov Sea which is an appendix to the Black Sea, the Mud-Dauber *Sceliphron destillatorium* has advanced along the valleys of Don and Kuban in upstream direction. From the Caspian Sea, the Mud-Dauber *Sceliphron destillatorium* has followed the valleys of Volga, Ural and Kura in upstream direction. From the Mediterranean Sea, the Mud-Dauber *Sceliphron destillatorium* has migrated along the eastern coasts of Ionian Sea, Adriatic Sea, Tyrrhenian Sea and Ligurian Sea as well as along the Rhône valley in upstream direction. The distribution of published records of the Mud-Dauber *Sceliphron destillatorium* in Europe reflects four potential immigration streets into Germany which extend from Basel in Switzerland into the southern part of the Upper Rhine Graben, from Zürich and Arbon in Switzerland around Lake Constance, from Krems and Linz in Austria along the Danube valley in upstream direction, and from Prague in Czechia along the Vltava valley and subsequently the Elbe valley in downstream direction. The evaluation of these four potential immigration streets into Germany reveals that the most promising regions for the search of potential occurrences of the Mud-Dauber *Sceliphron destillatorium* in Germany are the surroundings of Basel in the southern part of the Upper Rhine Graben, the vicinity of Lindau at the southeastern edge of Lake Constance, the interval of the Danube valley between Passau and Regensburg, and the interval of the Elbe valley around Dresden. Another possible immigration street of the Mud-Dauber *Sceliphron destillatorium* into Germany extends from the Morava (March) valley around Olomouc (formerly Olmütz) and the Becva valley between Vsetín and Olomouc across the watershed to the Odra valley between Noví Jicín and Ostrava in Czechia, and from there along the Odra valley in downstream direction to Wroclaw (formerly Breslau) and beyond in Poland and subsequently to Frankfurt an der Oder and beyond in Germany.

In comparison to the records in Brjansk and Penza in Russia in abt. 53.25 degrees northern latitude, the Mud-Dauber *Sceliphron destillatorium* would have the potential of farther wandering in Poland for example up to Toruń (formerly Thorn) in the Vistula valley in abt. 53 degrees northern latitude, up to Białystok in the Narew valley which tributes via the Bug valley to the Vistula valley in abt. 53.125 degrees northern latitude, and up to Szczecin (formerly Stettin) in the Odra valley in abt. 53.5 degrees northern latitude. Similarly, the Mud-Dauber *Sceliphron destillatorium* would have the potential of immigration into Germany for example along the Rhine valley in downstream direction up to Xanten northnorthwest of Duisburg beyond Cologne in abt. 51.75 degrees northern latitude, along the Elbe valley in downstream direction up to Hamburg in abt. 53.5 degrees northern latitude, and along the Weser valley in downstream direction up to Bremen in abt. 53 degrees northern latitude.

The 17 scattered localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland up to 2000 represent isolated pioneering sites in a virginal area from where further expansion of the Mud-Dauber *Sceliphron destillatorium* into up to 2000 uninhabited regions could be

expected in the near future which has been confirmed by the discovery of 79 additional localities of occurrence after 2000. In order to support the maintenance of the Mud-Dauber *Sceliphron destillatorium* at its 17 scattered localities of occurrence in the southeastern part of Poland up to 2000 as well as at its 79 additional localities of occurrence after 2000 and to promote the spreading from these places into the surrounding regions in the near future, specimens of the Mud-Dauber *Sceliphron destillatorium* must not be captured and samples of its mason nests must not be collected at any site in the southeastern part of Poland and adjacent countries. Observation in the field and photographical documentation of specimens and mason nests are fully sufficient for definite identification of the Mud-Dauber *Sceliphron destillatorium*.

Zusammenfassung

Das Vorkommen der Mauerwespe *Sceliphron destillatorium* (ILLIGER 1807) (Hymenoptera : Sphecidae) (welche früher auch *Pelopaeus destillatorius* genannt wurde) im südöstlichen Teil von Polen wurde bis 2000 nur an 17 isolierten Lokalitäten nachgewiesen, welche in einem großen Gebiet verstreut sind und durch erhebliche Entfernungen von den benachbarten Plätzen separiert sind, wohingegen 79 zusätzliche Lokalitäten des Vorkommens nach 2000 entdeckt wurden. Eine Übersichtskartierung von Niststandorten in dem Dreieck zwischen Nowy Sącz im Westen, Ustrzyki Górne südsüdwestlich Przemyśl im Süden und Lublin im Norden in 2000 hat das Auftreten von Mörtelnestern der Mauerwespe *Sceliphron destillatorium* an den Wänden und unter den Dächern von einzelnen Gebäuden in Ciężkowice nordöstlich Nowy Sącz, Krosno, Nowy Sącz, Przemyśl, Ropa östlich Nowy Sącz und Tarnów ergeben, wohingegen ich in etwa 50 anderen Städten und Dörfern ohne Erfolg nach Mörtelnestern gesucht habe. Außer in Ropa wurde der Fang von Exemplaren der Mauerwespe *Sceliphron destillatorium* in Czesławice westnordwestlich Lublin, Łubne südsüdwestlich Przemyśl, Szymbark östlich Nowy Sącz, Muszyna südsüdöstlich Nowy Sącz; und Ustrzyki Dolne, Ustrzyki Górne, Nasiczne, Berehy Górne und Wetlina südsüdwestlich Przemyśl bis 2000 bereits in der Literatur berichtet, und weitere Fänge von Exemplaren in Mików und Zatwarnica südsüdwestlich Przemyśl wurden bis 2000 durch unveröffentlichte Informationen beigesteuert. Die Mauerwespe *Sceliphron destillatorium* wurde in Polen erst vor etwa 50 Jahren erstmals nachgewiesen, wohingegen sie von Lviv (früher Lwów oder Lemberg) und verschiedenen anderen Plätzen im Dnestrtal und dessen Umgebung zwischen Lviv und Kamjanec-Podilskyj (früher Kamieniec Podolski) in der Ukraine sowie von Trencín (früher Trencsén), Zlatovce, Roznava (früher Rosenau or Rozsnyó), Turna, Kamenany, Sobrance (früher Szobráncz), Drahnov (früher Deregnyö) und Malé Ozorovce (früher Kisazar) in der Slowakei und von Uzhorod und Mukaceve in der Ukraine schon seit mehr als 50 - 150 Jahren bekannt ist, wobei die ältesten berichteten Funde der Mauerwespe *Sceliphron destillatorium* in diesen Gebieten von Kamjanec-Podilskyj in 1856, von Lviv in 1862, von Volcynec und Kalinovci in 1868, von Dzvenihorod in 1869, von Skala-Podilska in 1874, von Sobrance in 1875, und von Roznava in 1878 stammen.

Die biogeographische Auswertung der Lokalitäten des Vorkommens der Mauerwespe *Sceliphron destillatorium* im südöstlichen Teil von Polen sowie in der Slowakei und in der Ukraine ergibt zwei Einwanderungsstraßen. Entlang der Podolisch-Volhynischen Route von Osten ist die Mauerwespe *Sceliphron destillatorium* vom Schwarzen Meer über das Dnestrtal in stromaufwärtiger Richtung nach Lviv und von dort über die schmale Wasserscheide zwischen dem Quellgebiet des Dnestr südwestlich Lviv und dem Oberlauf des San bei Przemyśl sowie dem Quellgebiet des San zwischen Ustrzyki Górne und Ustrzyki Dolne südlich Przemyśl nach Westen und Nordwesten gewandert. Entlang der Transkarpathischen Route von Süden ist die Mauerwespe *Sceliphron destillatorium* hauptsächlich von Roznava, Turna, Kamenany, Sobrance, Drahnov und Malé Ozorovce in der Slowakei sowie von Uzhorod und Mukaceve in der Ukraine über den Tylicz Pass, den Dujawa Pass, den Dukla Pass, den Łupków Pass und den Uzok Pass über das Karpathengebirge in die Quellgebiete der Ropa, der Biała, der Wisłoka und der Nebenflüsse des Dunajec südlich und südöstlich Nowy Sącz sowie in die Quellgebiete des San und seiner Nebenflüsse südlich und südöstlich Sanok gewandert. Die Podolisch-Volhynische Route von Osten ist die Einwanderungsstraße für die Ankunft der Mauerwespe *Sceliphron destillatorium* in Przemyśl und Czesławice westnordwestlich Lublin sowie möglicherweise auch in Ustrzyki Dolne, Ustrzyki Górne, Nasiczne und Zatwarnica, wohingegen die Transkarpathische Route von Süden die Einwanderungsstraße für die Ankunft der Mauerwespe *Sceliphron destillatorium* in Ropa, Szymbark, Muszyna und Nowy Sącz sowie möglicherweise auch in Mików, Łubne, Wetlina, Berehy Górne und

Ustrzyki Górne ist. Wenn Mików, Łubne, Wetlina, Berehy Górne und Ustrzyki Górne von der Mauerwespe *Sceliphron destillatorium* entlang der Transkarpathischen Route von Süden erreicht worden wären, dann wäre ihre Ankunft in Ustrzyki Dolne, Nasiczne und Zatwarnica durch subsequente Ausbreitung von diesen Plätzen nach Norden und Nordosten erfolgt, wohingegen wenn Ustrzyki Dolne sowie Ustrzyki Górne, Nasiczne und Zatwarnica von der Mauerwespe *Sceliphron destillatorium* entlang der Podolisch-Volhynischen Route von Osten erreicht worden wären, dann wäre ihre Ankunft in Mików, Łubne, Wetlina und Berehy Górne durch weitere Progradation von Ustrzyki Dolne, Ustrzyki Górne, Nasiczne und Zatwarnica nach Südwesten und Nordwesten erfolgt.

Besonders die direkte Verbindung von Ustrzyki Dolne zu dem Dnestrtal durch den Strwiąz, welcher nordwestlich Ustrzyki Dolne entspringt und ostnordöstlich Sambir südwestlich Lviv und südöstlich Przemyśl in den Dnestr mündet, unterstreicht die Möglichkeit der Ankunft der Mauerwespe *Sceliphron destillatorium* in Ustrzyki Dolne durch Einwanderung entlang der Podolisch-Volhynischen Route von Osten. Die kürzeste Verbindung zu dem Santal und seinen Nebenflüssen über die Podolisch-Volhynische Route wäre das Übersteigen von dem Quellgebiet des Dnestr südöstlich Ustrzyki Dolne über die schmale Wasserscheide von nur etwa 5 km Breite in das Quellgebiet der Ruka, welche in den San mündet, wohingegen die kürzeste Verbindung zu dem Santal und seinen Nebenflüssen über die Transkarpathische Route von Süden das Übersteigen von dem Quellgebiet des Uz östlich Uzok über die schmale Wasserscheide von nur etwa 5 - 10 km Breite in das Quellgebiet des San nordnordöstlich Uzok wäre, wobei die Wanderung entlang des Santales in stromabwärtiger Richtung sowie das anschließende Eindringen in die südwestlichen Nebentäler des Santales und die Wanderung entlang der südwestlichen Nebentäler des Santales in stromaufwärtiger Richtung die Mauerwespe *Sceliphron destillatorium* dann nach Ustrzyki Górne, Nasiczne und Zatwarnica sowie möglicherweise sogar nach Berehy Górne, Wetlina, Łubne und Mików geführt hätte. Die Niststandorte der Mauerwespe *Sceliphron destillatorium* in Ciężkowice und Tarnów sowie möglicherweise auch in Nowy Sącz sind höchstwahrscheinlich durch fortgesetzte Expansion von Ropa, Szymbark und Muszyna nach der ursprünglichen Einwanderung zu diesen Plätzen entlang der Transkarpathischen Route von Süden erreicht worden, wohingegen der Niststandort der Mauerwespe *Sceliphron destillatorium* in Krosno als Ergebnis der subsequenten Ausbreitung nach der ursprünglichen Einwanderung nach Ropa, Szymbark und Muszyna oder nach Mików, Łubne, Wetlina, Berehy Górne und Ustrzyki Górne entlang der Transkarpathischen Route von Süden oder nach Przemyśl, Ustrzyki Dolne, Ustrzyki Górne, Nasiczne und Zatwarnica entlang der Podolisch-Volhynischen Route von Osten gegründet worden sein könnte.

Im Gegensatz zu der Verwendung von Pässen zur Überquerung des Karpathengebirges könnte die Mauerwespe *Sceliphron destillatorium* in Nowy Sącz auch durch Vordringen von Roznava, Turna und Kamenany nach Poprad and dann durch Wanderung entlang des Popradtales über Muszyna angekommen sein, welches eine schmale Pforte durch das Karpathengebirge bis zu der Mündung des Poprad in den Dunajec am südwestlichen Rand von Nowy Sącz bietet. Die Mauerwespe *Sceliphron destillatorium* wurde bisher nur im südöstlichen Teil von Polen gefunden und wurde bisher im südwestlichen Teil von Polen nicht nachgewiesen, aber die Anordnung einer Reihe von Lokalitäten nahe der Mährisch-Schlesischen Pforte südsüdwestlich Ostrava (früher Ostrau) in Mähren in Tschechien erlaubt die Annahme, daß die Mährisch-Schlesische Route eine realistische Einwanderungsstraße darstellt, welche die Mauerwespe *Sceliphron destillatorium* von Mähren in Tschechien nach Schlesien im südwestlichen Teil von Polen wahrscheinlich in Zukunft leiten wird oder sogar möglicherweise schon geleitet hat.

Die Hauptwanderungsstraßen der Mauerwespe *Sceliphron destillatorium* in Europa sind vom Schwarzen Meer, vom Kaspischen Meer und vom Mittelmeer ausgegangen. Vom Schwarzen Meer ist die Mauerwespe *Sceliphron destillatorium* entlang der Täler von Donau, Dnestr und Dnepr in stromaufwärtiger Richtung gewandert, und vom Azowschen Meer, welches ein Anhängsel des Schwarzen Meeres darstellt, ist die Mauerwespe *Sceliphron destillatorium* entlang der Täler von Don und Kuban in stromaufwärtiger Richtung vorgedrungen. Vom Kaspischen Meer ist die Mauerwespe *Sceliphron destillatorium* den Tälern von Wolga, Ural und Kura in stromaufwärtiger Richtung gefolgt. Vom Mittelmeer ist die Mauerwespe *Sceliphron destillatorium* entlang der östlichen Küsten von Ionischem Meer, Adriatischem Meer, Tyrrhenischem Meer und Ligurischem Meer sowie entlang des Rhônetales in stromaufwärtiger Richtung gewandert. Die Verbreitung der veröffentlichten Nachweise der Mauerwespe *Sceliphron destillatorium* in Europa spiegelt vier potentielle Einwanderungsstraßen nach Deutschland wider, welche sich von Basel in der Schweiz in den südlichen Teil des Oberrheingrabens, von Zürich und Arbon in der Schweiz um den Bodensee herum, von Krems und Linz in Österreich entlang des Donautales in stromaufwärtiger Richtung, und von Prag in Tschechien entlang des Moldauta-

les und anschließend des Elbetales in stromabwärtiger Richtung erstrecken. Die Auswertung dieser vier potentiellen Einwanderungsstraßen nach Deutschland ergibt, daß die meistversprechendsten Gebiete für die Suche von potentiellen Vorkommen der Mauerwespe *Sceliphron destillatorium* in Deutschland die Umgebung von Basel im südlichen Teil des Oberrheingrabens, die Umgebung von Lindau an der südöstlichen Ecke des Bodensees, das Intervall des Donautales zwischen Passau und Regensburg, und das Intervall des Elbetales um Dresden sind. Eine weitere mögliche Einwanderungsstraße der Mauerwespe *Sceliphron destillatorium* nach Deutschland erstreckt sich von dem Moravatal um Olomouc (früher Olmütz) und dem Becvatal zwischen Vsetín und Olomouc über die Wasserscheide zu dem Odertal zwischen Noví Jicín und Ostrava in Tschechien, und von dort entlang des Odertales in stromabwärtiger Richtung nach Wrocław (früher Breslau) und darüber hinaus in Polen und anschließend nach Frankfurt an der Oder und darüber hinaus in Deutschland.

Im Vergleich zu den Nachweisen in Brjansk und Penza in Rußland in etwa 53,25 Grad nördlicher Breite hätte die Mauerwespe *Sceliphron destillatorium* das Potential einer weiteren Wanderung in Polen beispielsweise bis nach Toruń (früher Thorn) im Weichseltal in etwa 53 Grad nördlicher Breite; bis nach Białystok im Narewtal, welches über das Bugtal in das Weichseltal entwässert, in etwa 53,125 Grad nördlicher Breite; und bis nach Szczecin (früher Stettin) im Odertal in etwa 53,5 Grad nördlicher Breite. In ähnlicher Weise hätte die Mauerwespe *Sceliphron destillatorium* das Potential der Einwanderung nach Deutschland beispielsweise entlang des Rheintales in stromabwärtiger Richtung bis nach Xanten nordnordwestlich Duisburg jenseits von Köln in etwa 51,75 Grad nördlicher Breite, entlang des Elbetales in stromabwärtiger Richtung bis nach Hamburg in etwa 53,5 Grad nördlicher Breite, und entlang des Wesertales in stromabwärtiger Richtung bis nach Bremen in etwa 53 Grad nördlicher Breite.

Die 17 verstreuten Lokalitäten des Vorkommens der Mauerwespe *Sceliphron destillatorium* im südöstlichen Teil von Polen bis 2000 repräsentieren isolierte Pionierstandorte in einem jungfräulichen Gebiet, von wo aus eine weitere Ausdehnung der Mauerwespe *Sceliphron destillatorium* in bis 2000 unbesiedelte Gebiete in der nahen Zukunft erwartet werden kann, was durch die Entdeckung von 79 zusätzlichen Lokalitäten des Vorkommens nach 2000 bestätigt wurde. Zur Unterstützung der Erhaltung der Mauerwespe *Sceliphron destillatorium* an ihren 17 verstreuten Lokalitäten des Vorkommens im südöstlichen Teil von Polen bis 2000 sowie an ihren 79 zusätzlichen Lokalitäten des Vorkommens nach 2000 und zur Promotion der Ausbreitung von diesen Plätzen in die umgebenden Gebiete in der nahen Zukunft dürfen an keiner Stelle im südöstlichen Teil von Polen und angrenzenden Ländern weder Exemplare der Mauerwespe *Sceliphron destillatorium* gefangen werden noch Proben von Mörtelnestern gesammelt werden. Die Beobachtung im Gelände und die fotografische Dokumentation von Exemplaren und Mörtelnestern sind für die definitive Identifizierung der Mauerwespe *Sceliphron destillatorium* völlig ausreichend.

Key Words

Hymenoptera, Sphecidae, digger wasps, *Sceliphron destillatorium*, Mud-Dauber, nesting sites, nesting ecology, nesting strategy, mason nests, building walls, building roofs, outer walls, inner walls, rain resistivity, stone substrates, wood substrates, metal substrates, synanthropy, field mapping, research strategy, southeastern Poland, Cięzkowice, Krosno, Nowy Sącz, Przemyśl, Ropa, Tarnów, biogeography, migration, northern latitude, Podolian-Volhynian route, Transcarpathian route, Moravian-Silesian route, Danubian route, Moldavian-Saxonian route, Rhodanian-Rhenanian route, Black Sea, Caspian Sea, Lake Aral, Mediterranean Sea, river valleys, Danube valley, Dnestr valley, Dnepr valley, Don valley, Kuban valley, Volga valley, Ural valley, Kura valley, Amudarija valley, Syrdarija valley, San valley, Vistula valley, Poprad valley, Dunajec valley, Nida valley, Pilica valley, Odra valley, Elbe valley, Vltava valley, Spree valley, Rhône valley, Saône valley, Rhine valley, Aare valley, Lake Léman, Lake Neuchâtel, Lake Bienne, Lake Zürich, Lake Constance, upstream direction, downstream direction, watersheds, tributaries, overstepping, bridging, channelization, mountain passes, Tylicz Pass, Dujawa Pass, Dukla Pass, Łupków Pass, Uzok Pass, mountain gates, Carpathian Mountains, Bieszczady Mountains, Beskid Mountains, Ukraina, Russia, Kazakhstan, Uzbekistan, Turkmenistan, Tadzikistan, Kirgisia, Slovakia, Czechia, Austria, Hungary, Romania, Switzerland, Germany, pioneering localities, expansion, potential, protection, history, population dynamics, winter stability, Palaearctic.

1 Origin and Status of the Study

Origin and status of the present study on biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Hymenoptera : Sphecidae) in Poland and surrounding countries are outlined as follows.

1.1 Origin of the Study

During the systematical mapping of nesting sites of the Delta Mud Wasp *Delta unguiculatum* (VILLERS 1789) (Hymenoptera : Eumenidae) (which has formerly also been called *Eumenes unguiculatus* or *Eumenes unguiculus*) and the Mason Bee *Megachile (Chalicodoma) parietina* (GEOFFROY in FOURCROY 1785) (Hymenoptera : Megachilidae) (which has formerly also been called *Chalicodoma muraria*) in Germany and France (MADER 2000 a), I have received the articles of SOSZYNSKI & SOSZYNSKI (1985) and CELARY (1996) on the occurrence of the Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Hymenoptera : Sphecidae) (which has formerly also been called *Pelopaeus destillatorius*) at some isolated localities in the southeastern part of Poland while it has so far not been recorded in other parts of Poland. At that time, I had just discovered the immigration of the Delta Mud Wasp *Delta unguiculatum* into the Moselle valley by overstepping across the watershed between the sources of the Saône and the Madon and by subsequent downstream wandering along the Madon valley up to its termination into the Moselle valley where so far only two isolated nesting sites of the Delta Mud Wasp *Delta unguiculatum* have been established in Neuves-Maisons and Toul southwest and west of Nancy, whereas I have not been able to find other nesting sites of the Delta Mud Wasp *Delta unguiculatum* in the Moselle valley upstream and downstream of the limited region around the mouth of the Madon (MADER 2000 a). I have therefore considered the possibility of an immigration of the Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* into the southeastern part of Poland from the Black Sea via the Dnestr valley upstream to Lviv (formerly Lwów or Lemberg) and from there across the narrow watershed between the source region of the Dnestr southwest of Lviv and the upper reach of the San near Przemyśl, and I have concluded from the above assumption that in case of a successful arrival in the San valley near Przemyśl, the further downstream wandering along the San valley could bring the Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* into the Vistula valley near Sandomierz and from there farther downstream towards Puławy and possibly even beyond.

The significance of the Dnestr valley as a migration street for wasps and bees has already been illustrated by KINEL & NOSKIEWICZ (1930) and KUNTZE & NOSKIEWICZ (1938) who have reported the occurrence of the Mud-Dauber *Sceliphron destillatorium* and also the Mud Wasp *Katamenes arbustorum* (PANZER 1799) (Hymenoptera : Eumenidae) (which has formerly also been called *Eumenes arbustorum*) that is also a xero-thermophilous wasp of ponto-mediterranean provenance at a suite of localities in the Dnestr valley and its surroundings between Ivano-Frankivsk and Kamjanec-Podilskyj southeast of Lviv, whereas the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* are not mentioned in the compilations of KINEL & NOSKIEWICZ (1930) and KUNTZE & NOSKIEWICZ (1938). SOSZYNSKI & SOSZYNSKI (1985) have also favoured an immigration of the Mud-Dauber *Sceliphron destillatorium* into the southeastern part of Poland along the Podolian-Volhynian route from the east via the Dnestr valley, whereas CELARY (1996) has given preference to an immigration of the Mud-Dauber *Sceliphron destillatorium* into the southeastern part of Poland along the Transcarpathian route from the south via several passes across the Carpathian Mountains.

I have thus decided to test my model of a possible immigration of the Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* into the southeastern part of Poland from the Black Sea via the Dnestr valley in upstream direction to Lviv and from there across the narrow watershed between the source region of the Dnestr southwest of Lviv and the upper reach of the San near Przemyśl in the field by undertaking a search for mason nests of the Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* in the southeastern part of Poland based on my experience in the mapping of nesting sites of the Delta Mud Wasp *Delta unguicu-*

latum in Germany and France (MADER 2000 a). The results of my overview mapping of nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland in 2000 as well as my interpretation of biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* in Poland and surrounding countries according to the review of the literature up to 2013 are presented here in a preliminary summary. Because I plan to conduct further field studies and literature evaluation, I would be very grateful to all readers for any information on the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland, Ukraina, Russia, Kazakhstan, Slovakia and Czechia as well as also in Austria, Hungary, Romania, Switzerland, Germany and surrounding countries based on captures of specimens, observations of nesting sites and flower visits, literature records, and availability of specimens in collections.

1.2 Status of the Study

The manuscript of an earlier version of the present study has already been almost completed in 2001. Due to various other projects (MADER 2009 a, 2010 a, 2011 a, 2012 a, 2012 b, 2013), I have not found the time to finish this study between 2001 and 2013. I have always planned to carry out more extensive investigations in field and literature on biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* and the Delta Mud Wasp *Delta unguiculatum*, but I have become engaged in several other time-consuming projects focussing on the Moselle Apollo *Parnassius apollo vinningensis* STICHEL 1899 (Lepidoptera : Papilionidae), the Stag Beetle *Lucanus cervus* LINNAEUS 1758 (Coleoptera : Lucanidae) and the Hornet *Vespa crabro* LINNAEUS 1758 (Hymenoptera : Vespidae) as well as on selenocyclicity, biochronology and cryochronology of butterflies, beetles and other insects in the meantime which do not allow a serious prediction of my availability to continue in detail with the research in field and literature on biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* and the Delta Mud Wasp *Delta unguiculatum.*

Therefore, after the termination of another large treatise on the Moselle Apollo *Parnassius apollo vinningensis*, the Stag Beetle *Lucanus cervus* and the Hornet *Vespa crabro* (MADER 2013), and as a consequence of the significant delay of the beginning of the spring due to the unforeseen substantial prolongation of the winter in early 2013 especially in comparison to early 2011 and early 2012 as well as the rarity of warm, sunny and dry weather in contrast to the predominance of cool and overcast weather with abundant rain in early spring 2013, I have finally decided to publish this study now in 2013 predominantly on the basis of the version having been established already in 2001 including review, supplementation and evaluation of the most important literature having appeared between 2001 and 2013 as the originally scheduled preliminary summary particularly because the renewed reading and editing of the manuscript in 2013 has convinced me that I have left a mature text in 2001 and that there would be no significant potential for improvement of the present study prior to considerably time-consuming additional investigations in field and literature.

In addition, an overview of the literature which has appeared between 2001 and 2013 has revealed that although the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed at various new localities by discovery of nests and/or capture of specimens since 2001 which, however, are all in accordance with my interpretation of biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* that I have already established in 2001, no substantial changes of the major trends of biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* which have been contained in my original analysis from 2001 have been necessary, but only subordinate modifications, actualizations and supplementations of my already existing model of biogeography and migration have had to be made upon incorporation and evaluation of the new localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* where nests have been identified and/or specimens have been obtained since 2001 as being documented in the various papers that have been published between 2001 and 2013.

Finally, since the remarks of SOSZYNSKI & SOSZYNSKI (1985) and CELARY (1996) almost no further comments have been given on biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* in the various papers having reported new localities of its occurrence in Poland, Slovakia and Czechia where only the distribution of places has been documented in descriptions and cartographical plots (particularly PANIGAJ 2003; TOTH, TOTHOVA & LUKAS 2005; LUKAS, BOGUSCH & LISKA

2006; WISNIOWSKI 2007; BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; KOSIBOWICZ 2009; KOWALCZYK, KURZAC & SOSZYNSKI 2009; BILANSKI, KOŁODZIEJ & PAJĄK 2012; JAROSIEWICZ 2012), and therefore I have also decided to publish my model of biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* which I have already set up in 2001 now in 2013 including review, supplementation and evaluation of the most important literature having appeared between 2001 and 2013 for the purpose of contribution to exchange of knowledge, stimulation of discussion, and promotion of research and collection of further localities of occurrence of the Mud-Dauber *Sceliphron destillatorium*. The publication of an enlarged and revised version of the present study with incorporation of all the new results from the literature having appeared since 2001 as well as additional material from unpublished information and review of collections will follow as soon as I have managed to work through the pile of documents containing new data on the distribution of the Mud-Dauber *Sceliphron destillatorium*, as soon as I have received sufficient and satisfactory feedback on all my requests for contribution of information, and as soon as I have succeeded in actualization of the suite of distribution maps which are presented here in the status of 2001 by implementation of the new localities having been confirmed since 2001.

2 Literature Review of Localities of Occurrence of *Sceliphron destillatorium* in Poland and Surrounding Countries

The literature review of the distribution of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland and surrounding countries focusses on the localities of its occurrence in Poland, Ukraina, Russia, Kazakhstan, Uzbekistan, Turkmenistan, Tadzikistan, Azerbajdzhan, Georgia, Slovakia, Czechia, Austria, Hungary, Romania, Croatia, Serbia, Bosna-Hercegovina, Makedonia, Slovenia, Switzerland and Germany. Comments are also offered on the synanthropical behaviour of the Mud-Dauber *Sceliphron destillatorium*, and a compilation of the reported flower visits as well as the cleptoparasites and renters of the Mud-Dauber *Sceliphron destillatorium* is also established. Only published localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* are included in this section, whereas specimens of the Mud-Dauber *Sceliphron destillatorium* in collections that have up to now not been documented in the literature are contained in the following section.

2.1 Localities of Occurrence of *Sceliphron destillatorium* in Poland

Concerning the localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland, distinction is made between 12 localities having been confirmed up to 2000 and 79 additional localities having been found after 2000. Together with the 5 localities where I have discovered mason nests in 2000 which are contained in the section on description of mason nests, in total 17 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland have been known up to 2000, whereas in total 96 localities of occurrence have been recorded up to 2013. All the localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* are situated exclusively in the southeastern part of Poland.

2.1.1 Localities Confirmed in the Southeastern Part of Poland up to 2000

Up to 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland has been confirmed only at in total 12 scattered localities in the southeastern part of Poland, whereas up to 2000, the Mud-Dauber *Sceliphron destillatorium* has not been found in the southwestern part of Poland at all. The 12

localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland which have been found up to 2000 are distributed in the Bieszczady Mountains, in the Beskid Mountains and their foreland, and in the Vistula valley and its vicinity. Together with the 5 localities in the Beskid Mountains and their foreland, in the Vistula valley and its vicinity, and in the San valley and its vicinity where I have discovered mason nests in 2000 which are contained in the section on description of mason nests, in total 17 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland have been known up to 2000. A statistical evaluation of the distribution of the 17 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland up to 2000 is also given.

2.1.1.1 Localities in the Vistula Valley and its Vicinity up to 2000

Up to 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Vistula valley and its vicinity by captures of living specimens or discoveries of dead specimens in Czesławice westnorthwest of Lublin in 1962 by ANASIEWICZ (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985). The specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured by ANASIEWICZ in Czesławice westnorthwest of Lublin in 1962 (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) is kept in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America (PULAWSKI, personal communication 2013).

2.1.1.2 Localities in the Bieszczady Mountains up to 2000

Up to 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Bieszczady Mountains by captures of living specimens or discoveries of dead specimens in Łubne westnorthwest of Ustrzyki Górne southsouthwest of Przemyśl in 1962 by SZUJECKI (PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985), in Ustrzyki Dolne southsouthwest of Przemyśl in 1973 by SOSZYNSKI (SOSZYNSKI & SOSZYNSKI 1985) and in 2000 by WISNIOWSKI (WISNIOWSKI 2000; WISNIOWSKI to CELARY, personal communication 2000), in Ustrzyki Górne southsouthwest of Przemyśl in 1968 by SOSZYNSKI (SOSZYNSKI & SOSZYNSKI 1985), in Wetlina westnorthwest of Ustrzyki Górne southsouthwest of Przemyśl in 1968 by SLIWINSKI (SOSZYNSKI & SOSZYNSKI 1985) and in 2000 by WISNIOWSKI (WISNIOWSKI 2000; WISNIOWSKI to CELARY, personal communication 2000), in Mików westnorthwest of Ustrzyki Górne southsouthwest of Przemyśl in 1994 by KURZAWA (KURZAWA to SOSZYNSKI, personal communication 2001), in Nasiczne northnorthwest of Ustrzyki Górne southsouthwest of Przemyśl in 1999 by PALACZYK (PALACZYK in WISNIOWSKI 2000; PALACZYK to SOSZYNSKI, personal communication 2001), in Berehy Górne northwest of Ustrzyki Górne southsouthwest of Przemyśl in 2000 by WISNIOWSKI (WISNIOWSKI 2000), and in Suche Rzeki southwest of Zatwarnica northnorthwest of Ustrzyki Górne southsouthwest of Przemyśl in 2000 by PALACZYK (PALACZYK in WISNIOWSKI 2000; PALACZYK to SOSZYNSKI, personal communication 2001).

Up to 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Bieszczady Mountains by observations of mason nests in Wetlina-Moczarne southsouthwest of Przemyśl in 2000 by WISNIOWSKI (WISNIOWSKI 2000; WISNIOWSKI to CELARY, personal communication 2000), and in Mików westnorthwest of Ustrzyki Górne southsouthwest of Przemyśl in 1994 by KURZAWA (KURZAWA to SOSZYNSKI, personal communication 2001).

The specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured by SZUJECKI in Łubne westnorthwest of Ustrzyki Górne southsouthwest of Przemyśl in 1962 (PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) is probably the specimen of the Mud-Dauber *Sceliphron destillatorium* from the Bieszczady Mountains that is kept in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America (PULAWSKI, personal communication 2013).

2.1.1.3 Localities in the Beskid Mountains and their Foreland up to 2000

Up to 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Beskid Mountains and their foreland by captures of living specimens or discoveries of dead specimens in Ropa east of Nowy Sącz in 1996 by CELARY (CELARY 1996), in Szymbark east of Nowy Sącz in 1994 and 1995 by CELARY (CELARY 1996), and in Muszyna south-southwest of Krynica southsoutheast of Nowy Sącz in 1998 by CELARY (CELARY 1998).

Up to 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Beskid Mountains and their foreland by observations of mason nests in Ropa east of Nowy Sącz in 1996 by CELARY (CELARY 1996, personal communication 2000).

2.1.1.4 Statistical Evaluation of the Distribution of the Localities up to 2000

According to the captures of living specimens, discoveries of dead specimens and observations of mason nests which probably have been at least in parts accidental, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has up to 2000 only been verified at 12 localities which include 8 localities in the Bieszczady Mountains, 3 localities in the Beskid Mountains and their foreland, and 1 locality in the Vistula valley and its vicinity. Together with the 5 localities where I have found mason nests in 2000 which are contained in the section on description of mason nests and that include 3 localities in the Beskid Mountains and their foreland, 1 locality in the Vistula valley and its vicinity, and 1 locality in the San valley and its vicinity, in total 17 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland have been known up to 2000 that include 8 localities in the Bieszczady Mountains, 6 localities in the Beskid Mountains and their foreland, 2 localities in the Vistula valley and its vicinity, and 1 locality in the San valley and its vicinity.

The first record of the Mud-Dauber *Sceliphron destillatorium* in Poland has been signaled from Czesławice westnorthwest of Lublin where it has been encountered by ANASIEWICZ in 1962 (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985), and before this discovery, the Mud-Dauber *Sceliphron destillatorium* has been completely unknown in Poland (NOSKIEWICZ & PUŁAWSKI 1960; PULAWSKI, personal communication 2013). The specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured by ANASIEWICZ in Czesławice westnorthwest of Lublin in the Vistula valley and its vicinity in 1962 (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) and probably also the specimen of the Mud-Dauber *Sceliphron destillatorium* that has been captured by SZUJECKI in Łubne westnorthwest of Ustrzyki Górne southsouthwest of Przemyśl in the Bieszczady Mountains in 1962 (PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) are kept in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America (PULAWSKI, personal communication 2013). In the southwestern part of Poland, the Mud-Dauber *Sceliphron destillatorium* has not been encountered at all up to 2000. The occurrence of the Mud-Dauber *Sceliphron destillatorium* at a few localities in the southeastern part of Poland has also been mentioned by WISNIOWSKI (2004).

2.1.2 Localities Confirmed in the Southeastern Part of Poland after 2000

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland has been confirmed at 79 additional localities in the southeastern part of Poland, whereas the Mud-Dauber *Sceliphron destillatorium* has still not been noticed in the southwestern part of Poland. The 79 additional localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland which have been found after 2000 are distributed in the Bieszczady Mountains, in the Beskid Mountains and their foreland, in the Vistula valley and its vicinity, in the San valley and its vicinity, in the Pilica valley

and its vicinity, and in the Nida valley and its vicinity. A statistical evaluation of the distribution of the 79 additional localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland after 2000 and the in total 96 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland up to 2013 is also given.

2.1.2.1 Localities in the Bieszczady Mountains after 2000

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Bieszczady Mountains by captures of living specimens or discoveries of dead specimens in Łupków southsouthwest of Sanok in 2003 by BURY (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009), and in Lutowiska southsoutheast of Ustrzyki Dolne in 2011 by BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Bieszczady Mountains by observations of mason nests in Chrewt at the southeastern margin of Lake Solina southsouthwest of Ustrzyki Dolne in 2003 (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Lutowiska southsoutheast of Ustrzyki Dolne in 2010 by HEBDA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Mchawa northnorthwest of Baligród southwest of Ustrzyki Dolne in 2011 by ŁABAJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

2.1.2.2 Localities in the Beskid Mountains and their Foreland after 2000

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Beskid Mountains and their foreland by captures of living specimens or discoveries of dead specimens in Zydowskie in the Magura National Park southsouthwest of Nowy Zmigród southwest of Krosno in 2010 by SERAFIN (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Dukla southsouthwest of Krosno in 2003 by ZATOR (KOSIBOWICZ 2009), in Głojsce westnorthwest of Dukla southsouthwest of Krosno in 2001 by SZCZUREK (KOSIBOWICZ 2009), in Teodorówka westnorthwest of Dukla southsouthwest of Krosno in 2003 by ZATOR (KOSIBOWICZ 2009), in Zboiska northnortheast of Dukla southsouthwest of Krosno in 2003 by ZATOR (KOSIBOWICZ 2009), in Wietrzno northnortheast of Dukla southsouthwest of Krosno in 2012 by KOSIBOWICZ (KOSIBOWICZ, personal communication 2013), in Targowiska eastnortheast of Miejsce Piastowe southsoutheast of Krosno in 2009 (unpublished information reported to CELARY, personal communication 2013), in Rymanów southeast of Krosno in 2011 by MATEUSIAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Biecz northeast of Gorlice west of Krosno in 2007 (unpublished information reported to CELARY, personal communication 2013), in Biała Nizna northeast of Grybów east of Nowy Sącz in 2011 by BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Pogórze Ciężkowickie near Ciężkowice northeast of Nowy Sącz in 2007 (MLYNARSKI to CELARY, personal communication 2013), in Lubień south of Myślenice south of Cracow (unpublished information reported to CELARY, personal communication 2013), in Zywiec southwest of Cracow in 2011 by JAROSIEWICZ (JAROSIEWICZ 2012), in Sopotnia Wielka southsoutheast of Zywiec southwest of Cracow in 2011 by DYBAŁ (KOSIBOWICZ, personal communication 2013), and in Czerwienne northnorthwest of Zakopane south of Cracow in 2003 by LACH (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Beskid Mountains and their foreland by observations of mason nests in Pielgrzymka near Osiek Jasielski northwest of Nowy Zmigród southwest of Krosno in 2010 by FELENCZAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Zydowskie in the Magura National Park southsouthwest of Nowy Zmigród southwest of Krosno in 2010 by SERAFIN (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Rymanów southeast of Krosno in 2011 by MATEUSIAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Zyznów southsoutheast of Strzyzów northnortheast of Krosno in 2009 by SZURLEJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Lubla southsouthwest of Frysztak northwest of Krosno in 2010 by ZIELINSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Biała Nizna northeast of Grybów east of Nowy Sącz in 2011 by WIDLAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Kalwaria Zebrzydowska southsouthwest of Cracow in 2011 by BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

2.1.2.3 Localities in the Vistula Valley and its Vicinity after 2000

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Vistula valley and its vicinity by captures of living specimens or discoveries of dead specimens in Swidnik southeast of Lublin in 2011 by KOCIK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Wilcza Wola southwest of Bojanów southsoutheast of Tarnobrzeg in 2010 by KOŁODZIEJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Zabno westsouthwest of Dąbrowa Tarnowska northnorthwest of Tarnów in 2010 by DYDYNSKI & BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Siedlanka east of Mielec northeast of Tarnów in 2010 by BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Niwiska southeast of Mielec northeast of Tarnów in 2010 by JEMIOŁO (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Ocieka southsoutheast of Mielec northeast of Tarnów in 2010 by JEMIOŁO (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Wozniczna south of Tarnów in 2010 by KOCIK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Łagiewniki at the southern margin of Cracow in 2008 by KOSIBOWICZ & AMBROZY (KOZIBOWICZ 2009), in Ojców north of Cracow in 2005 by SUCHANEK (WISNIOWSKI 2007) and in 2009 by PALACZYK & KLASA (PALACZYK & KLASA to CELARY, personal communication 2009), in Młoszowa southeast of Trzebinia westnorthwest of Cracow in 2011 by CELADYN (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Kamionka Mała southsoutheast of Bochnia eastsoutheast of Cracow in 2008 by WIDLAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Tymowa southeast of Bochnia eastsoutheast of Cracow in 2010 by FIDZINSKA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Buczyna southwest of Bochnia eastsoutheast of Cracow in 2010 by JOZEFCZYK (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Vistula valley and its vicinity by observations of mason nests in Czajkowa northnortheast of Mielec northeast of Tarnów in 2010 by WRONA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Tymowa southeast of Bochnia eastsoutheast of Cracow in 2010 by FIDZINSKA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Janowice southsoutheast of Sobionowice westsouthwest of Wieliczka southeast of Cracow in 2011 by BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

In contrast to the record of the Mud-Dauber *Sceliphron destillatorium* in Ojców north of Cracow in 2005 by SUCHANEK (WISNIOWSKI 2007), it has obviously not yet been encountered in Ojców during the study of hymenoptera in the region from 1990 to 2000, because it is not mentioned in WISNIOWSKI (2002).

2.1.2.4 Localities in the San Valley and its Vicinity after 2000

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the San valley and its vicinity by captures of living specimens or discoveries of dead specimens in Końskie near Brzozów and Dydnia northnorthwest to north of Sanok in 2002 and 2003 by NAWROCKI (KOSIBOWICZ 2009) and in 2009 (unpublished information reported to CELARY, personal communication 2013; in Rozpucie northeast of Tyrawa eastnortheast of Sanok in 2009, 2010 and 2011 by BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012); in Pakoszówka northwest of Sanok in 2008 by MASŁOWSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Bazanówka westsouthwest of Pakoszówka northwest of Sanok in 2010 by PLAZA & BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Zagórz southeast of Sanok in 2010 by SZMIŁYK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Uherce Mineralny southeast of Sanok in 2011 by ŁABAJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Posada Zarszyńska southsouthwest of Zarszyn west of Sanok in 2010 by LESNIAK & BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Srogów Górny northwest of Sanok since at least 2000 by RYBA (personal communication 2013), in Zurawica northeast of Przemyśl in 2003 by BURY (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009), in Dybków eastsoutheast of Sieniawa southeast of Lezajsk eastnortheast of Rzeszów in 2010 by MIKULSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Rudka near Sieniawa southeast of Lezajsk eastnortheast of Rzeszów in 2010 by SZKAMRUK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Markowa east of Rzeszów in 2008 by BURY (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009), in Głogów Małopolski northnorthwest of Rzeszów since 2008 by SUDOŁ (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; SUDOŁ, personal communication 2013), in Rudnik southeast of Nisko northnortheast of Rzeszów in 2008 by ZASTAWNY (BURY,

SUDOŁ, ZIĘBA & ZYŁA 2009), in Krzeszów southeast of Rudnik southeast of Nisko northnortheast of Rzeszów from 2003 to 2007 by SERAFIN (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Koziarnia southsoutheast of Rudnik southeast of Nisko northnortheast of Rzeszów in 2010 by SOWA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Turza near Sokołów Małopolski northnortheast of Rzeszów in 2010 by BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Lipnik westnorthwest of Kańczuga eastsoutheast of Rzeszów in 2010 by BURY (BURY, personal communication 2013), in Łopuszka Mała south of Kańczuga eastsoutheast of Rzeszów in 2010 by BURY (BURY, personal communication 2013), in Husów eastsoutheast of Rzeszów in 2011 by BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Bachórz northeast of Dynów southeast of Rzeszów in 2010 by BURY (BURY, personal communication 2013), in Tomaszów Lubelski southsoutheast of Zamość in 2009 by ZIĘBA (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009), in Antoniówka eastsoutheast of Zamość in 2012 by JAROSIEWICZ (JAROSIEWICZ, personal communication 2013), in Józefów southsouthwest of Zamość in 2009 by ZIĘBA (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009), in Wola Mała eastnortheast of Biłgoraj southwest of Zamość in 2009 by SZWED (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; SZWED, personal communication 2013), and in Tarnów in 2009 by PANEK (BURY, SUDOŁ, ZIE, BA & ZYŁA 2009).

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the San valley and its vicinity by observations of mason nests in Dybków eastsoutheast of Sieniawa southeast of Lezajsk eastnortheast of Rzeszów in 2006 and 2010 by MIKULSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012) and in 2013 by BURY (BURY, personal communication 2013), in Cieplice north of Sieniawa southeast of Lezajsk eastnortheast of Rzeszów in 2009 and 2010 by STARZAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Zmysłówka near Lezajsk eastnortheast of Rzeszów in 2011 by KASPRZAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Markowa east of Rzeszów in 2009 by BURY (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BURY, personal communication 2013), in Przeworsk eastnortheast of Rzeszów in 2013 by BURY (BURY, personal communication 2013), in Dębów near Przeworsk eastnortheast of Rzeszów in 2013 by BURY (BURY, personal communication 2013), in Pocyrchle near Nowa Sarzyna northnorthwest of Lezajsk northeast of Rzeszów in 2010 by SOWA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Wola Mała eastnortheast of Biłgoraj southwest of Zamość in 2009 by SZWED (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; SZWED, personal communication 2013), in Lubaczów northnortheast of Przemyśl since 2010 by BURY (BURY, personal communication 2013), in Stary Oleszyce west of Oleszyce westnorthwest of Lubaczów northnortheast of Przemyśl in 2013 by BURY (BURY, personal communication 2013), in Hermanowice southsoutheast of Przemyśl in 2010 by PŁOCICA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Krzeszów southeast of Rudnik southeast of Nisko northnortheast of Rzeszów from 2003 to 2007 by SERAFIN (BILANSKI, KOŁODZIEJ & PAJĄK 2012); in Rozpucie northeast of Tyrawa eastnortheast of Sanok in 2003, 2009, 2010 and 2011 by BILANSKI as well as in 2010 by NITKA (BILANSKI, KOŁODZIEJ & PAJĄK 2012); in Uherce Mineralny southeast of Sanok in 2011 by ŁABAJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Bazanówka westsouthwest of Pakoszówka northwest of Sanok in 2010 by PLAZA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Srogów Górny northwest of Sanok since at least 2000 by RYBA (personal communication 2013), in Zurawica northeast of Przemyśl in 2013 by BURY (BURY, personal communication 2013), in Husów eastsoutheast of Rzeszów in 2010 by WRONA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Koziarnia southsoutheast of Rudnik southeast of Nisko northnortheast of Rzeszów in 2010 by SOWA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Turza near Sokołów Małopolski northnortheast of Rzeszów in 2009 and 2010 by BILANSKI & KOŁODZIEJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Posada Zarszyńska southsouthwest of Zarszyn west of Sanok in 2010 by LESNIAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

2.1.2.5 Localities in the Pilica Valley and its Vicinity after 2000

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Pilica valley and its vicinity by captures of living specimens or discoveries of dead specimens in Inowłódz east of Tomaszów Mazowiecki southeast of Łódż in 2008 by KOWALCZYK & SOSZYNSKI (KOWALCZYK, KURZAC & SOSZYNSKI 2009), and in Okołowice north of Koniecpol east of Częstochowa in 2010 by MIELCZAREK (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of

Poland has been confirmed in the Pilica valley and its vicinity by observations of mason nests in Orzechówka southeast of Strzalków southeast of Radomsko northeast of Częstochowa in 2010 by MORAJKO (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

2.1.2.6 Localities in the Nida Valley and its Vicinity after 2000

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has been confirmed in the Nida valley and its vicinity by captures of living specimens or discoveries of dead specimens in Cisów southeast of Daleszyce southeast of Kielce in 2011 by MIELCZAREK & NOWAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Skowronno northeast of Pinczów south of Kielce in 2012 by CELARY (CELARY, personal communication 2013), in Chotel Czerwony (Przęślin reserve) northnortheast of Wiślica southsoutheast of Pinczów south of Kielce in 2012 by CELARY (CELARY, personal communication 2013), and in Krzyzanowice southsoutheast of Pinczów south of Kielce in 2012 by CELARY (CELARY, personal communication 2013).

2.1.2.7 Statistical Evaluation of the Distribution of the Localities after 2000

According to the captures of living specimens, discoveries of dead specimens and observations of mason nests which probably have been at least in parts accidental, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has after 2000 been verified at 79 additional localities which include 4 localities in the Bieszczady Mountains, 19 localities in the Beskid Mountains and their foreland, 15 localities in the Vistula valley and its vicinity, 34 localities in the San valley and its vicinity, 3 localities in the Pilica valley and its vicinity, and 4 localities in the Nida valley and its vicinity. Together with the 5 localities where I have found mason nests in 2000 which are contained in the section on description of mason nests, in total 17 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland have been known up to 2000, whereas in total 96 localities of occurrence have been recorded up to 2013 that include 12 localities in the Bieszczady Mountains, 25 localities in the Beskid Mountains and their foreland, 17 localities in the Vistula valley and its vicinity, 35 localities in the San valley and its vicinity, 3 localities in the Pilica valley and its vicinity, and 4 localities in the Nida valley and its vicinity.

An observation of the Palaearctic Mud-Dauber *Sceliphron destillatorium* even in Mokotów in the central part of Warsaw in the Vistula valley in Poland in 2008 (unpublished information reported to CELARY, personal communication 2013) in abt. 52.25 degrees northern latitude requires still confirmation, because a confusion with the Oriental Mud-Dauber *Sceliphron curvatum* could not be completely excluded, similarly as apparent records of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in Wrocław in the Odra valley in Lower Silesia and in Knurów close to the Odra valley south of Gliwice west of Katowice in Upper Silesia in Poland in 2012 (unpublished information reported to KOSIBOWICZ, personal communication 2013) have turned out as having been erroneous and have in fact represented registrations of the Oriental Mud-Dauber *Sceliphron curvatum* (KOSIBOWICZ, personal communication 2013). It is, however, possible that the Palaearctic Mud-Dauber *Sceliphron destillatorium* has already reached Warsaw in Poland in abt. 52.25 degrees northern latitude by successive wandering along the Vistula valley in downstream direction from its recorded occurrences in Tarnów and north of Tarnów in the Dunajec valley as well as around Mielec and north of Mielec in the Wisłoka valley which are all situated close to the terminations of the valleys of both tributaries into the Vistula valley, because in the eastwards adjacent Belarus, the Palaearctic Mud-Dauber *Sceliphron destillatorium* has been encountered in Pinsk east of Brest in the Prypjat valley (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013) in abt. 52.125 degrees northern latitude that is located still abt. 100 km farther northwards than Czesławice westnorthwest of Lublin and Swidnik southeast of Lublin as well as still abt. 70 km farther northwards than Inowłódz east of Tomaszów Mazowiecki. The Palaearctic Mud-Dauber *Sceliphron destillatorium* could also have arrived in Warsaw by wandering from the Black Sea along the Dnepr valley in upstream direction beyond Kijiv and then farther along the Prypjat valley northnorthwest of Kijiv in upstream direction beyond Pinsk and beyond the source region of the Prypjat east of Lublin from where it could have bridged into the San valley west of Lublin and could then have migrated along the Vistula valley in downstream direction to Warsaw.

2.2 Localities of Occurrence of *Sceliphron destillatorium* in Ukraina

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Ukraina has been confirmed at various localities in the western, southern and eastern parts of Ukraina.

2.2.1 Localities in the Western Part of Ukraina

In the western part of Ukraina, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has already been verified in Lviv (formerly Lwów or Lemberg) abt. 100 km east of Przemyśl in 1862 (SCHMIDT-GOEBEL 1876), in Volcynec (formerly Wołczyniec; Vovchynec in CELARY 1996) northeast of Ivano-Frankivsk (formerly Stanisławów; Ivan-Franko in CELARY 1996) abt. 175 km southeast of Przemyśl and abt. 100 km southsoutheast of Lviv before 1868 (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930, KUNTZE 1939), in Kamjanec-Podilskyj (formerly Kamieniec Podolski) abt. 225 km southeast of Lviv before 1853 (BELKE 1853, 1858 a, 1859), and in Skala-Podilska (formerly Skała; Skala-Podolskaya in CELARY 1996) northwest of Kamjanec-Podilskyj abt. 190 km southeast of Lviv before 1874 (WIERZEJSKI 1874, KINEL & NOSKIEWICZ 1930). Lviv is situated in the source regions of the creeks Scyrec, Zubrja, Davydivka and Bibrka which are all tributaries of the Dnestr; Volcynec is located in the Bystrycja valley close to its termination into the Dnestr valley, Kamjanec-Podilskyj is situated in the Smotryc valley close to its mouth into the Dnestr valley, and Skala-Podilska is located in the Zbruc valley that also tributes to the Dnestr valley.

In the Dnestr valley and its surroundings between Ivano-Frankivsk and Kamjanec-Podilskyj southeast of Lviv, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has also been confirmed in Ustecko (formerly Uścieczko; Ustechko in CELARY 1996) northnortheast of Horodenka eastsoutheast of Ivano-Frankivsk in the Dnestr valley before 1927 (KINEL & NOSKIEWICZ 1930), in Nyrkiv (formerly Czerwonogród) northnortheast of Horodenka eastsoutheast of Ivano-Frankivsk in the Dzurin valley close to its termination into the Dnestr valley before 1938 (KUNTZE & NOSKIEWICZ 1938), in Zaliscyky (formerly Zaleszczyki; Zaleshchiki in CELARY 1996) eastsoutheast of Horodenka eastsoutheast of Ivano-Frankivsk in the Dnestr valley before 1927 (KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), in Bilce-Zolote (formerly Bilcze) northeast of Horodenka eastsoutheast of Ivano-Frankivsk in the Seret valley close to its mouth into the Dnestr valley before 1938 (KUNTZE & NOSKIEWICZ 1938), in Sinkiv (formerly Sinków; Sinkov in CELARY 1996) eastsoutheast of Horodenka eastsoutheast of Ivano-Frankivsk in the Dnestr valley before 1927 (KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), in Horosova (formerly Horoszowa) westsouthwest of Kamjanec-Podilskyj in the Dnestr valley before 1938 (KUNTZE & NOSKIEWICZ 1938), in Kryvce (formerly Krzywcze) west of Kamjanec-Podilskyj in the Niclava valley close to its termination into the Dnestr valley before 1938 (KUNTZE & NOSKIEWICZ 1938), in Melnycja-Podilska (formerly Mielnica; Melnitsa-Podolskaya in CELARY 1996) westsouthwest of Kamjanec-Podilskyj in the Dnestr valley before 1927 (KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), in Dzvenihorod (formerly Dżwinogród; Dzvenigorod in CELARY 1996) southwest of Kamjanec-Podilskyj in the Dnestr valley in 1869 (ŁOMNICKI 1870, KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), in Okopy (formerly Okopy Sw. Trójcy) southsouthwest of Kamjanec-Podilskyj at the mouth of the Zbruc valley into the Dnestr valley before 1938 (KUNTZE & NOSKIEWICZ 1938), and in Kalinovci (formerly Kalinowce; Kalinovce in CELARY 1996) in the Ceremos valley close to its termination into the Prut valley westnorthwest of Cernivci in the Bukovina southeast of Ivano-Frankivsk and southwest of Kamjanec-Podilskyj before 1868 (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930).

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in the western part of Ukraina has thus been verified up to 2000 at in total 15 localities in the Dnestr valley and its surroundings between Lviv and Kamjanec-Podilskyj. The presence of the Mud-Dauber *Sceliphron destillatorium* in the Dnestr valley in Podolia has also been reported by KUNTZE (1931 a, 1931 b), whereas NOSKIEWICZ (1922, 1934) has not mentioned the Mud-Dauber *Sceliphron destillatorium* in his reviews of the most important results of his hymenopterological research in Podolia. In other localities in the Dnestr valley and its surroundings between Ivano-Frankivsk and Kamjanec-Podilskyj southeast of Lviv where WIERZEJ-

SKI (1868, 1874), KINEL & NOSKIEWICZ (1930) and KUNTZE & NOSKIEWICZ (1938) have mentioned the occurrence of various other wasps and bees, however, the Mud-Dauber *Sceliphron destillatorium* has obviously not been recorded during the period of thorough collection and evaluation of finds by WIERZEJSKI (1868, 1874), KINEL & NOSKIEWICZ (1930) and KUNTZE & NOSKIEWICZ (1938). Similarly, ELLIGSEN (1998) has not encountered the Mud-Dauber *Sceliphron destillatorium* during his monitoring of bees and wasps in the Dnestr valley southwest of Sambir southwest of Lviv and southeast of Przemyśl.

In the southwestern corner of Ukraina near the boundaries to Slovakia and Hungary, the Mud-Dauber *Sceliphron destillatorium* has been encountered in Uzhorod before 1937 (VAVRA in ZAVADIL, SUSTERA & BATA 1937) and in Mukaceve eastsoutheast of Uzhorod before 1937 (GREGOR in ZAVADIL, SUSTERA & BATA 1937). At the western margin of the Black Sea in the western part of Ukraina near the boundary to Romania, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been noticed on the island Maliy Tataru in the Danube delta in the surroundings of Izmail southwest of Odessa in 2002 (PROTSENKO 2003).

2.2.2 Localities in the Southern Part of Ukraina

In the southern part of Ukraina at the northern margin of the Black Sea and its transition into the Azov Sea, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed on the Crimea peninsula in Ali-Pasa in 1898 (BULGAKOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Alkadar northnorthwest of Sevastopol southwest of Simferopol in 1904 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Alusta southeast of Simferopol before 1918 (KOHL 1918), at the Ayja point near Ajazma southsoutheast of Sevastopol southsouthwest of Simferopol in 2004 and 2007 (FATERYGA 2007; FATERYGA in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Bachcysaraj southwest of Simferopol in 1901 (SHORENKO, personal communication 2013) and 1910 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Balaklava near Sevastopol southwest of Simferopol in 1904 (SHORENKO 2005 a), in Bila Skelja (formerly Belaja Skala) north of Bilohirsk (formerly Belogorsk) eastnortheast of Simferopol in 1910 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), at the Catyrdah northwest of Alusta southeast of Simferopol in 1900 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012) and 1904 (SHORENKO 2005 a), at the Chersones point westsouthwest of Sevastopol southwest of Simferopol in 1912 and 1914 (PLIGINSKIJ in SHORENKO 2005 a; SHORENKO, personal communication 2013), in Chrebet Tepe-Oba near Feodosija eastsoutheast of Simferopol in 2002 (SHORENKO 2005 a), in Feodosija eastsoutheast of Simferopol in 1997 (SHORENKO 2005 a) as well as in 2007 and 2009 (SHORENKO in SHORENKO & KONOVALOV 2010), in Izobilnoe near Alusta southeast of Simferopol in 2007 (SHORENKO & KONOVALOV 2010), in Jalta southsoutheast of Simferopol since 1996 (FATERYGA in SHORENKO 2005 a; FATERYGA in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in the Jaltanskyj reserve westsouthwest of Jalta southsoutheast of Simferopol since 1996 (FATERYGA in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012); in Jevpatorija westnorthwest of Simferopol in 1898 (BIRULA in SHORENKO 2005 a), in 1920 and 1928 (SHORENKO, personal communication 2013), in 1997 (FATERYGA in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012) and in 2009 (SHORENKO & KONOVALOV 2010); in the Karadah reserve southwest of Feodosija eastsoutheast of Simferopol in 1989 and 2001 (IVANOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), between 1998 and 2004 (SHORENKO 2005 a, 2005 b) and in 2009 (SHORENKO in SHORENKO & KONOVALOV 2010); in Kerc eastnortheast of Simferopol in 1998 (GORDIENKO in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Kiparisnoe westsouthwest of Alusta southeast of Simferopol in 1899 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Kipcak on the Tarchankut peninsula northwest of Simferopol in 2003 and 2005 (FATERYGA in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012) as well as in 2012 (ZIDKOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), between Kipcak and Dzangulja on the Tarchankut peninsula northwest of Simferopol in 2007 (FATERYGA in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Krasnogorskoe westsouthwest of Bilohirsk (formerly Belogorsk) eastnortheast of Simferopol in 1899 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in the Lisja bay east of Sudak eastsoutheast of Simferopol in 2008 (FATERYGA in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Mysovoe north of Lenine northeast of Feodosija eastnortheast of Simferopol in 1972 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in the

Opuk reserve southsouthwest of Kerc eastnortheast of Simferopol in 2001 (SEMIK in SHORENKO 2005 a; SEMIK in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012) and 2010 (IVANOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Orlovka north of Sevastopol southwest of Simferopol in 2002 (FATERYGA in SHORENKO 2005 a; NAUMENKO in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Parkov in the Jalta reserve westsouthwest of Jalta southsoutheast of Simferopol in 2008 (IVANOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Recnoe west of Bachcysaraj southwest of Simferopol in 1980 (SERBATENKO in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), at the Saryc point southeast of Sevastopol southsouthwest of Simferopol in 1998 (IVANOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Sajtana near Kipcak on the Tarchankut peninsula northwest of Simferopol in 1897 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Samokhvalovo near Bachcysaraj southwest of Simferopol in 1901 (SHORENKO 2005 a); in Simeiz near Alupka south of Simferopol in 1849 (RYBAKOV in SHORENKO 2005 a), in 1899 (KUZNETSOVA in SHORENKO 2005 a) and in 1910 (CERNOVIN in SHORENKO 2005 a); in Simferopol in 1895, 1898, 1899, 1920, 1928, 1972 and 1999 (SHORENKO 2005 a; PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012); in Sudak southwest of Feodosija eastsoutheast of Simferopol in 1904 (GLAZUNOV in SHORENKO 2005 a; GLAZUNOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012) and 2005 (FATERYGA in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Vesele (formerly Veseloe) west of Sudak southwest of Feodosija eastsoutheast of Simferopol in 1992 (IVANOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Zolotoe northeast of Lenine northeast of Feodosija eastnortheast of Simferopol in 1999 (IVANOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), and in Zori Ukrainy in the Jalta reserve westsouthwest of Jalta southsoutheast of Simferopol in 2008 and 2010 (IVANOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012). In the neighbourhood of the Crimea peninsula, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has also been recorded on the Obyticna Kosa (formerly Obitocnaja Kosa) westsouthwest of Berdjansk in 1997 (GOROBCHISHIN 2004).

Nests of the Mud-Dauber *Sceliphron destillatorium* have been encountered on the Crimea peninsula at the Ayja point near Ajazma southsoutheast of Sevastopol southsouthwest of Simferopol in 2004 and 2007 (FATERYGA & KOVBLYUK 2013 a), in the vicinity of Dzankoj northnortheast of Simferopol in 1995 (ONCUROV 2000), in Gursuf eastnortheast of Jalta southsoutheast of Simferopol between 1997 and 2002 (FATERYGA, personal communication 2013), in Hvardijske northnorthwest of Simferopol between 1997 and 2002 (IVANOV & FATERYGA 2003; FATERYGA & KOVBLYUK 2013 a), in Jalta southsoutheast of Simferopol between 1997 and 2002 (IVANOV & FATERYGA 2003; FATERYGA in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012; FATERYGA & KOVBLYUK 2013 a), in the vicinity of Jalta southsoutheast of Simferopol between 1996 and 2011 (FATERYGA & KOVBLYUK 2013 a), in the Karadah reserve southwest of Feodosija eastsoutheast of Simferopol between 1997 and 2002 (IVANOV & FATERYGA 2003; FATERYGA & KOVBLYUK 2013 a), in Kipcak on the Tarchankut peninsula northwest of Simferopol between 1997 and 2002 (IVANOV & FATERYGA 2003; FATERYGA & KOVBLYUK 2013 a), in Kurortne northeast of Kerc eastnortheast of Simferopol between 1996 and 2011 (FATERYGA & KOVBLYUK 2013 a), in the Lisja bay in 2008 (FATERYGA in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012; FATERYGA & KOVBLYUK 2013 a), at the Martjan point southeast of Nikita eastnortheast of Jalta southsoutheast of Simferopol between 1996 and 2011 (FATERYGA & KOVBLYUK 2013 a), in the Opuk reserve southsouthwest of Kerc eastnortheast of Simferopol since 2001 (FATERYGA & KOVBLYUK 2013 a), in Orlovka north of Sevastopol southwest of Simferopol in 2002 (FATERYGA & KOVBLYUK 2013 a), and in Simferopol in 1972 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012) and between 1997 and 2002 (FATERYGA, personal communication 2013).

2.2.3 Localities in the Eastern Part of Ukraina

In the eastern part of Ukraina north of the Black Sea, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been verified in Charkiv eastsoutheast of Kijiv in the Donec valley before 1873 (BELECKIJ 1873, JAROSEVSKIJ 1881), in the Kaniv reserve south of Kaniv northwest of Cerkasy southsoutheast of Kijiv in the Dnepr valley in 1986 (GOROBCHISHIN 1996; VERVES in GOROBCHISHIN 2005) as well as in 1987 and 1993 (GOROBCHISHIN 2005), in Kijiv in the Dnepr valley in 2002 (GOROBCHISHIN 2005), in Kupjansk eastsoutheast of Charkiv in the Oskil valley which tributes to the

Donec valley in 1867 (IVANOV 1872), in Slovjansk southeast of Charkiv in the Donec valley before 1881 (JAROSEVSKIJ 1881), in Svitylnja eastnortheast of Brovary northeast of Kijiv near the termination of the Desna valley into the Dnepr valley in 1993 (GOROBCHISHIN 2005), and in Vakalavcina near Sumy northwest of Charkiv in the Psel valley which tributes to the Dnepr valley in 1992 (GOROBCHISHIN 2005). In the northern part of Ukraina, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been recorded in the Polesye (Poliskyj reserve) northwest of Korosten westnorthwest of Kijiv before 1996 (VOBLENKO, GOROBCHISHIN & NESTEROV 1996).

2.3 Localities of Occurrence of *Sceliphron destillatorium* in Russia

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Russia has been confirmed at various localities in the southern and northern regions of the southwestern part of Russia.

2.3.1 Localities in the Southern Region of the Southwestern Part of Russia

In Russia north and east of the Black Sea close to the eastern boundary of Ukraina, the Mud-Dauber *Sceliphron destillatorium* has been encountered in Novorossijsk westsouthwest of Krasnodar at the northeastern margin of the Black Sea before 1915 (STRAND 1915) and in 1939 (TARASEVIC in ROMANOVA 1969), in the Kuban valley east of the Black Sea probably between Karacajevsk south of Stavropol and Ekaterinodar eastnortheast of Novorossijsk before 1899 (RADDE 1899), in Krasnogorskaja north of Karacajevsk south of Stavropol in the Kuban valley in 1925 (ROMANOVA 1969), and in Valujki (formerly Walouiki) east of Charkiv in the Oskil valley north of the Black Sea before 1913 (VELITSCHKOVSKY & KOHL 1913, VELITSCHKOVSKY in KOHL 1918). The Oskil belongs to the tributary system of the Donec which terminates into the Don that reaches the Azov Sea near Rostov-on-Don. In Russia north of the Black Sea, the Mud-Dauber *Sceliphron destillatorium* has also been verified in Brjansk in the Desna valley which tributes to the Dnepr valley between Kijiv and Moskva between 1964 and 1973 (KOLESNIKOV 1977).

In Russia north of the Azov Sea that is an appendix to the Black Sea, the Mud-Dauber *Sceliphron destillatorium* has also been encountered in the regions of Rostov-on-Don and Voronez in the Don valley as well as in the region of Doneck in the Donec valley, and in Borisoglebsk eastsoutheast of Voronez between 1965 and 1967 (MINORANSKIJ, CHARCENKO & FOMICEV 1970; FOMICEV & MINORANSKIJ 1971, MINORANSKIJ 1971); in Novoazovsk westsouthwest of Rostov-on-Don at the coast of the Azov Sea, in Migulinsk northnortheast of Rostov-on-Don in the Don valley, in Efremovo-Stepanovka northnortheast of Doneck in the Donec valley, and in Mitjakinsk in the region around Rostov-on-Don and Doneck between 1965 and 1967 (MINORANSKIJ, CHARCENKO & FOMICEV 1970; MINORANSKIJ 1971; MINORANSKIJ & SHKURATOV 1996); in Nedvigovka west of Chaltyr westnorthwest of Rostov-on-Don in 1994 (MINORANSKIJ & SHKURATOV 1996); in Djakovo southsoutheast of Anthracyt east of Doneck in 1999, 2000 and 2002 (KONOVALOV in SHORENKO & KONOVALOV 2010); and in Gajdary near Zmiev southsoutheast of Charkiv in 2000 (SHORENKO in SHORENKO & KONOVALOV 2010).

In Russia north of the Caspian Sea, the Mud-Dauber *Sceliphron destillatorium* has also been encountered in Astrachan in the Volga delta, in Saratov in the Volga valley and in Orynbor (formerly Orenburg) in the Ural valley before 1848 (EVERSMANN 1848, 1849), with both the Volga and the Ural terminating into the Caspian Sea, and in Poim west of Penza northnorthwest of Saratov in 1915 (KERENSKIJ 1919). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Astrachan in the Volga delta has also been mentioned by BECKER (1866), MORAWITZ (1890) and KOHL (1918), and the Mud-Dauber *Sceliphron destillatorium* has also been found on the island Biruci (formerly Birutschi) in the Volga delta southeast of Astrachan in 1865 (BECKER 1866). The report of EVERSMANN (1848, 1849) of the presence of the Mud-Dauber *Sceliphron destillatorium* in the western foreland of the Ural Mountains

has also been cited by SCHENCK (1857) and TASCHENBERG (1869, 1884, 1929). The Mud-Dauber *Sceliphron destillatorium* does not only occur in the western foreland of the Ural Mountains or in the cis-Uralian regions, but also in the eastern foreland of the Ural Mountains or in the trans-Uralian regions (EVERSMANN 1849). In the Volga valley, the Mud-Dauber *Sceliphron destillatorium* has also been noticed in Volgograd (formerly Sarepta) before 1880 (BECKER 1880, STRAND 1915, EVERSMANN in KOHL 1918). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in the region of Volgograd has also been mentioned by MINORANSKIJ, CHARCENKO & FOMICEV (1970) and FOMICEV & MINORANSKIJ (1971).

On a similar geographical latitude as Brjansk and Penza, the Mud-Dauber *Sceliphron destillatorium* has also been verified in Cita (formerly Tschita) east of Lake Baikal in Russia before 1918 (KOHL 1918, NEMKOV 2008), and the Mud-Dauber *Sceliphron dimidiativentris* which has been collected around Nikolajevsk close to the mouth of the Amur valley into the Ochotsk Sea in Russia before 1859 (MOTSCHULSKY 1859) represents probably in fact also the Mud-Dauber *Sceliphron destillatorium*.

2.3.2 Localities in the Northern Region of the Southwestern Part of Russia

On a geographical latitude considerably farther north of Brjansk and Penza, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has even been signaled from Kazan northnorthwest of Samara (formerly Kujbysev) in the Volga valley (MINORANSKIJ, CHARCENKO & FOMICEV 1970; FOMICEV & MINORANSKIJ 1971, MINORANSKIJ 1971) which is supported by specimens of the Mud-Dauber *Sceliphron destillatorium* in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg that have been captured in Ufa eastnortheast of Samara and in the Dankov district in the Rjazan province southeast of Moscow in Russia (PESENKO to CELARY, personal communication 2001) as well as by specimens of the Mud-Dauber *Sceliphron destillatorium* in the collection of the University of Niznij Novgorod in Russia that have been captured in Niznij Novgorod in the Volga valley (MOKROUSOV 2000 a, 2000 b, 2003; MOKROUSOV, personal communication 2013) which are also located on a geographical latitude considerably farther north of Brjansk and Penza. In addition to the region of Niznij Novgorod eastnortheast of Moscow, the Mud-Dauber *Sceliphron destillatorium* has also been encountered in the regions of Vladimir westsouthwest of Niznij Novgorod, Tatarstan southeast of Kazan and Mordovia south of Niznij Novgorod (MOKROUSOV 2010).

In the area around Kazan and Niznij Novgorod eastnortheast of eastsoutheast of Moscow, the Mud-Dauber *Sceliphron destillatorium* has also been encountered (MOKROUSOV, personal communication 2013) in Hyrkasy in the vicinity of Cheboksary in Chuvashia westnorthwest of Kazan in 1985 (BEREZIN & KRASILNIKOV 1998, BEREZIN 2010), in Simkino in the vicinity of Bolshebereznikovo in Mordovia in 2007 (RUCHIN, ANTROPOV & SHIBAEV 2009), in Obrezki in the vicinity of Ichalki in Mordovia in 2008 (LOBACHEV in RUCHIN, ANTROPOV & SHIBAEV 2009), in Andreevka in the vicinity of Kovylkino in Mordovia in 2008 (LOBACHEV in RUCHIN, ANTROPOV & SHIBAEV 2009), in Temnikov in Mordovia in 2011 and 2012 (MOKROUSOV, RUCHIN & EGOROV 2013), in the vicinity of Kasimov southsouthwest of Niznij Novgorod (ANANEVA & KOCETKOV 2001, KOCETKOV 2001, NIKOLAEVA & ANANEVA 2011), in the vicinity of Spas-Klepiki in the region of Klepikov southsouthwest of Niznij Novgorod (ANANEVA, BABKINA, BLINUSOV, LOBOV, MAROCKINA, RYBCAK, TRUSICYNA & CELTSOV 2008; NIKOLAEVA & ANANEVA 2011), near the nouth of river Panika in the vicinity of Miloslavskij south of Rjazan in 2010 (NIKOLAEVA & ANANEVA 2011), in the vicinity of Rjazan (ANANEVA & KOCETKOV 2001, KOCETKOV 2001, NIKOLAEVA & ANANEVA 2011), in the vicinity of Shatsk in the region of Rjazan (ANANEVA & KOCETKOV 2001, KOCETKOV 2001; KAZAKOVA, KRIVTSOV, NAZAROV, IVANCEV, PRIKLONSKIY & SOBOLEV 2004; NIKOLAEVA & ANANEVA 2011), in the vicinity of Spassk-Rjazanskij in the region of Spasskij eastsoutheast of Rjazan (NIKOLAEVA & ANANEVA 2011), in the vicinity of Barykin Bor in the region of Spasskij eastsoutheast of Rjazan in 2009 and 2010 (NIKOLAEVA & ANANEVA 2011), in the vicinity of Papusheva in the region of Spasskij eastsoutheast of Rjazan in 2009 and 2010 (NIKOLAEVA & ANANEVA 2011), and in the vicinity of Kameshkovo west of Niznij Novgorod (MIHLIN 2008).

The Mud-Dauber *Sceliphron destillatorium* has also been found in the Mohilev province in Belarus

(ARNOLD 1902) and in Pinsk east of Brest in Belarus (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013). The Mud-Dauber *Sceliphron destillatorium* has also been discovered in southern Siberia in Russia (MINORANSKIJ, CHARCENKO & FOMICEV 1970; FOMICEV & MINORANSKIJ 1971, MINORANSKIJ 1971, ISLAMOV 1971). The presence of the Mud-Dauber *Sceliphron destillatorium* in Russia has also been mentioned by KINEL & NOSKIEWICZ (1930), and the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Belarus has also been indicated by SHLYAKHTENOK & SKIBINSKA (2002).

2.4 Localities of Occurrence of *Sceliphron destillatorium* in Kazakhstan

The Mud-Dauber *Sceliphron destillatorium* is also present up to considerable distances east, southeast and northeast of the Caspian Sea in Kazakhstan, Uzbekistan, Turkmenistan and Tadzikistan, and between the Black Sea in the west and the Caspian Sea in the east, the Mud-Dauber *Sceliphron destillatorium* is also distributed in Georgia. The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Kazakhstan has been confirmed at various localities in the southern, eastern, western and northern parts of Kazakhstan.

2.4.1 Localities in the Southern and Eastern Parts of Kazakhstan

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southern and eastern parts of Kazakhstan east, southeast and northeast of the Caspian Sea has been verified in Almaty (formerly Alma-Ata) since 1927, in Caryn northeast of Almaty since 1965, in Ile (formerly Ili) northnorthwest of Almaty since 1950, in Kyzylorda (formerly Ksyl-Orda) east of Lake Aral westnorthwest of Almaty before 1972, in Taldykorgan (formerly Taldy-Kurgan) northnortheast of Almaty already since 1967, and in Zarkent (formerly Panfilov) eastnortheast of Almaty since 1967 (KAZENAS 1972, 1998, 2002); and in Semirecje and Zajsan northeast of Almaty since before 1935 (GUSSAKOVSKIJ 1935; KAZENAS 1998, 2002). In the Ural valley which terminates into the Caspian Sea, the Mud-Dauber *Sceliphron destillatorium* has also been encountered in Atyrau (formerly Gurjev) and in Oral (formerly Uralsk), and south of the Ural valley, the Mud-Dauber *Sceliphron destillatorium* has also been found in Aktöbe (formerly Aktjubinsk) in Kazakhstan since before 1972 (KAZENAS 1972, 1998, 2002).

Other localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southern and eastern parts of Kazakhstan east, southeast and northeast of the Caspian Sea include Ajak-Kalkan eastnortheast of Almaty, Aksuat westnorthwest of Zajsan northeast of Almaty, Akzar northnorthwest of Almaty, Alatau (formerly Altaj) foreland southwest of Almaty, Bakanas northnorthwest of Almaty, Bolsenarymskoe north of Zajsan northeast of Almaty, Ciili eastsoutheast of Kyzylorda westnorthwest of Almaty, Eltay southeast of Symkent westsouthwest of Almaty, Ile (formerly Ili) river northnorthwest of Almaty, Kapsagaj northnortheast of Almaty, Kazaly (formerly Kazalinsk) westnorthwest of Kyzylorda westnorthwest of Almaty, Lenger southeast of Symkent westsouthwest of Almaty, Leninogorsk northnorthwest of Zajsan northeast of Almaty, Lepsi northnortheast of Taldykorgan northnortheast of Almaty, Serebrjansk northnorthwest of Zajsan northeast of Almaty, Suzak in the foreland of the Karatau eastsoutheast of Kyzylorda westnorthwest of Almaty, Talgar east of Almaty, Turgen east of Almaty, Uspenovka in the vicinity of Zambyl westsouthwest of Almaty, and Zambyl westsouthwest of Almaty where the Mud-Dauber *Sceliphron destillatorium* has been found before 1998 (KAZENAS 1998, 2002).

The occurrence of the Mud-Dauber *Sceliphron destillatorium* around Almaty has also been reported by KAZENAS & ESENBEKOVA (2001), the presence of the Mud-Dauber *Sceliphron destillatorium* in the Zailijskij Alatau southwest of Almaty has been signaled by KAZENAS (1971, 2008) and ESENBEKOVA (2001), and the distribution of the Mud-Dauber *Sceliphron destillatorium* in the Alatau (formerly Altaj) southwest of Almaty has also been contributed by NEMKOV (2008).

2.4.2 Localities in the Western and Northern Parts of Kazakhstan

Other localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the western and northern parts of Kazakhstan east, northeast and northwest of the Caspian Sea include Arkalyk westnorthwest of Karagandy, Bercogur southsoutheast of Aktöbe (formerly Aktjubinsk) southeast of Orynbor (formerly Orenburg), Derzavinsk westnorthwest of Karagandy, Emba river that terminates into the Caspian Sea southsouthwest of Aktöbe, Inderbor north of Atyrau westsouthwest of Aktöbe, Karaul westsouthwest of Karagandy, Kulsary east of Atyrau southsouthwest of Aktöbe, Mangistau (formerly Mangyslak) northeast of Aktau, Ryn-Peski southsouthwest of Oral (formerly Uralsk), Temir south of Aktöbe, Temirbastau, and Urda northnorthwest of Astrachan where the Mud-Dauber *Sceliphron destillatorium* has been found before 1998 (KAZENAS 1998, 2002). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Mangistau (formerly Mangyslak) northeast of Aktau has already been signaled by KAZENAS (1972).

2.5 Localities of Occurrence of *Sceliphron destillatorium* in Uzbekistan, Turkmenistan and Tadzikistan

The Mud-Dauber *Sceliphron destillatorium* is also present up to considerable distances east, southeast and northeast of the Caspian Sea in Uzbekistan, Turkmenistan and Tadzikistan.

2.5.1 Localities in Uzbekistan

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Uzbekistan has been verified in Aksakat northeast of Taskent in 1967 (ISLAMOV 1971, 1986), in Bogustan eastnortheast of Taskent in 1968 (ISLAMOV 1971, 1986), in Buchara westsouthwest of Taskent before 1918 (KOHL 1918), in Satkal (formerly Catkal) east of Taskent in 1967 (ISLAMOV 1971, 1986), in Taskent between 1968 and 1984 (ISLAMOV 1986), in Ugam northeast of Taskent between 1968 and 1984 (ISLAMOV 1986), and in Zysak (formerly Sidzak) northeast of Samarqand (formerly Samarkand) southwest of Taskent between 1968 and 1984 (ISLAMOV 1986).

2.5.2 Localities in Tadzikistan

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Tadzikistan has been recorded in Kuljab southeast of Dusanbe in 1933 (POPOV in GUSSAKOVSKIJ 1935) and in Gusar northwest of Dusanbe in 1930 (KUSNECOVA in GUSSAKOVSKIJ 1935).

2.5.3 Localities in Turkmenistan

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Turkmenistan has been confirmed in Asgabat (formerly Askhabad or Astrabad) before 1871 (RADOSZKOVSKY 1871, RADOSZKOWSKI 1886), in Dusak eastsoutheast of Asgabat in 1898 (KOKUJEV 1902), in Kerki southeast of Cardzev before 1918 (KOHL 1918); and in and around Asgabat, Akibay eastnortheast of Asgabat, Cardzev eastnortheast of Asgabat, Farab eastnortheast of Asgabat, Geok-Tepe westnorthwest of Asgabat, Janyk-Baci eastsoutheast of Asgabat, Mary eastsoutheast of Asgabat, Morgunovka east of Asgabat, Sajat eastnortheast of Asgabat, Tedzen eastsoutheast of Asgabat, and Taskepri eastsoutheast of Asgabat between 1958 and 1966 (MJARCEVA 1968); as well as along the Murgab river between Mary and Taskepri eastsoutheast of Asgabat before 1963 (MJARCEVA 1963, 1968) and along the Karakum channel east of As-

gabat before 1963 (MJARCEVA 1963).

The Mud-Dauber *Sceliphron destillatorium* has also been encountered still farther towards east, southeast and northeast beyond Uzbekistan, Turkmenistan and Tadzikistan where it has been recorded in China already before 1895 (SICKMANN 1895, GUSSAKOVSKY 1936, VECHT & BREUGEL 1968, TSUNEKI 1971, KAZENAS 1978; NEMKOV, KAZENAS, BUDRIS & ANTROPOV 1995) and in Mongolia already in 1895 (KOHL 1918, GUSSAKOVSKIJ 1935; MINORANSKIJ, CHARCENKO & FOMICEV 1970; FOMICEV & MINORANSKIJ 1971, MINORANSKIJ 1971, ISLAMOV 1971, KAZENAS 1978; NEMKOV, KAZENAS, BUDRIS & ANTROPOV 1995).

2.6 Localities of Occurrence of *Sceliphron destillatorium* in Azerbajdzhan and Georgia

The Mud-Dauber *Sceliphron destillatorium* is also present between the Black Sea in the west and the Caspian Sea in the east in Azerbajdzhan and Georgia.

2.6.1 Localities in Azerbajdzhan

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Azerbajdzhan between the Black Sea in the west and the Caspian Sea in the east has been verified in the Kura valley in Gence (formerly Elisabethpol, Jelisawetpol or Gjanza) and in Chanlar (formerly Helenendorf) in Azerbajdzhan northeast of Jerevan (formerly Eriwan) before 1918 (KOHL 1918).

2.6.2 Localities in Georgia

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Georgia between the Black Sea in the west and the Caspian Sea in the east has been recorded in Tbilisi (formerly Tiflis) in Georgia before 1918 (KOHL 1918).

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in the Caucasus between the Black Sea in the west and the Caspian Sea in the east has also been mentioned by MINORANSKIJ, CHARCENKO & FOMICEV (1970); FOMICEV & MINORANSKIJ (1971) and MINORANSKIJ (1971).

2.7 Localities of Occurrence of *Sceliphron destillatorium* in Slovakia

Concerning the localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia, distinction is made between 23 localities having been confirmed up to 2000 and 57 additional localities having been found after 2000, with therefore in total 80 localities having been recorded up to 2013.

2.7.1 Localities Confirmed in Slovakia up to 2000

Up to 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia has been confirmed only at in total 23 scattered localities. The 23 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia which have been found up to 2000 are distributed in the eastern, western and southern parts of Slovakia. A statistical evaluation of the distribution of the 23 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia up to 2000 is also given.

2.7.1.1 Localities in the Eastern Part of Slovakia up to 2000

In the eastern part of Slovakia south of Poland on the other side of the Carpathian Mountains, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has up to 2000 been confirmed in Roznava (formerly Rosenau or Rozsnyó) westsouthwest of Kosice (formerly Kaschau or Kassa) before 1878 (FRITSCH 1878, MOCSARY 1897), in Sobrance (formerly Szobráncz) east of Michalovce east of Kosice before 1875 (MOCSARY 1875, 1897), in Drahnov (formerly Deregnyö) southsoutheast of Michalovce east of Kosice before 1884 (PASZLAVSZKY 1884, MOCSARY 1897), in Malé Ozorovce (formerly Kisazar) westsouthwest of Michalovce east of Kosice before 1902 (CHYZER 1902, CHYZER in ZAVADIL 1934; CHYZER in ZAVADIL, SUSTERA & BATA 1937), in Snina northnortheast of Michalovce eastnortheast of Kosice in 1993 (SMETANA 1996; SMETANA in LUKAS, BOGUSCH & LISKA 2006), in Dolina Chotinka west of Stakcín eastnortheast of Humenné eastnortheast of Kosice in 1993 (SMETANA 1996; SMETANA in LUKAS, BOGUSCH & LISKA 2006), in Kamenany westsouthwest of Roznava westsouthwest of Kosice in 1931 (PFEFFER in ZAVADIL, SUSTERA & BATA 1937; PFEFFER in KOLUBAJIV 1938), in Turna na Bodva eastsoutheast of Roznava westsouthwest of Kosice in 1948 (BOUCEK in HOFFER 1954; BOUCEK in LUKAS, BOGUSCH & LISKA 2006), in Rhodyho at the southern margin of Bardejov north of Presov north of Kosice before 1988 (JASZAY & PANIGAJ 1988), at the Mirkovské skaly eastsoutheast of Mirkovce eastnortheast of Lemesany southsoutheast of Presov northnortheast of Kosice before 1988 (JASZAY & PANIGAJ 1988), and in Vinicky northnorthwest of Streda nad Bodrogom southeast of Kosice in 1985 (JASZAY & PANIGAJ 1988; JASZAY in LUKAS, BOGUSCH & LISKA 2006).

2.7.1.2 Localities in the Western Part of Slovakia up to 2000

In the western part of Slovakia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has up to 2000 been verified in Trencín (formerly Trencsén) northnortheast of Bratislava before 1897 (MOCSARY 1897) as well as in 2002 and 2004 (LUKAS in LUKAS, BOGUSCH & LISKA 2006), in Zlatovce northwest of Trencín northnortheast of Bratislava before 1937 (CEPELAK in ZAVADIL, SUSTERA & BATA 1937; CEPELAK in LUKAS, BOGUSCH & LISKA 2006), in U Devánov northnorthwest of Myjava westnorthwest of Nové Mesto nad Vahom westsouthwest of Trencín northnortheast of Bratislava before 1999 (DEVAN 1999), in Zabava near Horne Srnie northnortheast of Trencín northnortheast of Bratislava before 1999 (DEVAN 1999), in Chropov southeast of Skalica north of Bratislava before 1999 (DEVAN 1999); in Nitra eastnortheast of Bratislava before 1937 (PFLEGER in ZAVADIL, SUSTERA & BATA 1937), in 1938 (HOFFER & ZAVADIL in LUKAS, BOGUSCH & LISKA 2006) and in 2002 (FENDA in LUKAS, BOGUSCH & LISKA 2006); in Drazovce northwest of Nitra in 1991 (LUKAS 1991), in Dolné Stitáre northeast of Nitra in 1991 (LUKAS 1991), in the Zoborska forest steppe at Zobor northeast of Nitra before 1991 (LUKAS 1991), in Zvolen south of Banská Bystrica before 1993 (RANDUSKA 1993), and in Grún northwest of Rabca northeast of Martin northnorthwest of Banská Bystrica before 1999 (DEVAN 1999).

2.7.1.3 Localities in the Southern Part of Slovakia up to 2000

In the southern part of Slovakia in the Danube valley and its vicinity at the boundary between Slovakia and Hungary, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has up to 2000 been noticed in Stúrovo opposite of Esztergom northwest of Budapest in 1943 (HOFFER 1954) and in 1947 (POSPISIL in LUKAS, BOGUSCH & LISKA 2006), and in Parkan northeast of Stúrovo northwest of Budapest between 1937 and 1947 (BALTHASAR 1948).

2.7.1.4 Statistical Evaluation of the Distribution of the Localities up to 2000

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia has thus been verified up to 2000 at in total 23 localities which include 10 localities in the eastern part of Slovakia, 11 localities in the western part of Slovakia, and 2 localities in the southern part of Slovakia. The presence of the Mud-Dauber *Sceliphron destillatorium* at several localities in the southern part of Slovakia has also

been mentioned by BALTHASAR (1972) who has probably referred at least in part to the notes in MOCSARY (1897), ZAVADIL (1934); ZAVADIL, SUSTERA & BATA (1937); KOLUBAJIV (1938), BALTHASAR (1948) and HOFFER (1954). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia has also been stated by PADR (1989).

2.7.2 Localities Confirmed in Slovakia after 2000

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia has been confirmed at 57 additional localities. The 57 additional localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia which have been found after 2000 are distributed in the eastern, western and southern parts of Slovakia. Most of the 57 additional localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia that have been reported after 2000 have been discovered during revision of specimens in various collections which have already been captured before 2000 (LUKAS, BOGUSCH & LISKA 2006). A statistical evaluation of the distribution of the 57 additional localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia after 2000 and the in total 80 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia up to 2013 is also given.

2.7.2.1 Localities in the Eastern Part of Slovakia after 2000

In the eastern part of Slovakia south of Poland on the other side of the Carpathian Mountains, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has after 2000 been confirmed in Kosice (CEPELAK in LUKAS, BOGUSCH & LISKA 2006), in Dobsiná northeast of Roznava east of Kosice in 1994 (OLEJAR in LUKAS, BOGUSCH & LISKA 2006), in Trebisov eastsoutheast of Kosice in 2005 (DORICOVA in LUKAS, BOGUSCH & LISKA 2006), in Malá Tŕna southsouthwest of Trebisov eastsoutheast of Kosice in 1909 (collected by NAGY in Budapest), in Somotor southeast of Kosice in 1952 (KOCOUREK in LUKAS, BOGUSCH & LISKA 2006) and in 1988 (TYRNER in LUKAS, BOGUSCH & LISKA 2006), in Královský Chlmec southeast of Kosice since 1954 (BALTHASAR & STANEK in LUKAS, BOGUSCH & LISKA 2006), in Leles southeast of Kosice in 1990 (VEPREK in LUKAS, BOGUSCH & LISKA 2006), in Herlany northeast of Kosice in 1996 (JANSKY in LUKAS, BOGUSCH & LISKA 2006), in Humenné northeast of Kosice in 2000 (UHRIN in LUKAS, BOGUSCH & LISKA 2006), in Ulické Krivé eastnortheast of Humenné northeast of Kosice in 2005 (DVORAK in LUKAS, BOGUSCH & LISKA 2006), in Vihorlat east of Humenné northeast of Kosice in 1990 (CERNY in LUKAS, BOGUSCH & LISKA 2006), in Nová Sedlica northeast of Humenné northeast of Kosice in 1990 (CERNY in LUKAS, BOGUSCH & LISKA 2006), in Remetské Hámre eastnortheast of Michalovce eastnortheast of Kosice in 1987 (VEPREK in LUKAS, BOGUSCH & LISKA 2006), in Turnianské Podhradie eastsoutheast of Roznava westsouthwest of Kosice in 1991 (LUKAS in LUKAS, BOGUSCH & LISKA 2006), in Rakovnica west of Roznava westsouthwest of Kosice in 2002 (BOGUSCH in LUKAS, BOGUSCH & LISKA 2006), in Filakovo southwest of Rimavska Sobota westsouthwest of Kosice in 1938 (ZAVADIL in LUKAS, BOGUSCH & LISKA 2006), in Hajnacka southwest of Rimavska Sobota westsouthwest of Kosice in 1990 (VEPREK in LUKAS, BOGUSCH & LISKA 2006), in Silica south of Roznava westsouthwest of Kosice in 1997 (SMETANA in LUKAS, BOGUSCH & LISKA 2006), in Domica southsouthwest of Roznava westsouthwest of Kosice in 1952 (RUDOLF in LUKAS, BOGUSCH & LISKA 2006), in Plesivec southsouthwest of Roznava westsouthwest of Kosice in 1949 (BALTHASAR in LUKAS, BOGUSCH & LISKA 2006), in Seleska eastnortheast of Moldava southwest of Kosice in 1947 (ZAVADIL in LUKAS, BOGUSCH & LISKA 2006), in Bardejov north of Presov north of Kosice in 1973 (JASZAY in LUKAS, BOGUSCH & LISKA 2006), in Nizný Orlík northwest of Svidník eastnortheast of Bardejov north of Kosice in 2004 (KAUTMAN in LUKAS, BOGUSCH & LISKA 2006), in Dlhona north of Svidník eastnortheast of Bardejov north of Kosice in 2003 (PANIGAJ 2003), in Vysná Pisaná northnortheast of Svidník eastnortheast of Bardejov north of Kosice in 2003 (PANIGAJ 2003), and in Lucenec southeast of Zvolen south of Banská Bystrica in 2004 (JANSKY in LUKAS, BOGUSCH & LISKA 2006).

2.7.2.2 Localities in the Western Part of Slovakia after 2000

In the western part of Slovakia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has after

2000 been verified in Opatová northeast of Trencín northnortheast of Bratislava in 2004 (LISKA in LUKAS, BOGUSCH & LISKA 2006), in Trnava northeast of Bratislava in 1989 (DRDULOVA in LUKAS, BOGUSCH & LISKA 2006), in Kamenný Mlyn west of Trnava northeast of Bratislava in 1997 (ALAYO in LUKAS, BOGUSCH & LISKA 2006), in Sedlisko near Soros northnortheast of Hlohovec northeast of Trnava northeast of Bratislava in 2002 (LUKAS in LUKAS, BOGUSCH & LISKA 2006), in Moravský Jan northnorthwest of Bratislava in 2002 (LUKAS in LUKAS, BOGUSCH & LISKA 2006), in Mana northnortheast of Nové Zámky southsoutheast of Nitra in 2003 (SMETANA in LUKAS, BOGUSCH & LISKA 2006), in Uhlisko near Banská Bystrica in 2000 (FRANC in LUKAS, BOGUSCH & LISKA 2006), in Záturcie near Martin northnorthwest of Banská Bystrica in 1987 (STRAKA in LUKAS, BOGUSCH & LISKA 2006), in Banská Stiavnica southsoutheast of Banská Bystrica in 2001 (LUKAS in LUKAS, BOGUSCH & LISKA 2006), in Levice eastsoutheast of Nitra in 1983 and 1984 (SMETANA in LUKAS, BOGUSCH & LISKA 2006), in Kalvária at the western margin of Levice eastsoutheast of Nitra in 1984 (SMETANA in LUKAS, BOGUSCH & LISKA 2006), in Rybníky at the southern margin of Levice eastsoutheast of Nitra in 1993 (KOLLAR in LUKAS, BOGUSCH & LISKA 2006), in Bátovce northeast of Levice east of Nitra in 2003 (BATOVSKY in LUKAS, BOGUSCH & LISKA 2006), at the Zabia hora near Bohunický Roháč northeast of Bohunice northnortheast of Bátovce northeast of Levice east of Nitra in 1997 (BATOVSKY in LUKAS, BOGUSCH & LISKA 2006), in Jablonovce northnortheast of Levice east of Nitra in 1996 (SMETANA in LUKAS, BOGUSCH & LISKA 2006), in Velká Vápenná westnorthwest of Levice east of Nitra in 1986 (SMETANA in LUKAS, BOGUSCH & LISKA 2006), and in Rokos west of Diviaky nad Nitricou west of Prievidza northnortheast of Nitra in 1982 (LUKAS in LUKAS, BOGUSCH & LISKA 2006).

2.7.2.3 Localities in the Southern Part of Slovakia after 2000

In the southern part of Slovakia in the Danube valley and its vicinity at the boundary between Slovakia and Hungary, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has after 2000 been noticed in Komárno westnorthwest of Budapest in 1968 (ROZKOSNY in LUKAS, BOGUSCH & LISKA 2006), in the Cenkovská forest steppe westsouthwest of Muzla eastnortheast of Komárno westnorthwest of Budapest in 2001 (LUKAS in LUKAS, BOGUSCH & LISKA 2006), in Kamenica northnortheast of Stúrovo northwest of Budapest in 1946 (SUSTERA in LUKAS, BOGUSCH & LISKA 2006), in Kamenin north of Kamenny Most northnorthwest of Stúrovo northwest of Budapest in 1986 (SMETANA in LUKAS, BOGUSCH & LISKA 2006), in Bratislava in 2000 (MADER 2000 a) and in 2001 and 2002 (LUKAS & ZITNANSKY in LUKAS, BOGUSCH & LISKA 2006), in Mlynská Dolina at the southwestern margin of Bratislava before 2003 (LUKAS 2003) and in 2004 (LUKAS in LUKAS, BOGUSCH & LISKA 2006), in Liscie Udolie at the western margin of Bratislava in 2001 (LUKAS, BOGUSCH & LISKA 2006), in Devín west of Bratislava in 1998 (LUKAS, BOGUSCH & LISKA 2006), in Devínska Kobyla west of Bratislava in 1987 and 1988 (LUKAS 1998) and in 1999 (LUKAS, BOGUSCH & LISKA 2006), in Devínska Nová Ves west of Bratislava in 1999 (LUKAS in LUKAS, BOGUSCH & LISKA 2006) and in 2005 (JURSIKOVA in LUKAS, BOGUSCH & LISKA 2006), in Ostrov Kopac southeast of Bratislava in 2000 (LUKAS in LUKAS, BOGUSCH & LISKA 2006), in Alzbetin Dvor northeast of Dunajská Luzná eastsoutheast of Bratislava in 1989 (ZITNANSKY in LUKAS, BOGUSCH & LISKA 2006), in Blazov north of Kútniky eastsoutheast of Dunajská Streda eastsoutheast of Bratislava in 1995 (PANIGAJ 2003), and in the Panónsky haj near Súr southsouthwest of Pezinok northeast of Bratislava in 2000 (LUKAS in LUKAS, BOGUSCH & LISKA 2006).

2.7.2.4 Statistical Evaluation of the Distribution of the Localities after 2000

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia has thus been verified after 2000 at in total 57 additional localities which include 26 localities in the eastern part of Slovakia, 17 localities in the western part of Slovakia, and 14 localities in the southern part of Slovakia. Together with the 23 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* which have been known in Slovakia up to 2000, in total 80 localities of occurrence have been recorded up to 2013 that include 36 localities in the eastern part of Slovakia, 28 localities in the western part of Slovakia, and 16 localities in the southern part of Slovakia. The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Slovakia and Moravia has also been mentioned by VEPREK & STRAKA (2007). Since the publication of LUKAS, BOGUSCH & LISKA (2006), no further observations of the Mud-Dauber *Sceliphron destillato-*

rium at additional localities have become known in Slovakia (BOGUSCH, personal communication 2013; LUKAS, personal communication 2013).

2.8 Localities of Occurrence of *Sceliphron destillatorium* in Czechia

Concerning the localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia, distinction is made between 16 localities having been confirmed up to 2000 and 18 additional localities having been found after 2000, with therefore in total 34 localities having been recorded up to 2013.

2.8.1 Localities Confirmed in Czechia up to 2000

Up to 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia has been confirmed only at in total 16 scattered localities. The 16 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia which have been found up to 2000 are distributed in Moravia in the eastern part of Czechia and in Bohemia in the western part of Czechia. A statistical evaluation of the distribution of the 16 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia up to 2000 is also given.

2.8.1.1 Localities in the Eastern Part of Czechia up to 2000

In Moravia in the eastern part of Czechia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has up to 2000 been proven in Hodonín (formerly Göding) southeast of Brno (formerly Brünn) before 1915 and in 1936 (ZBORIL in HEYMONS 1915, ZWOSCHIL in KOHL 1918; ZBORIL in ZAVADIL, SUSTERA & BATA 1937; HACHLER in ZAVADIL, SUSTERA & BATA 1937; STARY in HOFFER 1954); in Cejc northwest of Hodonin southeast of Brno before 1939 (SUSTERA in ZAVADIL 1939; SUSTERA in LUKAS, BOGUSCH & LISKA 2006), in 1941 (KOCOUREK in LUKAS, BOGUSCH & LISKA 2006), in 1942 (HOFFER 1954) and in 1943 (ZAVADIL in LUKAS, BOGUSCH & LISKA 2006); in Moravský Písek northeast of Hodonín southeast of Brno in 1931 and 1932 (HACHLER & STARY in LUKAS, BOGUSCH & LISKA 2006) as well as before 1937 (ZAVADIL in ZAVADIL, SUSTERA & BATA 1937), in the region of Ostrava before 1946 (ZAVADIL 1946), in Velehrad northwest of Uherské Hradiste eastsoutheast of Brno before 1939 (ZAVADIL 1939; ZAVADIL in LUKAS, BOGUSCH & LISKA 2006), in Znojmo southwest of Brno before 1937 (SNOFLAK in ZAVADIL, SUSTERA & BATA 1937), in Blansko north of Brno before 1937 (ZAVADIL in ZAVADIL, SUSTERA & BATA 1937), in Olomouc (formerly Olmütz) in 1938 (HOFFER 1954), in Kozlov near Litovel northwest of Olomouc before 1937 (SLAVICEK in ZAVADIL, SUSTERA & BATA 1937), in Kromeríz southsoutheast of Olomouc before 1937 (FIALA in ZAVADIL, SUSTERA & BATA 1937; FIALA in LUKAS, BOGUSCH & LISKA 2006), in Vsetín eastsoutheast of Olomouc before 1948 (ZAVADIL & SNOFLAK 1948, BALTHASAR 1972), in Bystrice pod Hostýnem westnorthwest of Vsetín eastsoutheast of Olomouc in 1936 (STARY in HOFFER 1954), in Mikuluvka northnorthwest of Vsetín eastsoutheast of Olomouc in 1939 (VODICKA in ZAVADIL 1939, VODICKA in ZAVADIL 1948; VODICKA in LUKAS, BOGUSCH & LISKA 2006), and in Milotice na Becva eastsoutheast of Hranice east of Olomouc before 1937 (GREGOR in ZAVADIL, SUSTERA & BATA 1937; GREGOR in ZAVADIL 1948). The presence of the Mud-Dauber *Sceliphron destillatorium* in Moravia has already been reported by SCHULZ (1904) without mentioning a locality.

2.8.1.2 Localities in the Western Part of Czechia up to 2000

In Bohemia in the western part of Czechia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has up to 2000 been recorded in Prague in 1936 (STARY in HOFFER 1954), in Revnícov west of Prague in 1950 (HOFFER 1954), and in Kaplice (formerly Kaplitz) southeast of Cesky Krumlov south of Prague before 1854 (KIRCHNER 1854).

2.8.1.3 Statistical Evaluation of the Distribution of the Localities up to 2000

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia has thus been verified up to 2000 at in total 16 localities which include 13 localities in Moravia in the eastern part of Czechia and 3 localities in Bohemia in the western part of Czechia. The results of the observations of the Mud-Dauber *Sceliphron destillatorium* in Bohemia and Moravia by STARY (in HOFFER 1954) have also been published by STARY (1939) according to a remark in HOFFER (1954).

The presence of the Mud-Dauber *Sceliphron destillatorium* in Bohemia has also been signaled by SCHENCK (1861), FRIESE (1926) and BIEGELEBEN (1928) who have not mentioned particular localities but have obviously cited the discovery of KIRCHNER (1854), whereas ZAVADIL, SUSTERA & BATA (1937) have assessed the discovery of the Mud-Dauber *Sceliphron destillatorium* in Kaplice southeast of Ceský Krumlov south of Prague by KIRCHNER (1854) as the effect of an accidental displacement, and ZAVADIL & SNOFLAK (1948) have even stated that the Mud-Dauber *Sceliphron destillatorium* has not been encountered in Bohemia at all. PADR (1989) has stated an occurrence of the Mud-Dauber *Sceliphron destillatorium* only in Moravia, but not in Bohemia.

2.8.2 Localities Confirmed in Czechia after 2000

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia has been confirmed at 18 additional localities. The 18 additional localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia which have been found after 2000 are distributed in Moravia in the eastern part of Czechia, whereas no further localities have been reported from Bohemia in the western part of Czechia after 2000. Most of the 18 additional localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia that have been reported after 2000 have been discovered during revision of specimens in various collections which have already been captured before 2000 (LUKAS, BOGUSCH & LISKA 2006). A statistical evaluation of the distribution of the 18 additional localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia after 2000 and the total 34 localities of occurrence of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia up to 2013 is also given.

2.8.2.1 Localities in the Eastern Part of Czechia after 2000

In Moravia in the eastern part of Czechia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has after 2000 been proven in Breclav southsoutheast of Brno in 2000 (VEPREK in LUKAS, BOGUSCH & LISKA 2006), in Lednice northwest of Breclav southsoutheast of Brno in 1986 (BILY & JELINEK in LUKAS, BOGUSCH & LISKA 2006) and in 1993 (HAVA in LUKAS, BOGUSCH & LISKA 2006), in Mikulov south of Brno in 1990 (RIHA in LUKAS, BOGUSCH & LISKA 2006), in Sedlec eastsoutheast of Mikulov south of Brno in 1952 (STANEK in LUKAS, BOGUSCH & LISKA 2006), in Bzenec northeast of Hodonín southeast of Brno in 1938 (ZAVADIL in LUKAS, BOGUSCH & LISKA 2006), in Slavkov east of Brno in 1942 (VOLAK in LUKAS, BOGUSCH & LISKA 2006), in Herspice southeast of Slavkov eastsoutheast of Brno in 1933 (VOLAK in LUKAS, BOGUSCH & LISKA 2006), in Staré Mesto at the northwestern margin of Uherské Hradiste eastsoutheast of Brno in 2003 (SRBA in LUKAS, BOGUSCH & LISKA 2006), in Salas northnorthwest of Velehrad northwest of Uherské Hradiste eastsoutheast of Brno in 2002 (SRBA in LUKAS, BOGUSCH & LISKA 2006), in Divnice east of Slavicín east of Uherské Hradiste eastsoutheast of Brno in 1996 (SVOBODA in LUKAS, BOGUSCH & LISKA 2006), in Kuzelov southwest of Velká nad Velickou south of Uherské Hradiste eastsoutheast of Brno in 1998 (SILINGR in LUKAS, BOGUSCH & LISKA 2006), in Holásky at the southern margin of Brno in 1998 (TROJAN in LUKAS, BOGUSCH & LISKA 2006), in Ivanovice at the southern margin of Brno in 1998 (TROJAN in LUKAS, BOGUSCH & LISKA 2006), in Opatovice north of Brno in 1991 (NAVRATIL in LUKAS, BOGUSCH & LISKA 2006), in Svitavy north of Brno in 1956 (STANEK in LUKAS, BOGUSCH & LISKA 2006), in Prerov southeast of Olomouc in 1995 (VEPREK in LUKAS, BOGUSCH & LISKA 2006), in Hodolany east of Olomouc in 1939 (TOMSIK in LUKAS, BOGUSCH & LISKA 2006), and in Stramberk east of Nový Jicin southsouthwest of Ostrava in 2003 (VEPREK in LUKAS, BOGUSCH & LISKA 2006).

2.8.2.2 Localities in the Western Part of Czechia after 2000

In Bohemia in the western part of Czechia, no further localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* have been recorded after 2000.

2.8.2.3 Statistical Evaluation of the Distribution of the Localities after 2000

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czechia has thus been verified after 2000 at in total 18 additional localities which include 18 localities in Moravia in the eastern part of Czechia and 0 localities in Bohemia in the western part of Czechia. Together with the 16 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* which have been known in Czechia up to 2000, in total 34 localities of occurrence have been recorded up to 2013 that include 31 localities in Moravia in the eastern part of Czechia and 3 localities in Bohemia in the western part of Czechia. The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Moravia and Slovakia has also been mentioned by VEPREK & STRAKA (2007). Since the publication of LUKAS, BOGUSCH & LISKA (2006), no further observations of the Mud-Dauber *Sceliphron destillatorium* at additional localities have become known in Czechia (BOGUSCH, personal communication 2013; LUKAS, personal communication 2013).

2.9 Localities of Occurrence of *Sceliphron destillatorium* in Austria

In more or less similar distances from the boundary of Poland as in Lviv (SCHMIDT-GOEBEL 1876), Volcynec northeast of Ivano-Frankivsk (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930, KUNTZE 1939) and Kamjanec-Podilskyj (BELKE 1853, 1858 a, 1859) in the western part of Ukraina, the Mud-Dauber *Sceliphron destillatorium* has also been encountered at various localities in the eastern part of Austria (KOHL 1880, 1893, 1918; SCHMIEDEKNECHT 1907, 1930; TÖLG & FAHRINGER 1911, HUBER 1916, WERNER 1927, HEDICKE 1930, KINEL & NOSKIEWICZ 1930; MAZEK-FIALLA 1935 a, 1935 b, 1936 a, 1936 b; EGGER 1974, DOLLFUSS 1987; GUSENLEITNER 1991, 1996 a; DOLLFUSS, GUSENLEITNER & BREGANT 1998; SCHWARZ 1999, MADER 2000 a, ZETTEL 2000; ZETTEL, GROSS & MAZZUCCO 2001; ZETTEL & WIESBAUER 2011) and Hungary (MOCSARY 1877, 1884, 1897, 1909; SAJO 1882, 1896; VELLAY 1899, CHYZER 1902, VANGEL 1905, MOCZAR & HENTER 1907, KOHL 1918, ROTARIDES 1934; MOCZAR 1938 a, 1946, 1953, 1961, 1972, 1973; ZILAHI-SEBESS 1939; BAJARI 1957; BENEDEK 1968, 1969, 1970, 1975, 1979; JOZAN 1983, 1985, 1989, 1990, 1992 a, 1992 b, 1996, 1998, 2000 a, 2000 b, 2001, 2002 a, 2002 b, 2003, 2007; KARSAI 1988, SCHARRER 1995). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in the eastern part of Austria has been confirmed at various localities both north and south of the Alps.

2.9.1 Localities North of the Alps in Austria

North of the Alps in Austria, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed in Vienna since 1871 (KOHL 1893, 1918; SCHMIEDEKNECHT 1907, 1930; HUBER 1916, HEDICKE 1930, KINEL & NOSKIEWICZ 1930, EGGER 1974, GUSENLEITNER 1991, MADER 2000 a, ZETTEL 2000; ZETTEL, GROSS & MAZZUCCO 2001); in Dornbach, Floridsdorf, Josefstadt, Prater, Sievering and Türkenschanze which are parts of the town of Vienna since 1871 (KOHL 1893, 1918; ZETTEL 2000; KOLAZY in ZETTEL, GROSS & MAZZUCCO 2001); in Mödling southsouthwest of Vienna since before 1918 (KOHL 1918, ZETTEL 2000), in Brühl southsouthwest of Vienna in 1881 (KOHL 1893, 1918), in Piesting southsouthwest of Vienna between 1866 and 1870 (TSCHEK in KOHL 1893), in Guntramsdorf south of Vienna in 1953 (SCHREMMER in DOLLFUSS 1987), in Kritzendorf northnorthwest of Vienna before 1911 (TÖLG & FAHRINGER 1911), in Plank in the Kamp valley north of Krems westnorthwest of Vienna in 1909 (WERNER 1927), in Linz in the Danube valley in 1996 (MARTZY in GUSENLEITNER 1996 a, SCHWARZ 1999), in Krems and Stein westnorthwest of Vienna in the Danube valley in 2000 (MADER 2000 a), at the Bisamberg south of Bisamberg and in

Stammersdorf southeast of Korneuburg northnorthwest of Vienna before 2011 (ZETTEL & WIESBAUER 2011), in Hainburg an der Donau eastsoutheast of Vienna in 2000 (MADER 2000 a), in Bad Deutsch-Altenburg westsouthwest of Hainburg an der Donau eastsoutheast of Vienna before 1939 (HAMMER in MADER 1939), in Weiden am See southeast of Neusiedl at the eastern margin of the Neusiedler See southsoutheast of Vienna in 2000 (MADER 2000 a), in Podersdorf at the eastern margin of the Neusiedler See in 1992 (MADL in DOLLFUSS, GUSENLEITNER & BREGANT 1998), in Illmitz at the eastern margin of the Neusiedler See between 1992 and abt. 2010 (GACK, personal communication 2013; GACK in STALLING 2002), possibly also in other localities at the eastern margin of the Neusiedler See before 1935 (MAZEK-FIALLA 1935 a, 1935 b, 1936 a, 1936 b; DOLLFUSS, GUSENLEITNER & BREGANT 1998), in Kirchberg am Wechsel southsoutheast of Gloggnitz southsouthwest of Wiener Neustadt in 1991 (RÖSSLER in ZETTEL 2000), and in Gries at the Brenner south of Innsbruck before 1880 (KOHL 1880). The occurrence of the Mud-Dauber *Sceliphron destillatorium* at the Neusiedler See southsoutheast of Vienna has also been signaled by HAMMER (in MADER 1939).

SCHEFFER (1851) and FRITSCH (1858, 1878) have already recorded the Mud-Dauber *Sceliphron spirifex* in and around Vienna before 1851 and since 1853, respectively, and it is possible that either the determinations of SCHEFFER (1851) and FRITSCH (1858, 1878) have been incorrect and they have in fact referred to the Mud-Dauber *Sceliphron destillatorium*, or that in addition to *Sceliphron spirifex* also *Sceliphron destillatorium* has already been present in and around Vienna before 1851 and since 1853, respectively, with both species not having been discriminated by SCHEFFER (1851) and FRITSCH (1858, 1878). In the collection of the Museum of Natural History in Vienna in Austria, no specimens of the Mud-Dauber *Sceliphron spirifex* from Vienna and its vicinity are contained (ZIMMERMANN, personal communication 2013) which could have been able to resolve the above enigma. The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Austria has also already been reported by SCHENCK (1861).

2.9.2 Localities South of the Alps in Austria

South of the Alps in Austria, the Mud-Dauber *Sceliphron destillatorium* has been encountered in Klagenfurt, in Ferlach and Viktring south of Klagenfurt, and in Rosegg and Moos west of Klagenfurt before 1990 (SCHWAMMBERGER & PRIESNER 1990); in Unterhart north of Oberrakitsch and Berg north of Weixelbaum eastsoutheast of Leibnitz southsoutheast of Graz in 1991 (GUSENLEITNER 1991), in Wundschuh south of Graz in 1978 (KLINGBERG in DOLLFUSS 1987), in the vicinity of Graz since 1980 (GEPP 2003), in Neuhaus am Klausenbach southwest of Jennersdorf eastsoutheast of Graz in 1993 (GUSENLEITNER in DOLLFUSS, GUSENLEITNER & BREGANT 1998), in Pernegg east of Leoben north of Graz in 1992 (GUSENLEITNER 1992), near Lobniggraben east of Eisenkappel southeast of Klagenfurt in 1995 (EBMER in GUSENLEITNER 1996 a), in Skutl (Leppen) east of Eisenkappel southeast of Klagenfurt in 1989 (GUSENLEITNER 1991, 1996 a), and in Breitenfeld/Rittschein in the Steiermark in 1983 (GUSENLEITNER in DOLLFUSS 1987).

2.10 Localities of Occurrence of *Sceliphron destillatorium* in Hungary

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Hungary has been confirmed at various localities in the northwestern, northeastern, southwestern and southeastern parts of Hungary.

2.10.1 Localities in the Northwestern Part of Hungary

In the northwestern part of Hungary, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed in Acsalag north of Csorna westnorthwest of Budapest before 1907 (MOCZAR & HENTER 1907), in Budapest since before 1897 (MOCSARY 1897, VANGEL 1905, KOHL 1918, SCHARRER 1995), in the vicinity of Budapest in 1923 (ENSLIN in SCHARRER 1995), in Budatétény at the

southern margin of Budapest before 1975 (BENEDEK 1975), in Köszeg north of Szombathely west of Budapest before 1938 (MOCZAR 1938 a), and in Pápa southsouthwest of Györ west of Budapest in 1961 and 1962 (BENEDEK 1970).

2.10.2 Localities in the Northeastern Part of Hungary

In the northeastern part of Hungary, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed in Bátorliget northeast of Debrecen east of Budapest before 1953 (MOCZAR 1953; JOZAN 1989, 1990), in Debrecen (formerly Debreczén) east of Budapest before 1877 (MOCSARY 1877, 1897), in Forró northnortheast of Miskolc northeast of Budapest before 1897 (MOCSARY 1897), in Hajdúhadház north of Debrecen east of Budapest before 1939 (ZILAHI-SEBESS 1939), in Hajdúszoboszló southwest of Debrecen east of Budapest before 1907 (MOCZAR & HENTER 1907), in Kisszentmiklós (formerly Kis-Szent-Miklós) near Gödöllö eastnortheast of Budapest before 1882 (SAJO 1882, 1896), and in Sárospatak eastnortheast of Miskolc northeast of Budapest before 1902 (CHYZER 1902).

2.10.3 Localities in the Southwestern Part of Hungary

In the southwestern part of Hungary, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed in Barcs westsouthwest of Pécs (formerly Fünfkirchen) southwest of Budapest before 1989 (JOZAN 1989), in Darány eastnortheast of Barcs southwest of Budapest before 1983 (JOZAN 1983, 1985), in Harta north of Kalocsa south of Budapest before 1907 (MOCZAR & HENTER 1907), in Kalocsa (formerly Kalasa) south of Budapest before 1897 (MOCSARY 1897, KOHL 1918), in Kaposvár northwest of Pécs southwest of Budapest before 1985 (JOZAN 1985), in Kiskunság south of Budapest before 1988 (KARSAI 1988), in Mernye and Mernyeszentmiklós north of Kaposvár southwest of Budapest before 1985 (JOZAN 1985), in Pécs southsouthwest of Budapest before 1985 (JOZAN 1985), in Peszér northnortheast of Dunaújváros south of Budapest (according to index and map in MOCZAR 1972) before 1897 (MOCSARY 1897), in Somogyaszaló and Somogygeszti north of Kaposvár southwest of Budapest before 1985 (JOZAN 1985), in Somogyjád northnorthwest of Kaposvár southwest of Budapest before 1985 (JOZAN 1985), and in the Zselic hills south of Kaposvár southwest of Budapest before 1989 (JOZAN 1992 a, 2007). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in the Somogy county southwest of Budapest since 1962 is also mentioned by JOZAN (2001).

At the northern margin of Lake Balaton southwest of Budapest, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been verified in Balatonalmádi northeast of Balatonfüred between 1965 and 1968 (BENEDEK 1979), in Vörösberény northeast of Balatonalmádi before 2000 (JOZAN 2000 a), in Káptalanfüred southsouthwest of Balatonalmádi northeast of Balatonfüred between 1965 and 1968 (BENEDEK 1979) and before 2000 (JOZAN 2000 a), in Csopak eastnortheast of Balatonfüred in 1968 (BENEDEK 1979) and before 2000 (JOZAN 2000 a), in Balatonfüred before 2000 (JOZAN 2000 a), in Tihany southsouthwest of Balatonfüred since 1931 (ROTARIDES 1934; MOCZAR 1946, 1961, 1973; JOZAN 1989); in Pécsely, Vászoly and Tagyon westnorthwest of Balatonfüred before 2000 (JOZAN 2000 a); in Örvényes westsouthwest of Balatonfüred before 2000 (JOZAN 2000 a), in Balatonhenye eastsoutheast of Tapolca before 2000 (JOZAN 2000 a), in Tapolca westsouthwest of Balatonfüred since 1961 (BENEDEK 1969, 1970; JOZAN 1989), in Révfülöp southeast of Tapolca before 2000 (JOZAN 2000 a); in Szigliget, Badacsonytomaj and Salföld east of Keszthely before 2000 (JOZAN 2000 a); in Keszthely westsouthwest of Balatonfüred in 1957 (BENEDEK 1979), and in Homokházi-erdö in 1960 (BENEDEK 1979).

At the southern margin of Lake Balaton southwest of Budapest, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been noticed in Balatonlelle westsouthwest of Balatonföldvár westsouthwest of Siófok before 1985 (JOZAN 1985), and in Látrány westsouthwest of Balatonföldvár westsouthwest of Siófok since abt. 1970 (JOZAN 2003). Unspecified records of the Mud-Dauber *Sceliphron destillatorium* in Hungary have also been signaled by MOCSARY (1884, 1909), ROVARTANI LAPOK (1897), BAJARI (1957), BENEDEK (1968) and JOZAN (1989).

In the Örség National Park west of Lake Balaton westsouthwest of Budapest, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been verified in Szentgotthárd southsouthwest of Szombathely, in Hegyhátszentjakab eastsoutheast of Szentgotthárd, in Pankasz eastsoutheast of Szentgotthárd, in Őriszentpéter eastsoutheast of Szentgotthárd, and in Vasszentmihály eastnortheast of Szentgotthárd in 1982 and 2001 (JOZAN 2002 a).

In the Drava valley at the boundary between Hungary and Croatia west, southwest and south of Pécs, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been recorded in Barcs westsouthwest of Pécs (formerly Fünfkirchen) southwest of Budapest before 1989 (JOZAN 1989), in Bélavár southwest of Nagyatád west of Pécs before 1998 (JOZAN 1998), in Somogyudvarhely westsouthwest of Nagyatád west of Pécs before 1998 (JOZAN 1998), in Vejti southsouthwest of Pécs before 1998 (JOZAN 1998), in Zákány south of Nagykanizsa before 1998 (JOZAN 1998), and at the Baláta Swamp (Baláta-tó) northeast of Csurgó southsoutheast of Nagykanizsa before 1996 (JOZAN 1996).

In the Villány Mountains near the boundary between Hungary and Croatia south and southsoutheast of Pécs, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed in Harkány west of Siklós south of Pécs in 1987 (WEIFFENBACH in DREWES 2003), in Kistótfalu north of Siklós south of Pécs before 2000 (JOZAN 2000 b), in Máriagyüd northwest of Siklós south of Pécs before 2000 (JOZAN 2000 b), and in Nagyharsány eastsoutheast of Siklós southsoutheast of Pécs before 2000 (JOZAN 2000 b). In the Mecsek Mountains north and northeast of Pécs southwest of Budapest, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been recorded since 1962 (JOZAN 2002 b).

2.10.4 Localities in the Southeastern Part of Hungary

In the southeastern part of Hungary, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed in Kecskemét southsoutheast of Budapest before 1897 (MOCSARY 1897), in Kiskunfélegyháza (formerly Félegyháza) southsoutheast of Kecskemét southsoutheast of Budapest before 1905 (VANGEL 1905), in Ocsa southsoutheast of Budapest before 1989 (JOZAN 1989), in Szeged southsoutheast of Budapest before 1897 (MOCSARY 1897, VELLAY 1899), and in Tiszaalpár southeast of Kecskemét southsoutheast of Budapest before 1907 (MOCZAR & HENTER 1907).

In the Béda-Karapancsa reserve at the four-countries edge at the southeastern corner of Hungary, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been verified in Adica and Béda southeast of Mohács eastsoutheast of Pécs from 1989 to 1991 (JOZAN 1992 b).

2.11 Localities of Occurrence of *Sceliphron destillatorium* in Romania

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Romania has been confirmed at various localities in the western and eastern parts of Romania.

2.11.1 Localities in the Western Part of Romania

In the western part of Romania, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed northwest and west of Bucharest in the Apuseni Mountains (formerly Bihar Mountains or Cséhtelek) northeast of Deva northwest of Bucharest before 1872 (MOCSARY 1872) and in 1910 (VECHT & BREUGEL 1968), in Aiud (formerly Nagyenyed) northeast of Deva northwest of Bucharest before 1914 (SZILADY 1914), in Haţeg (formerly Hátszeg) south of Deva westnorthwest of Bucharest before 1897 (MOCSARY 1897), in Hunedoara (formerly Vajdahunyad) south of Deva westnorthwest of Bucharest in 1905 and 1906 (MOCZAR 1939), in the Banat Mountains southsoutheast of Timişoara (formerly Temeswar or Temesvár) westnorthwest of Bucharest before 1918 (KOHL 1918), in Reşiţa (formerly Resicza) southsoutheast of Timişoara westnorthwest of Bucharest before 1905 (VANGEL

1905), in Baile Herculane (formerly Herkulesbad or Herkulesfürdö) southsoutheast of Reşiţa southsoutheast of Timişoara westnorthwest of Bucharest in 1911 (SELESI & RAFAJLOVIC 1963), in Oradea (formerly Nagyvárad) northwest of Bucharest before 1872 (MOCSARY 1872, 1877, 1897), in Pir (formerly Peér) northnortheast of Oradea northwest of Bucharest before 1904 (ZILAHI-KISS 1904), in Hodod (formerly Hadad) eastnortheast of Oradea northwest of Bucharest before 1904 (ZILAHI-KISS 1904), in Nuşfalau (formerly Nagyfalu) eastnortheast of Oradea northwest of Bucharest before 1897 (MOCSARY 1897), in Orşova westnorthwest of Craiova west of Bucharest before 1897 (MOCSARY 1897), in Sibiu (formerly Hermannstadt) northwest of Bucharest before 1874 (RIESS in MOCSARY 1874), in Târnaveni (formerly Dicsöszentmartón) southwest of Târgu Mureş northnorthwest of Bucharest before 1897 (MOCSARY 1897), in Cheţani (formerly Maroskecze) westsouthwest of Târgu Mureş northnorthwest of Bucharest before 1905 (VANGEL 1905), and in Zau de Câmpie (formerly Mezözáh) westnorthwest of Târgu Mureş (representing the former region Mezöség southeast of Cluj-Napoca; formerly Klausenburg) northnorthwest of Bucharest before 1873 (HERMAN 1873, MOCSARY 1897).

In the western part of Romania, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed southwest and south of Bucharest in Giurgiu south of Bucharest before 1968 (SCOBIOLA-PALADE 1968 a), in Putineiu westsouthwest of Alexandria or west of Giurgiu southwest of Bucharest in 1949 (SCOBIOLA 1950, SCOBIOLA-PALADE 1968 a), and in Islaz west of Turnu Magurele southwest of Bucharest in 1949 (SCOBIOLA 1950, SCOBIOLA-PALADE 1968 a).

2.11.2 Localities in the Eastern Part of Romania

In the eastern part of Romania, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed northeast and east of Bucharest in Braila northeast of Bucharest before 1930 (MÜLLER 1930), in Braneşti east of Bucharest in 1949 (SCOBIOLA 1950, SCOBIOLA-PALADE 1968 a), in Tulcea (formerly Tultscha) east of Braila northeast of Bucharest before 1918 (KOHL 1918), in Codru around Tulcea east of Braila northeast of Bucharest in 1962 (SCOBIOLA-PALADE 1987), in the sand bank Caraorman in the Danube delta east of Braila northeast of Bucharest between 1967 and 1970 (SCOBIOLA-PALADE 1972), in the sand bank Saraturile - Sfantu Gheorghe in the Danube delta east of Braila northeast of Bucharest between 1971 and 1973 (SCOBIOLA-PALADE 1974 a, 1989), in Letea in the Danube delta east of Braila northeast of Bucharest between 1962 and 1966 (SCOBIOLA-PALADE 1968 b), in Lacu Sarat southwest of Braila northeast of Bucharest in 1926 (MÜLLER 1930), in Iaşi northnortheast of Bucharest in 1953 (LEHRER & SCUTARU 1963), in Amara northnorthwest of Slobozia eastnortheast of Bucharest before 1968 (SCOBIOLA-PALADE 1968 a, 1974 b), in Mangalia south of Constanţa eastsoutheast of Bucharest before 1959 (SCOBIOLA 1959, SCOBIOLA-PALADE 1967), in Comarova near Neptun north of Mangalia south of Constanţa eastsoutheast of Bucharest before 1959 (SCOBIOLA-PALADE 1967), and in Bucharest since before 1925 (COULON 1925, SCOBIOLA 1950, SCOBIOLA-PALADE 1968 a). South of Mangalia south of Constanţa at the western margin of the Black Sea south of the Danube delta, the Mud-Dauber *Sceliphron destillatorium* has also been recorded in Varna in Bulgaria in 1956 (ATANASSOV 1955, PUŁAWSKI 1957; PULAWSKI, personal communication 2013) as well as in the vicinity of Varna (LJUBOMIROV to PULAWSKI, personal communication 1993).

2.12 Localities of Occurrence of *Sceliphron destillatorium* in Croatia

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Croatia has been confirmed at various localities in the northwestern and southeastern parts of Croatia.

2.12.1 Localities in the Northwestern Part of Croatia

In the northwestern part of Croatia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has

been confirmed in Bakar (formerly Buccari) southeast of Rijeka (formerly Fiume) westsouthwest of Zagreb (formerly Agram) since before 1897 (MOCSARY 1897, VOGRIN 1955, SELESI & RAFAJLOVIC 1963), in Bakarac southeast of Bakar southeast of Rijeka westsouthwest of Zagreb in 1964 (WEIFFENBACH in DREWES 2003), in Crikvenica southeast of Rijeka southwest of Zagreb in 1961 (ERLANDSSON 1974), in Karin east of Zadar southsouthwest of Zagreb in 1976 (MUCALICA 1979), in Koromacno south of Labin southsouthwest of Rijeka westsouthwest of Zagreb in 2003 (JOZAN 2009), in Kraljevica southeast of Bakar southeast of Rijeka westsouthwest of Zagreb in 1914 (SELESI & RAFAJLOVIC 1963), in Medulin southeast of Pula southwest of Rijeka southwest of Zagreb in 2004 (JOZAN 2009), in Moscenicka Draga southwest of Rijeka westsouthwest of Zagreb in 1964 (WEIFFENBACH in DREWES 2003), in Orehovica northeast of Rijeka westsouthwest of Zagreb before 1890 (KORLEVIC 1890), in Plitvica westnorthwest of Bihać southsouthwest of Zagreb before 1914 (SZILADY 1914), in Pula (formerly Pola) southwest of Rijeka southwest of Zagreb before 1918 (SCHLETTERER in KOHL 1918), in Racja Vas (formerly Castelnuovo) northwest of Rijeka westsouthwest of Zagreb before 1918 (KOHL 1918), in Rijeka (formerly Fiume) westsouthwest of Zagreb before 1890 (KORLEVIC 1890, MOCSARY 1897, VOGRIN 1955), in Rovinj (formerly Rovigno) westsouthwest of Rijeka westsouthwest of Zagreb (GUSENLEITNER 1996 b), in Senj (formerly Zengg) southsoutheast of Rijeka southwest of Zagreb before 1890 (KORLEVIC 1890, MOCSARY 1897, VOGRIN 1955), in Sibenik northwest of Split southsouthwest of Zagreb in 1969 (WEIFFENBACH in DREWES 2003), in Strigova (formerly Stridóvár) northnorthwest of Varazdin northnortheast of Zagreb before 1918 (VOGRIN 1918), in Susak eastsoutheast of Rijeka westsouthwest of Zagreb before 1890 (KORLEVIC 1890, MOCSARY 1897), in Vrana on the island Cres south of Rijeka southwest of Zagreb in 1894 (LANGHOFFER 1896), and in Zadar (formerly Zara) southsouthwest of Zagreb since before 1817 (GERMAR 1817, FRAUENFELD 1861, KOHL 1918, ERLANDSSON 1974, MUCALICA 1979).

In the northwestern part of Croatia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has also been verified in Draga eastsoutheast of Trieste westsouthwest of Zagreb, in Durdevac southsoutheast of Koprivnica eastnortheast of Zagreb, in Gospic northnortheast of Zadar southsouthwest of Zagreb, in Grabarje northnortheast of Sisak southeast of Zagreb or southwest of Sisak southsoutheast of Zagreb, in Jablanac southeast of the island Rab southwest of Zagreb, in Karlobag northnorthwest of Zadar southsouthwest of Zagreb, on the island Krk westsouthwest of Zagreb, in Krapina north of Zagreb, in Labemartin on the island Krk westsouthwest of Zagreb, in Molve-Mace southeast of Koprivnica eastnortheast of Zagreb, in Novi Vinodolski southeast of Rijeka westsouthwest of Zagreb, in Porec west of Rijeka westsouthwest of Zagreb, in Slunj south of Karlovac southsouthwest of Zagreb, in Trnovec southeast of Varazdin northeast of Zagreb, and in Vinjerac eastnortheast of Zadar southsouthwest of Zagreb before 1955 (VOGRIN 1955).

Near the boundary between Italy and Croatia, the Mud-Dauber *Sceliphron destillatorium* has also been found in Grado westnorthwest of Trieste before 1911 (TÖLG & FAHRINGER 1911) and in Duíno northnorthwest of Trieste before 1912 (STROBL in KOHL 1918, MAIDL 1922). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Istria in the region of Trieste westsouthwest of Zagreb has also been mentioned by GRAEFFE (1911), and the occurrence of the Mud-Dauber *Sceliphron destillatorium* on the island Krk westsouthwest of Zagreb has also been signaled by MADER (1939).

2.12.2 Localities in the Southeastern Part of Croatia

In the southeastern part of Croatia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed in Bol on the island Brac (formerly Brazza) southsoutheast of Split (formerly Spalato) southsoutheast of Zagreb in 1912 (MAIDL 1922), in Brusje (formerly Brusije) on the island Hvar south to southsoutheast of Split southsoutheast of Zagreb before 1887 (GASPERINI 1887), in Dubrovnik southsoutheast of Zagreb in 1937 (SELESI & RAFAJLOVIC 1963), on the island Hvar south to southsoutheast of Split southsoutheast of Zagreb in 1966 (MUCALICA 1979), on the peninsula Peljesac (formerly Sabioncello or Sabionella) northwest of Dubrovnik (formerly Ragusa) southsoutheast of Zagreb before 1918 (PENTHER in KOHL 1918, SELESI & RAFAJLOVIC 1963), in Split (formerly Spalato) southsoutheast of Zagreb before 1889 (GASPERINI 1889), in Vela Luka on the island Korcula westnorthwest of Dubrovnik southsoutheast of Zagreb in 1937 (JAEGER in SELESI & RAFAJLOVIC 1963), on the island Vis (formerly Lissa) southsouthwest of Split southsouthwest of Zagreb before 1887 (GAS-

PERINI 1887), and in Zelenika east of Hercegnovj southeast of Dubrovnik southsoutheast of Zagreb before 1907 (MOCZAR & HENTER 1907).

In the southeastern part of Croatia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has also been verified in Kostajnica southsoutheast of Sisak southsoutheast of Zagreb or eastnortheast of Hercegnovj (at the latter place, the locality is now Morinj) southeast of Dubrovnik southsoutheast of Zagreb, and at the mouth of the Neretva southeast of Ploce northwest of Dubrovnik before 1955 (VOGRIN 1955).

2.13 Localities of Occurrence of *Sceliphron destillatorium* in Serbia

In Serbia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been proven in Apatin northwest of Novi Sad northwest of Belgrade before 1897 (MOCSARY 1897), in Bar (formerly Antivari) southsoutheast of Niksič southsouthwest of Belgrade in 1917 (FULMEK in MAIDL 1922), in Belgrade since before 1918 (SCHULTHESS-RECHBERG in KOHL 1918, GROZDANOVIC 1957, JAEGER in SELESI & RAFAJLOVIC 1963, RADOVIC 1976, MUCALICA 1979), in Deliblato (formerly Deliblat) northnortheast of Kovin east of Belgrade before 1897 (MOCSARY 1897, SELESI & RAFAJLOVIC 1963), in Grebenac (formerly Grebenácz) west of Bela Crkva eastnortheast of Belgrade before 1879 (MOCSARY 1879, 1897; SELESI & RAFAJLOVIC 1963), in Kelebija near Subotica northnorthwest of Novi Sad northwest of Belgrade in 1917 (SELESI & RAFAJLOVIC 1963), in Kotor west of Podgorica southsouthwest of Belgrade in 1976 (RADOVIC 1976), in Kovin (formerly Kubin) east of Belgrade before 1897 (MOCSARY 1897), in Kragujevac southsoutheast of Belgrade in 1922 (SELESI & RAFAJLOVIC 1963), in Kula northnorthwest of Novi Sad northwest of Belgrade before 1922 (MAIDL 1922), in Majdanpek eastsoutheast of Belgrade in 1935 (ZIVOJNOVIC 1950), in Nis southsoutheast of Belgrade before 1918 (SCHULTHESS-RECHBERG in KOHL 1918), in Slanci east of Belgrade in 1968 (MUCALICA 1979), in Sremski Karlovci southeast of Novi Sad northwest of Belgrade between 1930 and 1940 (MUCALICA 1979), in Subotica northnorthwest of Novi Sad northwest of Belgrade in 1909 (SELESI & RAFAJLOVIC 1963), in Vranjina southsouthwest of Podgorica southsouthwest of Belgrade in 1975 (RADOVIC 1976), in Ulcinj southsoutheast of Niksič southsouthwest of Belgrade in 1917 (FULMEK in MAIDL 1922), in Velebit westnorthwest of Kanjiza east of Subotica northnorthwest of Novi Sad northwest of Belgrade in 1956 (MUCALICA 1979), and in Zemun north of Belgrade in 1939 (SELESI & RAFAJLOVIC 1963).

2.14 Localities of Occurrence of *Sceliphron destillatorium* in Bosna-Hercegovina

In Bosna-Hercegovina, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been noticed in Mostar southwest of Sarajevo and in Rudo southsoutheast of Visegrad eastsoutheast of Sarajevo before 1911 (TÖLG & FAHRINGER 1911) as well as in Bosanski Novi westnorthwest of Banja Luka northwest of Sarajevo before 1914 (SZILADY 1914).

2.15 Localities of Occurrence of *Sceliphron destillatorium* in Makedonia

In Makedonia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been recorded in Skopje in 1942 by TULESKOV (CINGOVSKI 1960), at the Crna Gora north of Skopje in 1940 by RUTZNER (CINGOVSKI 1960), and in Bitola southsouthwest of Skopje in 1942 by TULESKOV (CINGOVSKI 1960).

2.16 Localities of Occurrence of *Sceliphron destillatorium* in Slovenia

In Slovenia, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed in the former Belvedere west of Izola southwest of Trieste before 1918 (PENTHER in KOHL 1918), in Gancani eastsoutheast of Murska Sobota in 1991 (GOMBOC in GOGALA 2011), in Lipe south of Ljubljana in 1993 (JURECIC in GOGALA 2011), in Log westnorthwest of Zabnica and Lukovica north of Zabnica in 1990 (GOGALA 2011), in Podcetrtek southsouthwest of Rogaska Slatina in 1931 (JAEGER in GOGALA 2011) and 1932 (JAEGER in SELESI & RAFAJLOVIC 1963), and in Portoroz southeast of Piran in 1959 (HEINRICH in SCHARRER 1995). Since the publication of GOGALA (2011), no further observations of the Mud-Dauber *Sceliphron destillatorium* at additional localities have become known in Slovenia (GOGALA, personal communication 2013).

2.17 Localities of Occurrence of *Sceliphron destillatorium* in Switzerland

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Switzerland has been confirmed at various localities both north and south of the Alps.

2.17.1 Localities North of the Alps in Switzerland

North of the Alps in Switzerland, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed in Basel before 1883 (KOHL 1883, HUBER 1916), in Fully northeast of Martigny eastsoutheast of Geneva in the Rhône valley before 1900 (VERNIER, BARBALAT & GONSETH 1996), in Martigny eastsoutheast of Geneva in the Rhône valley before 1883 (FREY-GESSNER in KOHL 1883, HUBER 1916), in Sierre (Siders) east of Geneva in the Rhône valley before 1883 (FREY-GESSNER in KOHL 1883, HUBER 1916), and in Sion (Sitten) east of Geneva in the Rhône valley before 1918 (SCHULTHESS-RECHBERG in KOHL 1918). North of the Alps in Switzerland, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has also been verified in Dornach south of Basel in 1995 (TÖPFL in VERNIER, BARBALAT & GONSETH 1996), in Corcelles west of Neuchâtel southwest of Basel in 1995 (VERNIER, BARBALAT & GONSETH 1996), in Zürich in 1995 (UNGRICHT 1995; UNGRICHT in VERNIER, BARBALAT & GONSETH 1996), and in Arbon northnortheast of St. Gallen eastnortheast of Zürich in 1995 (RICKLI in GONSETH, IMBECK & TUSSAC 2001).

Another specimen of the Mud-Dauber *Sceliphron destillatorium* has been encountered in Kleinhüningen that is located at the northern margin of Basel immediately south of the boundary between Switzerland and Germany and east of the boundary between Switzerland and France in the three-countries-triangle by SCHANOWSKI in 2001 (SCHMID-EGGER 2005). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Switzerland has also been reported by BEAUMONT (1964), and the presence of the Mud-Dauber *Sceliphron destillatorium* in Switzerland has already been signaled by SULZER (1776) and RÖMER (1789).

2.17.2 Localities South of the Alps in Switzerland

South of the Alps in Switzerland, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been verified at the Monte Generoso northnortheast of Mendrisio southsoutheast of Lugano from 1994 to 1996 (SALZMANN-WANDELER & REZBANYAI-RESER 1999), in Somazzo at the northnortheastern margin of Mendrisio southsoutheast of Lugano from 1994 to 1996 (SALZMANN-WANDELER & REZBANYAI-RESER 1999), in Meride northnorthwest of Mendrisio southsoutheast of Lugano before 1999 (SALZMANN-WANDELER & REZBANYAI-RESER 2001), in Brè southeast of Lugano (SALZ-

MANN-WANDELER & REZBANYAI-RESER 2001) before 1999; and in Biasca, Claro and Roveredo north to northeast of Bellinzona northnortheast of Lugano in 1997 (SALVIONI 1997).

2.18 Localities of Occurrence of *Sceliphron destillatorium* in Germany

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Germany has so far been confirmed only at a few localities in the Upper Rhine valley, in side valleys of the Upper Rhine valley, and in the Elbe valley and its vicinity.

2.18 1 Localities in the Upper Rhine Valley

The first record of mason nests of the Mud-Dauber *Sceliphron destillatorium* in Germany has been made by PREISS & STALLING in 1997 in Grenzach-Wyhlen (STALLING 2002) which is located abt. 5 km east of Basel in Switzerland where the Mud-Dauber *Sceliphron destillatorium* has already been found before 1883 (KOHL 1883, HUBER 1916). The mason nests of the Mud-Dauber *Sceliphron destillatorium* in Grenzach-Wyhlen have been discovered accidentally when a wooden nesting box for owls which has been fixed in several m height on the inner wall of a wooden barn that is surrounded by orchards and fields south of the village has been checked and two mason nests of the Mud-Dauber *Sceliphron destillatorium* have been found below the ceiling and at the top of the inner wall at the edge to the ceiling of the wooden nesting box that have consisted of eight and nine nest cells, respectively (STALLING 2002). In total 16 individuals of the Mud-Dauber *Sceliphron destillatorium* have emerged from the in total 17 nest cells of the two mason nests some weeks after the discovery of the mason nests, their removal from the nesting box in the barn and their maintenance in the laboratory, with among twelve individuals two males and ten females having been observed (STALLING 2002). The wooden barn south of Grenzach-Wyhlen is located close to the river in the Rhine valley at the southern margin of the Dinkelberg which represents a southern outpost of the Black Forest. The discovery of the Mud-Dauber *Sceliphron destillatorium* in Grenzach-Wyhlen east of Basel by PREISS & STALLING in 1997 (STALLING 2002) has been made only a few years after the last documented records of the Mud-Dauber *Sceliphron destillatorium* in the surroundings of Basel which include confirmations of specimens in Dornach south of Basel in 1995 (TÖPFL in VERNIER, BARBALAT & GONSETH 1996), in Corcelles west of Neuchâtel southwest of Basel in 1995 (VERNIER, BARBALAT & GONSETH 1996) and in Zürich in 1995 (UNGRICHT 1995; UNGRICHT in VERNIER, BARBALAT & GONSETH 1996). Another specimen of the Mud-Dauber *Sceliphron destillatorium* has been encountered in Kleinhüningen that is located at the northern margin of Basel immediately south of the boundary between Switzerland and Germany and east of the boundary between Switzerland and France in the three-countries-triangle by SCHANOWSKI in 2001 (SCHMID-EGGER 2005).

2.18 2 Localities in Side Valleys of the Upper Rhine Valley

GAUSS (1997) has reported a capture of the Mud-Dauber *Sceliphron spirifex* in Kirchzarten eastsoutheast of Freiburg in the Dreisam valley abt. 10 km east of the margin of the Upper Rhine Graben in 1990. A redetermination of the specimen having been captured in 1990 by GAUSS (1997) in Kirchzarten, however, has revealed that it is in fact the Mud-Dauber *Sceliphron destillatorium* (OSTEN to OHL, personal communication 2001; OHL in STALLING 2002; OHL, personal communication 2013). The completely fresh female of the Mud-Dauber *Sceliphron destillatorium* having been discovered by GAUSS (1997) in Kirchzarten would thus represent the second definite record of the Mud-Dauber *Sceliphron destillatorium* in Germany. The specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured by GAUSS (1997) in Kirchzarten in 1990 is kept in the collection of the Museum of Natural History in Stuttgart (OHL, personal communication 2013). The presence of the Mud-Dauber *Sceliphron destillatorium* in Germany has already been signaled by SCHÄFFER (1766) and CHRIST (1791).

2.18.3 Localities in the Elbe Valley and its Vicinity

The collection of the Museum of Natural History in Görlitz in Germany contains a specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (SEIFERT, personal communication 2013). The isolated find of the Mud-Dauber *Sceliphron destillatorium* in Saxony which has been considered as the result of an artificial import (BURGER, personal communication to OHL 1999; OHL 2001) represents also the specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (BURGER, personal communication 2013; CREUTZBURG, personal communication 2013).

2.19 Synanthropical Behaviour

The synanthropical behaviour of the Mud-Dauber *Sceliphron destillatorium* as well as the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* by constructing their mason nests frequently or in many regions even almost exclusively on the walls and below the roofs of buildings in towns and villages has been summarized by MADER (2000 a). The significance of the synanthropical behaviour of the Mediterranean Mud-Dauber *Sceliphron destillatorium* as a prerequisite for its successful advance towards the north has also been emphasized by MINORANSKIJ, CHARCENKO & FOMICEV (1970), FOMICEV & MINORANSKIJ (1971), MINORANSKIJ (1971) and SOSZYNSKI & SOSZYNSKI (1985). Aspects of the synanthropical behaviour of the Mud-Dauber *Sceliphron destillatorium* by nesting on the walls and below the roofs of houses in towns and villages have also been mentioned by CHRIST (1791), ŁOMNICKI (1870), IVANOV (1872), WIERZEJSKI (1874), ROTARIDES (1934), GUSSAKOVSKIJ (1935), MAZEK-FIALLA (1935 a, 1935 b, 1936 a, 1936 b), MOCZAR (1946); MINORANSKIJ, CHARCENKO & FOMICEV (1970); FOMICEV & MINORANSKIJ (1971), MINORANSKIJ (1971), KAZENAS (1972, 1998, 2001, 2002), CARRIERE (2003, 2004), IVANOV & FATERYGA (2003); BURY, SUDOŁ, ZIĘBA & ZYŁA (2009); BILANSKI, KOŁODZIEJ & PAJĄK (2012); BLÖSCH (2012) and FATERYGA & KOVBLYUK (2013 a, 2013 b).

FAHRINGER (1922), KUNTZE (1939), MJARCEVA (1968) and CELARY (1996) have also observed the Mud-Dauber *Sceliphron destillatorium* in the vicinity of buildings, and SCHMIDT-GOEBEL (1876), SCHWAMMBERGER & PRIESNER (1990), UNGRICHT (1995; in VERNIER, BARBALAT & GONSETH 1996), CELARY (1996) and BILANSKI, KOŁODZIEJ & PAJĄK (2012) have noticed females of the Mud-Dauber *Sceliphron destillatorium* upon collection of mud for construction of nests on buildings in towns and villages. TÖPFL (in VERNIER, BARBALAT & GONSETH 1996) has observed a female of the Mud-Dauber *Sceliphron destillatorium* upon capture and transport of a spider for provision of a nest in a town. The English term Mud-Dauber is used according to PECKHAM & PECKHAM (1898), RAU (1928) and SHAFER (1949).

2.20 Flower Visits

The nesting ecology of the Delta Mud Wasp *Delta unguiculatum*, the Mason Bee *Megachile (Chalicodoma) parietina* and the Mud-Dauber *Sceliphron destillatorium* is discussed extensively in MADER (2000 a) which contains also a compilation of the reported flower visits of the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina*. As a supplement, the reported flower visits of the Mud-Dauber *Sceliphron destillatorium* are listed here.

The compilation of the reported flower visits of the Mud-Dauber *Sceliphron destillatorium* includes predominantly Apiaceae or Umbelliferae; subordinately also Fabaceae or Leguminosae, Lamiaceae or Labiatae and Asteraceae or Compositae; and accessorily also various other plant families. Visits of flowers of Apiaceae or Umbelliferae by the Mud-Dauber *Sceliphron destillatorium* have also been mentioned by WERNER (1927), BERNARD (1933), STEINER (1954), ATANASSOV (1955), BENEDEK (1975)

and BILANSKI, KOŁODZIEJ & PAJĄK (2012). On the other hand, SCOBIOLA (1950) has also noted visits of flowers of Asteraceae or Compositae by the Mud-Dauber *Sceliphron destillatorium*.

2.20.1 Apiaceae or Umbelliferae

From the plant family Apiaceae or Umbelliferae, the Mud-Dauber *Sceliphron destillatorium* has been observed visiting flowers of the Ground-Elder or Goutweed *Aegopodium podagraria* (Apiales : Apiaceae) (CELARY 1996), the Toothpick Plant *Ammi visnaga* (Apiales : Apiaceae) (MORICE 1911, KOHL 1918), the Angelica *Angelica* (Apiales : Apiaceae) (GUSENLEITNER 1992), the Wild Angelica or Woodland Angelica *Angelica silvestris* (Apiales : Apiaceae) (BENEDEK 1968, JOZAN 1985), the Hare's-Ear or Thoroughwax *Bupleurum* (Apiales : Apiaceae) (FREITAG, personal communication 2001), the Shrubby Hare's-Ear or Shrub Thoroughwax *Bupleurum fruticosum* (Apiales : Apiaceae) (GAYUBO 1984; FATERYGA, personal communication 2013), the Wild Carrot *Daucus carota* (Apiales : Apiaceae) (MAGRETTI 1881; ZETTEL, GROSS & MAZZUCCO 2001), the Gum-Bearing Olive Parsley *Elaeoselinum gummiferum* (Apiales : Apiaceae) (GAYUBO 1981), the Sea-Holly or Eryngo *Eryngium* (Apiales : Apiaceae) (MARQUET 1875), the Sea-Holly or Eryngo *Eryngium campestre* (Apiales : Apiaceae) (KOHL 1918; FATERYGA, personal communication 2013), the Giant Fennel *Ferula communis* (Apiales : Apiaceae) (GAYUBO 1981), the Giant Fennel *Ferula ugamica* (Apiales : Apiaceae) (ISLAMOV 1986), the Ferulage *Ferulago* (Apiales : Apiaceae) (GAYUBO 1981), the Common Fennel or Sweet Fennel *Foeniculum* (Apiales : Apiaceae) (KOHL 1880, 1918; RUDOW 1912, BIEGELEBEN 1928; WALL, personal communication 2000), the Common Fennel or Sweet Fennel *Foeniculum vulgare* (Apiales : Apiaceae) (MAGRETTI 1881; GAYUBO 1981, 1984; TORMOS & JIMENEZ 1985, GAYUBO & HERAS 1986), the Wild Pepper Fennel or Bitter Fennel *Foeniculum vulgare piperitum* (Apiales : Apiaceae) (RING, personal communication 2013), the Hogweed or Cow-Parsnip *Heracleum sphondylium* (Apiales : Apiaceae) (WISNIOWSKI 2000; NOWAK in BILANSKI, KOŁODZIEJ & PAJĄK 2012), the Garden Lovage *Levisticum officinale* (Apiales : Apiaceae) (BIEGELEBEN 1928), the Garden Parsnip or Wild Parsnip *Pastinaca sativa* (Apiales : Apiaceae) (KOHL 1880, 1918; BENEDEK 1968; WALL, personal communication 2000), the Parsley *Petroselinum sativum* (Apiales : Apiaceae) (MAGRETTI 1881), the Much-Good *Peucedanum cervaria* (Apiales : Apiaceae) (CELARY 1996, 1998), the Dill *Peucedanum graveolens* (Apiales : Apiaceae) (BENEDEK 1968, 1979), and the Villous Deadly Carrot *Thapsia villosa* (Apiales : Apiaceae) (VECHT & BREUGEL 1968, GAYUBO 1981).

2.20.2 Fabaceae or Leguminosae

From the plant family Fabaceae or Leguminosae, the Mud-Dauber *Sceliphron destillatorium* has been observed visiting flowers of the Sainfoin or Holy Clover Milk-Vetch *Astragalus onobrychis* (Fabales : Fabaceae) (JOZAN 1985), the Yellow Lucerne or Blue Alfalfa *Medicago falcata* (Fabales : Fabaceae) (KAZENAS 1972), the Lucerne or Alfalfa *Medicago sativa* (Fabales : Fabaceae) (MJARCEVA 1965), the Restharrow *Ononis spinosa* (Fabales : Fabaceae) (MAZEK-FIALLA 1935 a, 1935 b, 1936 b), the Diverse Scorpion-Vetch or Common Vetch *Securigera varia* (Fabales : Fabaceae) (SCOBIOLA 1950), and the Twin-Flowered Blue Fenugreek or Blue Melilot *Trigonella geminiflora* (Fabales : Fabaceae) (ISLAMOV 1986).

2.20.3 Lamiaceae or Labiatae

From the plant family Lamiaceae or Labiatae, the Mud-Dauber *Sceliphron destillatorium* has been observed visiting flowers of the Mint *Mentha* (Lamiales : Lamiaceae) (GUSENLEITNER 1996 b), the Horse Mint *Mentha longifolia* (Lamiales : Lamiaceae) (FATERYGA, personal communication 2013), the Pennyroyal *Mentha pulegium* (Lamiales : Lamiaceae) (VECHT & BREUGEL 1968), the Plantain or Buckhorn *Plantago* (Lamiales : Plantaginaceae) (MJARCEVA 1965), and the Thyme *Thymus* (Lamiales : Lamiaceae) (WALL, personal communication 2000).

2.20.4 Asteraceae or Compositae

From the plant family Asteraceae or Compositae, the Mud-Dauber *Sceliphron destillatorium* has been observed visiting flowers of the Distuff Thistle *Atractylis* (Asterales : Asteraceae) (EBMER, personal communication 2001), the Nodding Thistle or Musk Bristle-Thistle *Carduus nutans* (Asterales : Asteraceae) (ATANASSOV 1962), and the Tall Fleabane or Annual Fleabane *Erigeron annuus* (Asterales : Asteraceae) (JOZAN 1985).

2.20.5 Other Plant Families

From other plant families, the Mud-Dauber *Sceliphron destillatorium* has been observed visiting flowers of the Onion *Allium* (Asparagales : Liliaceae) (KOHL 1880, 1918), the Flowering Rush or Water Gladiolus *Butomus umbellatus* (Alismatales : Butomaceae) (PROTSENKO 2003), the Aromatic Goosefoot *Chenopodium aromaticum* (Caryophyllales : Chenopodiaceae) (BENEDEK 1979), the Field Bindweed *Convolvulus arvensis* (Solanales : Convolvulaceae) (MJARCEVA 1965), the Common Hazel or Cobnut Hazel *Corylus avellana* (Fagales : Betulaceae) (KOHL 1880), the Swallow-Wort *Cynanchum acutum* (Gentianales : Apocynaceae) (FATERYGA, personal communication 2013), the Viper's Bugloss *Echium* (Boraginales : Boraginaceae) (ZAVADIL, SUSTERA & BATA 1937), the Italian Viper's Bugloss *Echium italicum* (Boraginales : Boraginaceae) (ATANASSOV 1962), the Desert Candle or Foxtail Lilly *Eremurus regelii* (Asparagales : Xanthorrhoeaceae) (ISLAMOV 1986), the Common Spindle or European Spindle *Euonymus europaeus* (Celastrales : Celastraceae) (FREITAG, personal communication 2001), the Evergreen Spindle or Japanese Spindle *Euonymus japonicus* (Celastrales : Celastraceae) (KOHL 1880, 1918), the Spurge or Milkweed *Euphorbia* (Malpighiales : Euphorbiaceae) (KAZENAS 1974, SCOBIOLA-PALADE 1989), the Spurge or Milkweed *Euphorbia esula* (Malpighiales : Euphorbiaceae) (KAZENAS 1972), the Spurge or Milkweed *Euphorbia nicaeensis* (Malpighiales : Euphorbiaceae) (GAYUBO & HERAS 1986), the Spurge or Milkweed *Euphorbia seguieriana* (Malpighiales : Euphorbiaceae) (SCOBIOLA-PALADE 1972), the Spurge or Milkweed *Euphorbia steposa* (Malpighiales : Euphorbiaceae) (SCOBIOLA-PALADE 1968 b), the Barbary Wolfberry or Chinese Box-Thorn *Lycium barbarum* (Solanales : Solanaceae) (JOZAN 1985), the Christ's Thorn or Jerusalem Thorn *Paliurus spina-christi* (Rosales : Rhamnaceae) (KORLEVIC 1890, FRITSCH 1915; SEIFERT, personal communication 2013), the White Poplar or Silver-Leaved Poplar *Populus alba* (Malpighiales : Salicaceae) (KORLEVIC 1890), the Tamarisk *Tamarix* (Caryophyllales : Tamaricaceae) (MJARCEVA 1965, KAZENAS 1998), and the Common Jujube or African Lotus *Zizyphus jujuba* (Rosales : Rhamnaceae) (BERNARD 1935, VECHT & BREUGEL 1968). The Mud-Dauber *Sceliphron destillatorium* has also been observed sucking honeydew of the Silver Fir *Abies alba* (Coniferales : Pinaceae) (MASŁOWSKI in BILANSKI, KOŁODZIEJ & PAJĄK 2012), and the Peach *Persica vulgaris* (Rosales : Rosaceae) (MIKULSKI in BILANSKI, KOŁODZIEJ & PAJĄK 2012).

2.21 Cleptoparasites

The nesting ecology of the Delta Mud Wasp *Delta unguiculatum*, the Mason Bee *Megachile (Chalicodoma) parietina* and the Mud-Dauber *Sceliphron destillatorium* is discussed extensively in MADER (2000 a) which contains also a compilation of the reported cleptoparasites of the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina*. As a supplement, the reported cleptoparasites of the Mud-Dauber *Sceliphron destillatorium* are listed here.

The compilation of the reported cleptoparasites of the Mud-Dauber *Sceliphron destillatorium* contains exclusively other insects which incorporate predominantly Hymenoptera, and subordinately also Coleoptera and Diptera.

Some of the below mentioned cleptoparasites of the Mud-Dauber *Sceliphron destillatorium* from the insect orders Hymenoptera and Diptera represent in fact probably cleptoparasites of primary renters of cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* from the hymenoptera families

Sphecidae (Digger Wasps), Megachilidaë (Mason Bees and Leaf-Cutter Bees) and Eumenidae (Mud Wasps) or even cleptoparasites of secondary renters of cells of nests of other bees and wasps from the hymenoptera families Sphecidae (Digger Wasps), Megachilidae (Mason Bees and Leaf-Cutter Bees) and Eumenidae (Mud Wasps) which have primarily rented cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* (FATERYGA & KOVBLYUK 2013 a).

2.21.1 Hymenoptera

From the insect order Hymenoptera, the reported cleptoparasites of the Mud-Dauber *Sceliphron destillatorium* include the Gold Wasps *Chrysis fasciata* OLIVIER 1790 (RUDOW 1902), *Chrysis ignita* (LINNAEUS 1758) (ROTARIDES 1934, MAZEK-FIALLA 1936 a, MOCZAR 1946), *Chrysis pelopaeicida* BUYSSON 1887 (RUDOW 1902), *Chrysis taczanovskyi* RADOSZKOWSKI 1876 (FATERYGA & KOVBLYUK 2013 a), *Hedychrum nobile* (SCOPOLI 1763) (STEFANI in KOHL 1918), *Stilbum calens* (FABRICIUS 1781) (LICHTENSTEIN 1873, MADER 1939, MJARCEVA 1968), *Stilbum cyanurum* (FORSTER 1771) (STEFANI 1888, FRIESE 1926, BIEGELEBEN 1928, ROTARIDES 1934, MAZEK-FIALLA 1936 a; MOCZAR 1946, 1961; ATANASSOV 1955, OLBERG 1959, MJARCEVA 1968, KAZENAS 2001, GOROBCHISHIN 2005) and *Stilbum splendidum* (FABRICIUS 1775) (LICHTENSTEIN 1873, STEFANI 1883; RUDOW 1902, 1912) (Hymenoptera : Chrysididae); the Ichneumonid Wasps *Acroricnus seductor* (SCOPOLI 1786) (MOCSARY 1884, MOCSARY in KOHL 1918, MANSION 1926, BERLAND 1928, FRILLI 1966, CAMPADELLI & PAGLIANO 1987; YU, ACHTEMBERG & HORSTMANN 2005; MEI, PEZZI, TOGNI & DEVINCENZO 2012), *Stenarella gladiator* (SCOPOLI 1763) (CAMPADELLI & PAGLIANO 1987) and *Therion circumflexum* (LINNAEUS 1758) (CAMPADELLI & PAGLIANO 1987) (Hymenoptera : Ichneumonidae); the Chalcidid Wasp *Smicra myrifex* (SULZER 1776) (Hymenoptera : Chalcididae) (EGGER 1974), the Eulophid Wasp *Melittobia acasta* (WALKER 1839) (Hymenoptera : Eulophidae) (BROWNE 1922, DAHMS 1984, MADL & VIDLAR 2005; TOTH, TOTHOVA & LUKAS 2005; FATERYGA & KOVBLYUK 2013 a), and undetermined ichneumonid wasps (Hymenoptera : Ichneumonidae) (CARRIERE 2003).

2.21.2 Coleoptera

From the insect order Coleoptera, the reported cleptoparasites of the Mud-Dauber *Sceliphron destillatorium* include the Carpet Beetle *Anthrenus* MÜLLER 1764 (Coleoptera : Dermestidae) (MOCZAR 1946; MINORANSKIJ, CHARCENKO & FOMICEV 1970; MINORANSKIJ 1971, CARRIERE 2005), the Glabrous Cabinet Beetle *Trogoderma glabrum* HERBST 1783 (Coleoptera : Dermestidae) (MINORANSKIJ, CHARCENKO & FOMICEV 1970; MINORANSKIJ 1971), and the Orange-Shouldered Blister Beetle *Sitaris muralis* (FORSTER 1771) (Coleoptera : Meloidae) (STEFANI 1883).

2.21.3 Diptera

From the insect order Diptera, the reported cleptoparasites of the Mud-Dauber *Sceliphron destillatorium* include the Flesh Flies *Amobia distorta* ALLEN 1926 (MINORANSKIJ, CHARCENKO & FOMICEV 1970; MINORANSKIJ 1971), *Amobia pelopei* (RONDANI 1859) (KAZENAS 2001, GOROBCHISHIN 2005, FATERYGA & KOVBLYUK 2013 a), *Amobia signata* (MEIGEN 1824) (CAMPADELLI & PAGLIANO 1987), *Senotainia deserta* ROHDENDORF 1935 (MINORANSKIJ 1971, GOROBCHISHIN 2005) and *Senotainia tricuspis* MEIGEN 1838 (MINORANSKIJ 1971) (Diptera : Sarcophagidae); and undetermined flies (Diptera) (ROTARIDES 1934, MOCZAR 1946, CARRIERE 2003).

2.22 Renters

The nesting ecology of the Delta Mud Wasp *Delta unguiculatum*, the Mason Bee *Megachile (Chalicodo-*

ma) parietina and the Mud-Dauber *Sceliphron destillatorium* is discussed extensively in MADER (2000 a) which contains also a compilation of the reported renters of cells of mason nests of the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina.* As a supplement, the reported renters of cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* are listed here.

The compilation of the reported renters of cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* contains exclusively Hymenoptera that incorporate Sphecidae (Digger Wasps), Megachilidae (Mason Bees and Leaf-Cutter Bees), Anthophoridae (Hairy-Footed Flower Bees), Colletidae (Masked Bees), Eumenidae (Mud Wasps) and Pompilidae (Spider Wasps).

Some of the below mentioned renters of cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* from the hymenoptera families Megachilidae (Mason Bees and Leaf-Cutter Bees), Anthophoridae (Hairy-Footed Flower Bees) and Colletidae (Masked Bees) represent in fact probably secondary renters of cells of nests of other bees and wasps from the hymenoptera families Sphecidae (Digger Wasps), Megachilidae (Mason Bees and Leaf-Cutter Bees) and Eumenidae (Mud Wasps) which have primarily rented cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* (FATERYGA & KOVBLYUK 2013 a).

2.22.1 Sphecidae

From the hymenoptera family Sphecidae, the reported renters of cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* include the Digger Wasps *Agenia intermedia* (DAHLBOM 1845) (RUDOW 1912) and *Larra anathema* (ROSSI 1790) (RUDOW 1902, 1912) (Hymenoptera : Sphecidae). The Oriental Blue Mud-Dauber *Chalybion bengalense* (DAHLBOM 1845) has been registered as a renter of cells of mason nests of the Nearctic Mud-Dauber *Sceliphron caementarium* (DRURY 1773) (MEI, PEZZI, TOGNI & DEVINCENZO 2012).

2.22.2 Megachilidae

From the hymenoptera family Megachilidae, the reported renters of cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* include the Mason Bees *Osmia* PANZER 1806 (RUDOW 1902, 1912), *Osmia caerulescens* (LINNAEUS 1758) (MINORANSKIJ, CHARCENKO & FOMICEV 1970; MINORANSKIJ 1971; FATERYGA & KOVBLYUK 2013 a), *Osmia cornuta* (LATREILLE 1805) (FATERYGA & KOVBLYUK 2013 a), *Osmia dimidiata* (MORAWITZ 1870) (FATERYGA & KOVBLYUK 2013 a), *Osmia manicata* MORICE 1901 (FATERYGA & KOVBLYUK 2013 a), *Osmia melanogaster* SPINOLA 1808 (FATERYGA & KOVBLYUK 2013 a), *Osmia niveata* (FABRICIUS 1804) (FATERYGA & KOVBLYUK 2013 a), *Osmia rufa* (LINNAEUS 1758) (CARRIERE 2003; FATERYGA & KOVBLYUK 2013 a) and *Osmia versicolor* LATREILLE 1911 (ROTARIDES 1934) (Hymenoptera : Megachilidae); and the Leaf-Cutter Bees *Megachile apicalis* SPINOLA 1808 (FATERYGA & KOVBLYUK 2013 a), *Megachile ericetorum* LEPELETIER 1841 (FATERYGA & KOVBLYUK 2013 a), *Megachile leachella* CURTIS 1828 (STEFANI 1883) and *Megachile rotundata* (FABRICIUS 1787) (CAMPADELLI & PAGLIANO 1987) (Hymenoptera : Megachilidae).

From the hymenoptera family Anthophoridae, the reported renters of cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* include the Hairy-Footed Flower Bee *Anthophora plumipes* (PALLAS 1772) (Hymenoptera : Anthophoridae) (FATERYGA & KOVBLYUK 2013 a), and from the hymenoptera family Colletidae, the reported renters of cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* include the Masked Bee *Hylaeus* FABRICIUS 1793 (Hymenoptera : Colletidae) (FATERYGA & KOVBLYUK 2013 a).

2.22.3 Eumenidae

From the hymenoptera family Eumenidae, the reported renters of cells of mason nests of the Mud-

Dauber *Sceliphron destillatorium* include the Mud Wasps *Odynerus* LATREILLE 1802 (RUDOW 1902, 1912; IWATA 1976), *Euodynerus dantici* (ROSSI 1790) (FATERYGA & KOVBLYUK 2013 a), *Euodynerus disconotatus* (LICHTENSTEIN 1884) (FATERYGA & KOVBLYUK 2013 a), *Euodynerus posticus* (HERRICH-SCHÄFFER 1841) (CAMPADELLI & PAGLIANO 1987), *Ancistrocerus* (EVANS & EBERHARD 1970), *Ancistrocerus auctus* (FABRICIUS 1793) (IVANOV & FATERYGA 2003, FATERYGA 2007, FATERYGA & KOVBLYUK 2013 a), *Ancistrocerus gazella* (PANZER 1798) (FATERYGA & KOVBLYUK 2013 a) and *Ancistrocerus renimaculata* LEPELETIER 1841 (PIEK 1989; CARRIERE 2003, 2005) (Hymenoptera : Eumenidae).

Inversely, MOCZAR (1973) has observed that the Mud-Dauber *Sceliphron destillatorium* has provisioned a nest of the Mud Wasp *Paragymnomerus spiricornis* (SPINOLA 1808) (Hymenoptera : Eumenidae) in loess walls.

2.22.4 Pompilidae

From the hymenoptera family Pompilidae, the reported renters of cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* include the Spider Wasp *Auplopus carbonarius* (SCOPOLI 1763) (Hymenoptera : Pompilidae) (FATERYGA & KOVBLYUK 2013 a).

Undetermined renters of cells of mason nests of the Mud-Dauber *Sceliphron destillatorium* have also been mentioned by MAZEK-FIALLA (1936 a).

3 Collection Review of Localities of Occurrence of *Sceliphron destillatorium* in Poland and Surrounding Countries

In addition to the literature review of the distribution of the Mud-Dauber *Sceliphron destillatorium* in Poland, Ukraina, Russia, Kazakhstan, Uzbekistan, Turkmenistan, Tadzikistan, Azerbajdzhan, Georgia, Slovakia, Czechia, Austria, Hungary, Romania, Croatia, Serbia, Bosna-Hercegovina, Makedonia, Slovenia, Switzerland and Germany, the localities and dates of capturing of various specimens of the Mud-Dauber *Sceliphron destillatorium* in collections which have not been published so far provide important further information for the understanding of the biogeography and the reconstruction of the migration of the Mud-Dauber *Sceliphron destillatorium*. The collection review of the distribution of the Mud-Dauber *Sceliphron destillatorium* includes Ukraina, Russia, Kazakhstan, Uzbekistan, Turkmenistan, Tadzikistan, Kirgisia, Azerbajdzhan, Georgia, Austria, Hungary, Romania, Croatia, Serbia, Makedonia, Slovenia, Switzerland and Germany.

Specimens of the Mud-Dauber *Sceliphron destillatorium* in collections that have already been documented in the literature which is cited above are not repeated here, and therefore this chapter contains no sections on Poland, Czechia and Slovakia, because almost all the discoveries of the Mud-Dauber *Sceliphron destillatorium* in Poland, Czechia and Slovakia up to 2013 have already been published (literature review in chapter 2) and only a few recent records of the Mud-Dauber *Sceliphron destillatorium* in Poland are mentioned for the first time as personal communications in this monograph. The only exception are two specimens of the Mud-Dauber *Sceliphron destillatorium* which have been captured in Sobrance (formerly Szobráncz) east of Michalovce east of Kosice before 1875 by MOCSARY and in Malá Tŕna (formerly Kistornya) southsouthwest of Trebisov eastsoutheast of Kosice in 1909 by NAGY in the eastern part of Slovakia that are kept in the collection of the Museum of Natural History in Budapest in Hungary (VAS, personal communication 2013).

Because I have not received sufficient and satisfactory feedback on all my requests for contribution of information until the editorial deadline, I plan to publish an enlarged version including the material from the still outstanding inquiries and the new results of the coming flight season at a later time.

3.1 Localities of Occurrence of *Sceliphron destillatorium* in Ukraina

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Ukraina has been confirmed at various localities in the western, southern and eastern parts of Ukraina.

3.1.1 Localities in the Western Part of Ukraina

In the southwestern corner of Ukraina near the boundary to Slovakia, MOKROUSOV (personal communication 2013) has collected specimens of the Mud-Dauber *Sceliphron destillatorium* in Kamjanycja northeast of Uzhorod southwest of Lviv in the Uz valley in 2009 and 2012 that are contained in the collection of the University of Niznij Novgorod in Russia (MOKROUSOV, personal communication 2013), and a specimen which has been captured in Mukaceve (formerly Munkács) eastsoutheast of Uzhorod by UJHELYI probably before 1900 is kept in the collection of the Museum of Natural History in Budapest in Hungary (VAS, personal communication 2013).

In the collection of the Museum of Natural History in Stuttgart in Germany, a specimen of the Mud-Dauber *Sceliphron destillatorium* is contained which has been captured in Odessa near the mouth of the Dnestr into the Black Sea in the western part of Ukraina before 1900 (OSTEN, personal communication 2001), thus confirming that the Mud-Dauber *Sceliphron destillatorium* is resident at the northwestern margin of the Black Sea since more than 100 years, and similarly, the collection of the University of Simferopol in Ukraina contains several specimens of the Mud-Dauber *Sceliphron destillatorium* which have been captured in Simferopol, Sevastopol southwest of Simferopol, Catyrdah southeast of Simferopol, Jevpatorija westnorthwest of Simferopol, Kiparisnoe westsouthwest of Alusta southeast of Simferopol, Krasnogorskoe westsouthwest of Bilohirsk (formerly Belogorsk) eastnortheast of Simferopol, Sajtana near Kipcak on the Tarchankut peninsula northwest of Simferopol, Samokhvalovo near Bachcysaraj southwest of Simferopol, Simeiz near Alupka south of Simferopol, and Sudak southwest of Feodosija eastsoutheast of Simferopol on the Crimea peninsula in the southern part of Ukraina between 1849 and 1901 (SHORENKO 2005 a; PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012) that also testify to the existence of the Mud-Dauber *Sceliphron destillatorium* at the northern margin of the Black Sea (including the Azov Sea which is an appendix to the Black Sea) since more than 100 years.

The collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg bears specimens of the Mud-Dauber *Sceliphron destillatorium* which have been captured in Izmail southwest of Odessa in the Danube valley in the western part of Ukraina, and in the Bender province southeast of Chişinau in the Dnestr valley in Moldavia (PESENKO to CELARY, personal communication 2001).

3.1.2 Localities in the Southern Part of Ukraina

In the southern part of Ukraina, the Mud-Dauber *Sceliphron destillatorium* has been captured on the Crimea peninsula near the Alma river south of Simferopol (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Alupka south of Simferopol (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Alusta southeast of Simferopol (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in the vicinity of Alusta southeast of Simferopol in 1987 by NESTEROV (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001) and in 1997 by MOKROUSOV (specimens in the collection of the University of Niznij Novgorod in Russia; MOKROUSOV, personal communication 2013), in Jevpatorija westnorthwest of Simferopol (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), at the

Karadah southwest of Feodosija east of Simferopol in an unknown year by KARAVAJEV (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001; and in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Sevastopol southwest of Simferopol (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Simferopol (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), and in Sudak southwest of Feodosija eastsoutheast of Simferopol in 1988 by BARKALOV (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013).

3.1.3 Localities in the Eastern Part of Ukraina

In the eastern part of Ukraina, the Mud-Dauber *Sceliphron destillatorium* has been captured in the Askanija Nova reserve in the Cherson (Gola Prystan) district near the Dnepr valley in 1984 by NESTEROV (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), in Bandurivka east of Znamjanka southsoutheast of Kijiv in the Inhulec valley which tributes to the Dnepr valley in 1948 by OSYCNJUK (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), in Charkiv eastsoutheast of Kijiv in the Donec valley (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Darivka eastnortheast of Cherson (Gola Prystan) in the Inhulec valley which tributes to the Dnepr valley in 1984 by NESTEROV (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), in Dnipropetrovsk (formerly Jekaterinoslav) in the Dnepr valley in 1861 by NORDMANN (specimen in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013), in Irpin northwest of Kijiv in the Irpin valley which tributes to the Dnepr valley in 1918 by an unknown collector (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), in Kijiv in the Dnepr valley in 1965 by VOINSTVENSKIY (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), in Kirovohrad southsoutheast of Kijiv in the Inhulec valley in 1943 by EICHWERK (specimen in the collection of the Zoological Museum of the University of Hamburg in Germany; SCHÜTTE, personal communication 2013), in Kupjansk eastsoutheast of Charkiv in the Oskil valley which tributes to the Donec valley in 1983 by PLJUSC (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), in Panceve northwest of Kirovohrad southsoutheast of Kijiv in the Inhul valley in 1985 by ROMASENKO (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), in Poltava eastsoutheast of Kijiv in the Vorskia valley which tributes to the Dnepr valley in 1913 by OGOBLIN (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001; and in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Znamjanka northeast of Kirovohrad southsoutheast of Kijiv in the Inhulec valley which tributes to the Dnepr valley in 1927 by PARAMONOV (specimens in collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), and in the Zytomyr (Zitomir) province west of Kijiv in the Teteriv valley that terminates into the Dnepr valley (specimens in collection of the Zoological Institute of Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001).

3.2 Localities of Occurrence of *Sceliphron destillatorium* in Russia

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Russia has been confirmed at various

localities in the southern and northern regions of the southwestern part of Russia.

3.2.1 Localities in the Southern Region of the Southwestern Part of Russia

In the southern region of the southwestern part of Russia, the Mud-Dauber *Sceliphron destillatorium* has been captured in Astrachan in the Volga delta (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), near Nikolskoye at the Volga river in the vicinity of Astrachan in 1989 by LER (specimens in the collection of the Institute of Biology and Soil Science of the Far East Branch of the Russian Academy of Sciences in Vladivostok in Russia; DANILOV, personal communication 2013); in Volgograd (formerly Sarepta) in the Volga valley in 1870 by BECKER and in 1886 by an unknown collector (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), before 1900 (specimens in the collection of SAUSSURE of the Museum of Natural History in Geneva in Switzerland; MERZ, personal communication 2001; LANDRY, personal communication 2013), in an unknown year by LICHTWARDT (specimen in the collection of the German Entomological Institute in Müncheberg; LISTON, personal communication 2013) and in an unknown year by an unknown collector (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001); in Archada in the region of Volgograd in 1960 by PRITIKINA (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013), in Kamysin north of Volgograd in 1949 by VIKTOROV (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013), in Orynbor (formerly Orenburg) in the Oral (formerly Ural) valley in 1915 by GROTHE (specimens in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013), in Kargala eastnortheast of Orynbor in 1915 by GROTHE (specimens in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013), in Krasnodar in the Kuban valley (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Novorossijsk westsouthwest of Krasnodar at the northeastern margin of the Black Sea in an unknown year by KONOW (specimens in the collection of the German Entomological Institute in Müncheberg; LISTON, personal communication 2013; and in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013), in Stavropol east of Krasnodar in the Kuban valley (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Lazarevskaja (Lazarevskoe) northwest of Soci at the northeastern margin of the Black Sea in 1978 by PULAWSKI (specimen in the collection of the Smithsonian Museum of Natural History in Washington in the United States of America; HARRIS, personal communication 2013), in Valujki (formerly Walouiki) east of Charkiv probably before 1913 by VELITSCHKOVSKY (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), and at an unspecified locality in southern Russia before 1900 by TOURNIER (specimens in the collection of the Museum of Natural History in Geneva in Switzerland; MERZ, personal communication 2001; LANDRY, personal communication 2013).

3.2.2 Localities in the Northern Region of the Southwestern Part of Russia

The collection of the University of Niznij Novgorod in Russia includes specimens of the Mud-Dauber *Sceliphron destillatorium* that have been captured in Niznij Novgorod eastnortheast of Moscow in 1923 by SHVERIN; in Pustyn in the vicinity of Arzamas south of Niznij Novgorod eastnortheast of Moscow in 1984 by KRIVONOGOV, in 2001 by IVANOVA, in 2003 by IVCHENKO, in 2004 by SOKOLOVA, and between 2000 and 2010 by MOKROUSOV (MOKROUSOV 2000 a, 2000 b, 2003); in Makarievo

north of Lyskovo eastsoutheast of Niznij Novgorod eastnortheast of Moscow in 2012 by MOKROUSOV, in Melenki southwest of Niznij Novgorod eastnortheast of Moscow in 2005 by MOKROUSOV, in Boldovo in the vicinity of Ruzajevka in Mordovia north of Penza eastsoutheast of Moscow in 2007 by MOKROUSOV, in Puliaevka in the vicinity of Belgorod northnortheast of Charkiv in 2007 by POTANIN, in Asanovo in the vicinity of Shemursha in Chuvashia southwest of Kazan in 1956 by KOZLOV & OLIGER (MOKROUSOV, BEREZIN & EGOROV 2011), in the vicinity of Verchneuslonskij in Tatarstan southeast of Kazan in 2009 by VAFIN, and in the vicinity of Laishevo in Tatarstan southeast of Kazan in 2008 by SHULAEV (MOKROUSOV, personal communication 2013).

The collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg bears specimens of the Mud-Dauber *Sceliphron destillatorium* which have been captured in the Dankov district in the Rjazan province southeast of Moscow in the Oka valley that tributes to the Volga valley, in the Penza province northnorthwest of Saratov, in Ufa eastnortheast of Samara in the Belaja valley which tributes to the Kama valley that terminates into the Volga valley, and in the Samara (formerly Kujbysev) province in the Volga valley (PESENKO to CELARY, personal communication 2001).

The collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America contains a specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured in Pinsk east of Brest in the Prypjat valley in Belarus (PULAWSKI, personal communication 2013).

3.3 Localities of Occurrence of *Sceliphron destillatorium* in Kazakhstan

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Kazakhstan has been confirmed at various localities in the southern, eastern, western and northern parts of Kazakhstan.

3.3.1 Localities in the Southern and Eastern Parts of Kazakhstan

In the southern and eastern parts of Kazakhstan, the Mud-Dauber *Sceliphron destillatorium* has been captured in Aktöbe (formerly Aktjubinsk) southeast of Orynbor (formerly Orenburg) in 1985 by NESTEROV (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), at the Ile (formerly Ili) river in the region of Almaty in 2010 by POTANIN (specimens in the collection of the University of Niznij Novgorod in Russia; MOKROUSOV, personal communication 2013), at the Ile (formerly Ili) river near Kapsagaj northnortheast of Almaty in 1990 by PREDEL (CREUTZBURG, personal communication 2013), in Karaoy in the vicinity of the Markakól lake north of Zajsan in 1996 by ZINCHENKO (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013), in Kazaly (formerly Kazalinsk) near the mouth of the Syrdarija river into Lake Aral (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Kyzylorda (formerly Ksyl-Orda) east of Lake Aral westnorthwest of Almaty in 1905 by LEROY (specimens in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013), in the vicinity of Leninogorsk northnorthwest of Zajsan in 1983 by BOHOLDIN (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013), and in Oral (formerly Uralsk) in the Oral (formerly Ural) valley (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001).

3.3.2 Localities in the Northern and Western Parts of Kazakhstan

In the northern and western parts of Kazakhstan, the Mud-Dauber *Sceliphron destillatorium* has been captured near the Emba river that terminates into the Caspian Sea southsouthwest of Aktöbe (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Mangistau (formerly Mangyslak) northeast of Aktau (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Temir south of Aktöbe (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), and in Ujgusk in 1980 by an unknown collector (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001).

3.4 Localities of Occurrence of *Sceliphron destillatorium* in Uzbekistan, Turkmenistan, Tadzikistan and Kirgisia

The occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed at various localities in Uzbekistan, Turkmenistan, Tadzikistan and Kirgisia.

3.4.1 Localities in Uzbekistan

In Uzbekistan, the Mud-Dauber *Sceliphron destillatorium* has been captured in Buchara westsouthwest of Taskent (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001; and in the collection of the Zoologisches Forschungsinstitut of the University of Bonn in Germany; PETERS, personal communication 2013), in Fergana southeast of Taskent by WEBER-BAULER (specimens in the collection of the Museum of Natural History in Geneva in Switzerland; MERZ, personal communication 2001; LANDRY, personal communication 2013), in the Nuratan Tau (Khrebet Nuratau) Mountains and in the Chajat (Khayat) valley near Andebaraut north to northwest of Samarqand (formerly Samarkand) southwest of Taskent (KALUZA, personal communication 2013), and near the Syrdarija river southsouthwest of Taskent (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) and in 1901 by HEYMONS (specimens in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013).

3.4.2 Localities in Turkmenistan

In Turkmenistan, the Mud-Dauber *Sceliphron destillatorium* has been captured in Asgabat (formerly Askhabad or Astrabad) in 1979 by BUGROV (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013), in Firyuza westnorthwest of Asgabat in 1988 by LELEJ (specimens in the collection of the Institute of Biology and Soil Science of the Far East Branch of the Russian Academy of Sciences in Vladivostok; DANILOV, personal communication 2013), in Kara-Kala westnorthwest of Asgabat in 1984 by NESTEROV (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), and in Kerki southeast of Cardzev before 1918 (specimen in the collection of the Zoologisches Forschungsinstitut of the University of Bonn in Germany; PETERS, personal communication 2013).

3.4.3 Localities in Tadzikistan

In Tadzikistan, the Mud-Dauber *Sceliphron destillatorium* has been captured in Gissar westsouthwest of Dusanbe in 1972 (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013), in Kuljab southeast of Dusanbe (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Schajban near Chozent (formerly Leninabad) southsoutheast of Taskent in 1980 by KOROVIN (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), in the Ramit reserve in the Gissar mountain range westsouthwest of Dusanbe in 1978 by ZYKOV (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013) and in 1985 by NESTEROV (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), and in Varzob northnortheast of Dusanbe in 1980 by PLJUSC (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001).

3.4.4 Localities in Kirgisia

In Kirgisia, the Mud-Dauber *Sceliphron destillatorium* has been captured near Kazarman in the region of Zalalabad eastsoutheast of Taskent in 1999 by MOKROUSOV (specimens in the collection of the University of Niznij Novgorod in Russia; MOKROUSOV, personal communication 2013), at the Kekemeren river westsouthwest of Chaek southsouthwest of Biskek in 2001 by DUBATOLOV (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013), at the Kirov water reserve in the Talas region northeast of Taskent in 1999 by MOKROUSOV (specimens in the collection of the University of Niznij Novgorod in Russia; MOKROUSOV, personal communication 2013), in the Kuru-Tegerek gorge in the Satkal valley near Taskömir eastsoutheast of Taskent in 2001 by DUBATOLOV (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013), in Przevalsk southeast of Almaty (formerly Alma-Ata) in 1985 by KRIOLENKO (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), and in the Sary Chelek reserve north of Taskömir eastsoutheast of Taskent in 2000 by DUBATOLOV (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013).

3.5 Localities of Occurrence of *Sceliphron destillatorium* in Azerbajdzhan and Georgia

The occurrence of the Mud-Dauber *Sceliphron destillatorium* has been confirmed at various localities in Azerbajdzhan and Georgia.

3.5.1 Localities in Azerbajdzhan

In Azerbajdzhan and surrounding regions, the Mud-Dauber *Sceliphron destillatorium* has been captured in the Araks (formerly Araxes) valley near Nachicevan (formerly Nachtschewan) southeast of Jerevan (formerly Eriwan) in Azerbajdzhan in 1898 by REITTER (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Bilav

near Nachicevan southeast of Jerevan in Azerbajdzhan in 1977 by OSYCNJUK (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), in Chanlar (formerly Helenendorf) in Azerbajdzhan northeast of Jerevan in 1886 by LEDER (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in the Chosrov reserve eastsoutheast of Jerevan in Armenia in 1979 by OSYCNJUK and in 1983 by NESTEROV (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), and in Jerevan in Armenia in 1898 by KORB (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013) beyond the source region of the Araks.

3.5.2 Localities in Georgia

In Georgia and surrounding regions, the Mud-Dauber *Sceliphron destillatorium* has been captured in Derbent northwest of Baku at the western margin of the Caspian Sea in Dagestan (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Gagra westnorthwest of Suchumi westnorthwest of Tbilisi (formerly Tiflis) at the eastern margin of the Black Sea in Georgia (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), in Machackala northnorthwest of Baku at the western margin of the Caspian Sea in Dagestan in an unknown year by KARAVAJEV (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), and in Tbilisi in the Kura valley in Georgia in 1979 by OSYCNJUK (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001).

3.6 Localities of Occurrence of *Sceliphron destillatorium* in Austria

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in the eastern part of Austria has been confirmed at various localities both north and south of the Alps.

3.6.1 Localities North of the Alps in Austria

North of the Alps in Austria, the Mud-Dauber *Sceliphron destillatorium* has been captured in Baden southsouthwest of Vienna in 1909 by an unknown collector (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Brühl southsouthwest of Vienna in 1881 and 1888 by KOLAZY (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Dornbach in Vienna in 1887 by an unknown collector (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Floridsdorf in Vienna probably between 1880 and 1890 by KOLAZY (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Gars am Kamp south of Horn northwest of Vienna in 1891 by an unknown collector (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Gerasdorf northnortheast of Vienna probably before 1939 by HAMMER (specimen in the collection of the Zoological Museum of the University of Hamburg in Germany; SCHÜTTE, personal communication 2013); in Illmitz at the eastern margin of the Neusiedler See southsoutheast of Vienna in 1933 by MACHURA (specimen in the collection of the Zoological Museum of the University of Hamburg in Germany; SCHÜTTE, personal communication 2013), in 1965 by WALL (personal communication 2000) as well as between 1992 and abt. 2010 by GACK (personal communication 2013; GACK in STALLING 2002); in Josefsthal westnorthwest of Traiskirchen southsouthwest of Vienna in 1866 by MANN (specimen in

the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Kronstein southsouthwest of Rappoltskirchen west of Vienna in 1883 by BECKER (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Krumbach southsoutheast of Neunkirchen south of Vienna in 1935 by TROLL (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in the Marchfeld in 1960 by GAUSS (specimen in the collection of the Adelhauser Museum in Freiburg; SANDEBECK, personal communication 2001) that is the region between Vienna and Marchegg at the March (Morava) at the boundary between Austria and Slovakia, in Piesting southsouthwest of Vienna in 1871 by TSCHEK (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Podersdorf at the eastern margin of the Neusiedler See southeast of Vienna in 1992 by MADL (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Pöllau west of Hartberg southsouthwest of Vienna in 1933 by an unknown collector (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Prater in Vienna in 1861 by TÜRK and probably between 1880 and 1890 by KOLAZY (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), and in Vienna probably between 1880 and 1890 by KOLAZY as well as in 1892 by an unknown collector (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013).

3.6.2 Localities South of the Alps in Austria

South of the Alps in Austria, specimens of the Mud-Dauber *Sceliphron destillatorium* have been captured in Jaun south of St. Peter am Ottersbach southsoutheast of Graz in 1996 by GUSENLEITNER (personal communication 2001), in Mogersdorf east of Jennersdorf eastsoutheast of Graz in 1995 by GUSENLEITNER (personal communication 2001), and in St. Georgen south of Bleiburg eastsoutheast of Klagenfurt in 1994 by EBMER (personal communication 2001).

3.7 Localities of Occurrence of *Sceliphron destillatorium* in Hungary

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Hungary has been confirmed at various localities in the northwestern, northeastern, southwestern and southeastern parts of Hungary.

3.7.1 Localities in the Northwestern Part of Hungary

From the northwestern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Somogy County Museum in Kaposvár (LEVENTE, personal communication 2013) which have been captured by JOZAN in Fertörákos northeast of Sopron westnorthwest of Budapest, in Pákozd eastnortheast of Székesfehérvár westsouthwest of Budapest, in Tés northwest of Várpalota westnorthwest of Székesfehérvár westsouthwest of Budapest, and in Velem southwest of Köszeg northnorthwest of Szombathely west of Budapest.

From the northwestern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Museum of Natural History in Budapest (VAS, personal communication 2013) which have been captured in Budapest in 1949 by SZÖKE & BEHYNA as well as in an unknown year by KUTHY, in Börzsöny north of Kóspallag northnorthwest of Budapest in 1958 by MOCZAR, in Budatétény at the southern margin of Budapest in 1959 by MARTINOVICH, in Csepel at the southern margin of Budapest in an unknown year by CERVA, in Nadap northeast of Székesfehérvár westsouthwest of Budapest in 1951 by MOCZAR, in Pér southeast of Györ west of Budapest in an unknown year by an unknown collector, in Pestszentlörinc at the southeastern margin of Budapest in an unknown year by FEKETE, and in Sukoró northeast of Székesfehérvár westsouthwest of Budapest

in 1951 by BAJARI, ERDÖS & MOCZAR.

In the northwestern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* have also been captured in Györ west of Budapest in 1993 by GRAJETZKI (specimen in the collection of the Museum of Natural History in Görlitz in Germany; SEIFERT, personal communication 2013), and in Simontornya southsoutheast of Székesfehérvár southsouthwest of Budapest in 1909 and 1924 by PILLICH (specimens in the collection of the Museum of Natural History in Budapest; VAS, personal communication) as well as in 1928 by an unknown collector (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013).

3.7.2 Localities in the Northeastern Part of Hungary

From the northeastern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Somogy County Museum in Kaposvár (LEVENTE, personal communication 2013) which have been captured by JOZAN in Gyöngyöstarján northeast of Gyöngyös eastnortheast of Budapest, and in Sárospatak eastnortheast of Miskolc northeast of Budapest.

From the northeastern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Museum of Natural History in Budapest (VAS, personal communication 2013) which have been captured in Bátorliget northeast of Debrecen east of Budapest in 1949 by KASZAB, in Debrecen (formerly Debreczén) east of Budapest probably before 1904 by ZILAHI-KISS and in an unknown year by MOCZAR, in Forró northnortheast of Miskolc northeast of Budapest probably before 1897 by MOCSARY, in Gödöllö eastnortheast of Budapest in an unknown year by BARTKO, in Ipolytarnóc northwest of Salgótarján northnortheast of Budapest in 1996 by JUHASZ, in Magyargéc (formerly Kis-Géc) westsouthwest of Salgótarján northnortheast of Budapest in 1957 by LIPTHAY, in Nagylóc westsouthwest of Salgótarján northnortheast of Budapest in an unknown year by KRALIK, in the Nyirség around Bátorliget northeast of Debrecen east of Budapest in 1948 by MOCZAR & KOVACS, in Örbottyán (formerly Örszentmiklós) north of Veresegyház northnorthwest of Gödöllö eastnortheast of Budapest in 1918 by SAJO, in Rimóc westsouthwest of Salgótarján northnortheast of Budapest in 1958 by LIPTHAY, in Sajóvárkony eastnortheast of Ozd northnorthwest of Eger eastnortheast of Budapest in an unknown year by MOCZAR, in the Sátor Mountains near Telkibánya northnorthwest of Sárospatak eastnortheast of Miskolc northeast of Budapest in 1955 by RACZ, in Vácrátót northnorthwest of Veresegyház northnorthwest of Gödöllö eastnortheast of Budapest in 1948 by KASZAB, and in Veresegyház northnorthwest of Gödöllö eastnortheast of Budapest in in 1954 by UJHELYI.

3.7.3 Localities in the Southwestern Part of Hungary

From the southwestern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Somogy County Museum in Kaposvár (LEVENTE, personal communication 2013) which have been captured by JOZAN in Alsóbogát north of Kaposvár southwest of Budapest, in Bodrog northnorthwest of Kaposvár southwest of Budapest, in Böszénfa southsoutheast of Kaposvár southwest of Budapest, in Büssü northwest of Dombóvár northnorthwest of Pécs southwest of Budapest, in Cserénfa southeast of Kaposvár southwest of Budapest, in Cserkút west of Pécs southsouthwest of Budapest, in Csombárd northwest of Kaposvár southwest of Budapest, in Darány eastnortheast of Barcs southwest of Budapest, in Ecseny northnortheast of Kaposvár southwest of Budapest, in Fülöpszállás southeast of Dunaújváros southsouthwest of Budapest, in Gálosfa southsoutheast of Kaposvár southwest of Budapest, in Gamás north of Kaposvár southwest of Budapest, in Hetes northwest of Kaposvár southwest of Budapest, in Kaposkeresztúr eastsoutheast of Kaposvár southwest of Budapest, in Kaposvár northwest of Pécs southsouthwest of Budapest, in Kisasszond west of Kaposvár southwest of Budapest, in Kisbárapáti northnortheast of Kaposvár southwest of Budapest, in Kiskorpád west of Kaposvár southwest of Budapest, in Mánfa south of Komló north of Pécs southsouthwest of Budapest, in Máza northnortheast of Pécs southsouthwest of Budapest, in Mernye and Mernyeszentmiklós north of Kaposvár southwest of Budapest, in Nagyberki east of Kaposvár southwest of

Budapest, in Nagyszékely westnorthwest of Paks southsouthwest of Budapest, in Orfü southeast of Kaposvár southwest of Budapest, in Osztopán northnorthwest of Kaposvár southwest of Budapest, in Pári southsouthwest of Tamási northeast of Kaposvár southwest of Budapest, in Pécs southsouthwest of Budapest, in Pécsvárad eastnortheast of Pécs southsouthwest of Budapest, in Pincehely eastnortheast of Tamási northeast of Kaposvár southwest of Budapest, in Somodor northnortheast of Kaposvár southwest of Budapest, in Somogyaszaló and Somogygeszti north of Kaposvár southwest of Budapest, in Somogyjád northnorthwest of Kaposvár southwest of Budapest, in Szászvár northwest of Mázа northnortheast of Pécs southsouthwest of Budapest, in Szekszárd southsouthwest of Budapest, in Szenna southwest of Kaposvár southwest of Budapest, in Szigetvár west of Pécs southsouthwest of Budapest, in Tolnanémedi eastnortheast of Tamási northeast of Kaposvár southwest of Budapest, in Várda northnorthwest of Kaposvár southwest of Budapest, and in the Zselic hills south of Kaposvár southwest of Budapest.

From the southwestern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Museum of Natural History in Budapest (VAS, personal communication 2013) which have been captured in the Apajpuszta southsouthwest of Budapest in 1952 by MOCZAR & BAJARI, in Hajós southsoutheast of Kalocsa south of Budapest in an unknown year by TALHAMMER, in Hosszúhetény (formerly Ormánd) eastnortheast of Pécs southsouthwest of Budapest in 1921 by VASVARI, in Mezöfalva (formerly Hercegfalva) westsouthwest of Dunaújváros south of Budapest in 1941 by RUFF, in Ocsa southeast of Dunaharaszti south of Budapest in 1952 by VALEZ, in Paks south of Budapest in 1939 and 1942 by an unknown collector, and in Pécs southsouthwest of Budapest in 1941 by MOCZAR.

From the northern margin of Lake Balaton southwest of Budapest, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Somogy County Museum in Kaposvár (LEVENTE, personal communication 2013) which have been captured by JOZAN in Alsóörs eastnortheast of Balatonfüred, in Badacsonytomaj eastnortheast of Keszthely, in Bakonybél northwest of Veszprém, in Balatonalmádi northeast of Balatonfüred, in Balatonfüred, in Balatonfüzfö northnortheast of Balatonalmádi northeast of Balatonfüred, in Balatonkenese east of Balatonalmádi northeast of Balatonfüred, in Csopak eastnortheast of Balatonfüred, in Lovas southwest of Balatonalmádi northeast of Balatonfüred, in Örvényes westsouthwest of Balatonfüred, in Tagyon westnorthwest of Balatonfüred, in Tapolca westsouthwest of Balatonfüred, in Tihany southsouthwest of Balatonfüred, in Révfülöp southeast of Tapolca, in Szigliget east of Keszthely, and in Veszprémfajsz southsouthwest of Veszprém; and are contained in the collection of the Museum of Natural History in Budapest (VAS, personal communication 2013) which have been captured in Bakonyszentlászló northnorthwest of Veszprém in 1959 by MIHALYI.

From the southern margin of Lake Balaton southwest of Budapest, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Somogy County Museum in Kaposvár (LEVENTE, personal communication 2013) which have been captured by JOZAN in Balatonföldvár westsouthwest of Siófok, in Balatonlelle westsouthwest of Balatonföldvár westsouthwest of Siófok, in Balatonszermes westsouthwest of Balatonföldvár westsouthwest of Siófok, in Fonyód westsouthwest of Balatonföldvár westsouthwest of Siófok, in Kapoly southwest of Siófok, in Köröshegy south of Balatonföldvár westsouthwest of Siófok, in Kötcse southsoutheast of Balatonföldvár westsouthwest of Siófok, in Látrány westsouthwest of Balatonföldvár westsouthwest of Siófok, in Siófok, in Tab southsouthwest of Siófok, in Torvaj southsouthwest of Siófok, in Vörs south of Keszthely, and in Zamárdi westsouthwest of Siófok; and are contained in the collection of the Museum of Natural History in Budapest (VAS, personal communication 2013) which have been captured in Zamárdi westsouthwest of Siófok in 1953 by BAJARI & MOCZAR.

From the Örség National Park west of Lake Balaton westsouthwest of Budapest, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Somogy County Museum in Kaposvár (LEVENTE, personal communication 2013) which have been captured by JOZAN in Szentgotthárd southsouthwest of Szombathely, in Hegyhátszentjakab eastsoutheast of Szentgotthárd, in Öriszentpéter eastsoutheast of Szentgotthárd, and in Vasszentmihály eastnortheast of Szentgotthárd.

From the Drava valley at the boundary between Hungary and Croatia west, southwest and south of Pécs, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Somogy County Museum in Kaposvár (LEVENTE, personal communication 2013) which have been

captured by JOZAN in Boldogasszonyfa northnortheast of Szigetvár northeast of Barcs, in Darány eastnortheast of Barcs, in Csurgó southsoutheast of Nagykanizsa, in Gyékényes westnorthwest of Csurgó southsoutheast of Nagykanizsa, in Komlósd south of Nagyatád southeast of Nagykanizsa, in Lad northeast of Barcs, in Somogyszob eastnortheast of Csurgó southsoutheast of Nagykanizsa, in Vejti southsouthwest of Pécs, in Zákány south of Nagykanizsa, and in Zalakaros north of Csurgó southsoutheast of Nagykanizsa.

From the Villány Mountains near the boundary between Hungary and Croatia south and southsoutheast of Pécs, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Somogy County Museum in Kaposvár (LEVENTE, personal communication 2013) which have been captured by JOZAN in Máriagyüd northwest of Siklós south of Pécs, and in Nagyharsány eastsoutheast of Siklós southsoutheast of Pécs; and are contained in the collection of the Museum of Natural History in Budapest (VAS, personal communication 2013) which have been captured in Máriagyüd northwest of Siklós south of Pécs in 1955 by BAJARI, and in Villány eastnortheast of Siklós southsoutheast of Pécs in 1955 by BAJARI.

In the southwestern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* have also been captured in Budapest in 1927 by STÖCKLEIN (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013), in Dunaharaszti south of Budapest in 1962 by PULAWSKI (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013), in Harkány west of Siklós south of Pécs in 1986 by SIEBER (specimen in the collection of the Museum of Natural History in Görlitz in Germany; SEIFERT, personal communication 2013), in Keszthely at the northwestern margin of Lake Balaton probably before 1939 by an unknown collector (specimen in the collection of the Zoological Museum of the University of Hamburg in Germany; SCHÜTTE, personal communication 2013), in Peszér northnortheast of Dunaújváros south of Budapest (according to index and map in MOCZAR 1972) in an unknown year by an unknown collector (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013), and in Tihany southsouthwest of Balatonfüred southwest of Budapest since 1929 by various collectors (specimens in the collection of the Museum of Natural History in Budapest; VAS, personal communication 2013) and in 1964 by an unknown collector (specimen in the collection of the German Entomological Institute in Müncheberg; LISTON, personal communication 2013).

3.7.4 Localities in the Southeastern Part of Hungary

From the southeastern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Somogy County Museum in Kaposvár (LEVENTE, personal communication 2013) which have been captured by JOZAN in Agasegyháza westsouthwest of Kecskemét southsoutheast of Budapest, in Fülöpháza west of Kecskemét southsoutheast of Budapest, and in Soltszentimre westsouthwest of Kecskemét southsoutheast of Budapest.

From the southeastern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* are contained in the collection of the Museum of Natural History in Budapest (VAS, personal communication 2013) which have been captured in Albertirsa north of Kecskemét southsoutheast of Budapest in 1954 and 1958 by KUTAS, in Bugac westsouthwest of Kiskunfélegyháza southsoutheast of Kecskemét southsoutheast of Budapest in 1924 by SZILADY, in Dombiratos south of Békéscsaba eastsoutheast of Budapest in an unknown year by KUTHY, in Gyömrö southsoutheast of Budapest in 1956 by CSEGEZI, in Jászberény northnorthwest of Szolnok eastsoutheast of Budapest in 1939 by MOCZAR, in Kékes north of Markaz northnorthwest of Szolnok eastsoutheast of Budapest in an unknown year by ZILAHI-KISS, in Kelebia westsouthwest of Szeged southsoutheast of Budapest in 1955 by SZTANKOV, in Kiskunfélegyháza southsoutheast of Kecskemét southsoutheast of Budapest in 1939 by MOCZAR, in Kiskunhalas southsoutheast of Budapest by BAJARI & SOLYMOSNE, in Monor southeast of Budapest in 1957 by BORZSAK, and in Tompa westsouthwest of Szeged southsoutheast of Budapest in 1959 by TOTH and in 1962 by MIHALYI.

In the southeastern part of Hungary, specimens of the Mud-Dauber *Sceliphron destillatorium* have also been captured in Mindszent north of Szeged southsoutheast of Budapest in 1993 by OSTEN (specimen in the collection of the Museum of Natural History in Stuttgart in Germany; OSTEN, personal communication 2001), and in Szeged southsoutheast of Budapest in 1990 by OEHLKE (specimen in the collection of the German Entomological Institute in Müncheberg; LISTON, personal communication 2013) and in an unknown year by FEKETE (specimen in the collection of the Museum of Natural History in Budapest in Hungary; VAS, personal communication 2013).

3.8 Localities of Occurrence of *Sceliphron destillatorium* in Romania

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Romania has been confirmed at various localities in the western and eastern parts of Romania.

3.8.1 Localities in the Western Part of Romania

In the western part of Romania, the Mud-Dauber *Sceliphron destillatorium* has been captured northwest and west of Bucharest in Abrud (formerly Abrudbánya) west of Aiud (formerly Nagyenyed) northeast of Deva northwest of Bucharest in 1909 probably by SZILADY, in Beclean (formerly Bethlen) westsouthwest of Fagaraş westnorthwest of Brasov northnortheast of Bucharest probably before 1904 by ZILAHI-KISS, in Cehu Silvaniei (formerly Szilágycseh) southwest of Baia Mare north of Cluj-Napoca (formerly Klausenburg) northnorthwest of Bucharest probably before 1904 by ZILAHI-KISS, in Ciucea (formerly Csucsa) westnorthwest of Cluj-Napoca in 1944 by MOCZAR, in Haţeg (formerly Hátszeg) south of Deva westnorthwest of Bucharest in 1918 by KÖNCZEY, in Hodod (formerly Hadad) eastnortheast of Oradea northwest of Bucharest probably before 1904 by ZILAHI-KISS, in Hunedoara (formerly Vajdahunyad) south of Deva westnorthwest of Bucharest in 1905 by MOCZAR, in Munţii Retezat (formerly Retyezát or Eisenmarkt) southsouthwest of Haţeg south of Deva westnorthwest of Bucharest in an unknown year by DIOSZEGHY, in Oradea (formerly Nagyvárad) northwest of Bucharest probably before 1872 by MOCSARY, in Orşova westnorthwest of Craiova west of Bucharest probably before 1897 by MOCSARY, in Saschiz (formerly Szászkézd or Schäßburg) eastsoutheast of Sighişoara northwest of Brasov northnortheast of Bucharest in an unknown year by SILBERNAGEL, in Târnaveni (formerly Dicsöszentmartón) southwest of Târgu Mureş northnorthwest of Bucharest probably before 1897 by MOCSARY and in an unknown year by CSIKI, and in Turda (formerly Torda) southsoutheast of Cluj-Napoca northnorthwest of Bucharest in 2000 by JOZAN (all specimens in the collection of the Museum of Natural History in Budapest in Hungary; VAS, personal communication 2013).

3.8.2 Localities in the Eastern Part of Romania

In the eastern part of Romania, the Mud-Dauber *Sceliphron destillatorium* has been captured northeast and east of Bucharest in the sand bank Caraorman in the Danube delta east of Braila northeast of Bucharest in 1965 by NAGY (specimen in the collection of the Smithsonian Museum of Natural History in Washington in the United States of America; HARRIS, personal communication 2013), in Periprava northeast of Tulcea in 1963 by SCOBIOLA (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013), and in Tulcea (formerly Tultscha) east of Braila northeast of Bucharest in 1863 by MANN (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013) and in 1963 by SCOBIOLA (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013).

3.9 Localities of Occurrence of *Sceliphron destillatorium* in Croatia

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Croatia has been confirmed at various localities in the northwestern and southeastern parts of Croatia.

3.9.1 Localities in the Northwestern Part of Croatia

In the northwestern part of Croatia, the Mud-Dauber *Sceliphron destillatorium* has been captured in Baska on the island Krk westsouthwest of Zagreb between 1965 and 1970 by HEINRICH (specimens in the collection of the Senckenberg Museum of Natural History in Frankfurt am Main; KOPELKE, personal communication 2001; PETERS, personal communication 2013; and in the collection of the Museum of Natural History in Karlsruhe; FRICKE, personal communication 2013, VERHAAGH, personal communication 2013) and in 1971 (specimen in the collection of the Museum of Natural History in Kassel; MALEC, personal communication 2001; MANSFELD, personal communication 2013), in Biograd northwest of Split southsoutheast of Zagreb in 1971 by ELBERT (specimen in the collection of the Senckenberg Museum of Natural History in Frankfurt am Main; KOPELKE, personal communication 2001; PETERS, personal communication 2013), in Bakar (formerly Buccari) southeast of Rijeka (formerly Fiume) westsouthwest of Zagreb probably before 1897 by MOCSARY (specimen in the collection of the Museum of Natural History in Budapest in Hungary; VAS, personal communication 2013), in Koromacno south of Labin southsouthwest of Rijeka westsouthwest of Zagreb in 2003 by JOZAN (specimen in the collection of the Somogy County Museum in Kaposvár in Hungary; LEVENTE, personal communication 2013); on the island Krk (formerly Veglia) westsouthwest of Zagreb in 1934 by NADIG (specimens in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013), in 1937 by STÖCKLEIN (specimens in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013), probably before 1939 by MADER (specimens in the collection of the Zoological Museum of the University of Hamburg in Germany; SCHÜTTE, personal communication 2013; in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013; and in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013), before 1940 by MADER (specimens in the collection of the Museum of Zoology in Lausanne; KNISPEL, personal communication 2001) and in 1968 by HEINRICH (specimens in the collection of the Senckenberg Museum of Natural History in Frankfurt am Main; KOPELKE, personal communication 2001; PETERS, personal communication 2013); in Medulin southeast of Pula southwest of Rijeka southwest of Zagreb in 2004 by JOZAN (specimen in the collection of the Somogy County Museum in Kaposvár in Hungary; LEVENTE, personal communication 2013), in Mravinka northeast of Split southsoutheast of Zagreb in 1917 (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013), in Osijek (formerly Eszék) eastsoutheast of Zagreb in 1956 by LENCZY (specimen in the collection of the Museum of Natural History in Budapest in Hungary; VAS, personal communication 2013), in Osor on the island Cres southwest of Zagreb in 1971 by EBMER (personal communication 2001), on the island Pag north of Zadar southsouthwest of Zagreb by MANDRE (specimen in the collection of the Museum of Natural History in Mainz in Germany; RENKER, personal communication 2013), in Pula (formerly Pola) southwest of Rijeka southwest of Zagreb probably before 1918 by SCHLETTERER (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013) and in 1974 by BLÖSCH (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013), on the island Rab (formerly Arbe) southsoutheast of Rijeka southsouthwest of Zagreb in 1914 by BARBATO (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Rovinj (formerly Rovigno) westsouthwest of Rijeka westsouthwest of Zagreb in 1911 by ANISITS (specimens in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013) and in 1969 by an unknown collector (specimens in the collection of the Museum of Natural History in Braunschweig in Germany; KAMCKE, personal communication 2013), in Senj (formerly Zengg) southsoutheast of Rijeka southwest of Zagreb in 1900 by PAVEL and in 1911 by NAGY (specimens in the collection of the Museum of Natural History in Budapest in Hungary; VAS, personal

communication 2013), in Umag westnorthwest of Rijeka westsouthwest of Zagreb in 1975 by EBMER (personal communication 2001), in Vrsar westsouthwest of Rijeka westsouthwest of Zagreb in 1974 by WALL (personal communication 2000), and in Zadar (formerly Zara) southsouthwest of Zagreb in 1871 by GEIGER (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013).

3.9.2 Localities in the Southeastern Part of Croatia

In the southeastern part of Croatia, the Mud-Dauber *Sceliphron destillatorium* has been captured in Bol on the island Brac (formerly Brazza) southsoutheast of Split (formerly Spalato) southsoutheast of Zagreb in 1912 by MAIDL (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Draga eastsoutheast of Trieste westsouthwest of Zagreb in 1964 by WEIFFENBACH (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013), in Dubrovnik (formerly Ragusa) southsoutheast of Zagreb in 1868 by MANN (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Gruz (formerly Gravosa) at the northwestern margin of Dubrovnik southsoutheast of Zagreb in 1914 and 1918 by FAHRINGER (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), on the island Hvar southsoutheast of Zagreb in 1962 by GUSENLEITNER (personal communication 2001) and in 1977 by WALL (personal communication 2000), on the island Korcula southsoutheast of Zagreb in 1912 by CERNY (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013) and in 1959 by MAYRHOFER (specimens in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001), in Makarska eastsoutheast of Split southsoutheast of Zagreb in 1968 by EBMER (personal communication 2001), in Milna on the island Brac southsoutheast of Split southsoutheast of Zagreb in 1971 by PAVICEVIC (CETKOVIC, personal communication 2013), in Mlini eastsoutheast of Dubrovnik southsoutheast of Zagreb in 1957 by EITTINGER (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013), in Moscenicka Draga southwest of Rijeka westsouthwest of Zagreb in an unknown year by an unknown collector (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013), in Orasac northwest of Dubrovnik southsoutheast of Zagreb in 1977 by WALL (personal communication 2000), in Orebic on the peninsula Peljesac southsoutheast of Zagreb in 1912 by MAIDL (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013) and in 1959 by MAYRHOFER (specimens in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001), on the peninsula Peljesac (formerly Sabioncello or Sabionella) northwest of Dubrovnik (formerly Ragusa) southsoutheast of Zagreb in 1900 by PENTHER (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Split southsoutheast of Zagreb in 1862 and 1868 by MANN as well as in 1912 by MAIDL (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Sucurac westnorthwest of Split southsoutheast of Zagreb in 1924 by NOVAK (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Zadar (formerly Zara) southsouthwest of Zagreb in an unknown year by an unknown collector (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013), and in Zelenika east of Hercegnovj southeast of Dubrovnik southsoutheast of Zagreb probably before 1907 by NAGY (specimen in the collection of the Museum of Natural History in Budapest in Hungary; VAS, personal communication 2013).

3.10 Localities of Occurrence of *Sceliphron destillatorium* in Serbia

In Serbia, the Mud-Dauber *Sceliphron destillatorium* has been captured in Apatin northwest of Novi Sad northwest of Belgrade probably before 1897 by MOCSARY (specimen in the collection of the Museum of Natural History in Budapest in Hungary; VAS, personal communication 2013), in Belgrade

in 2002 and 2012 by CETKOVIC (personal communication 2013), in the Beli Rzav gorge near Podstolac westsouthwest of Uzice southwest of Belgrade in 2003 by PAVICEVIC (CETKOVIC, personal communication 2013), in Borca north of Belgrade in 2009 by MILENKOVIC (CETKOVIC, personal communication 2013), in Canj west of Sutomore northnorthwest of Bar southsouthwest of Podgorica southsouthwest of Belgrade in 2012 by PLECAS (CETKOVIC, personal communication 2013), in Deliblato (formerly Deliblat) northnortheast of Kovin east of Belgrade in an unknown year by HOLTZ (specimen in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013), in Dobanovci northwest of Surcin west of Belgrade in 2003 by CETKOVIC (personal communication 2013), in Grebenac (formerly Grebenácz) west of Bela Crkva eastnortheast of Belgrade probably before 1879 by MOCSARY (specimen in the collection of the Museum of Natural History in Budapest in Hungary; VAS, personal communication 2013), in Hutovo Blato southsouthwest of Mostar southwest of Belgrade in 2012 by MLADENOVIC (CETKOVIC, personal communication 2013), in Krusedol northnorthwest of Nova Pazova northnorthwest of Belgrade in 1988 by MLADENOVIC (CETKOVIC, personal communication 2013), in Novi Sad (formerly Újvidék) northwest of Belgrade in 1899 by KERTESZ and in 1944 by MOCZAR (specimens in the collection of the Museum of Natural History in Budapest in Hungary; VAS, personal communication 2013) as well as in 2009 by SAVIC (CETKOVIC, personal communication 2013), in Ripanj south of Belgrade in 2003 by CETKOVIC (personal communication 2013), in Salinac northeast of Smederevo southeast of Belgrade in 2012 by DULIC (CETKOVIC, personal communication 2013), in Ulcinj southsoutheast of Niksič southsouthwest of Belgrade in 1997 and 2003 by CETKOVIC (personal communication 2013), and in Zasavica westsouthwest of Sremska Mitrovica southwest of Novi Sad northwest of Belgrade in 2003 by PAUNOVIC (CETKOVIC, personal communication 2013).

3.11 Localities of Occurrence of *Sceliphron destillatorium* in Makedonia

In Makedonia, the Mud-Dauber *Sceliphron destillatorium* has been captured in Skopje (formerly Üzküb) in 1917 by SCHULZE (specimen in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013) and in 1918 by STÖCKLEIN (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013), in Stip southeast of Skopje in 1938 by ZWICK-ROEHL (specimen in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013), in Hudova northwest of Dojran southeast of Skopje in 1917 by FAHRINGER (specimen in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013), and in Konsko westnorthwest of Gevgelija southwest of Skopje in Makedonia in 1988 by MADL (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013).

3.12 Localities of Occurrence of *Sceliphron destillatorium* in Slovenia

In Slovenia, the Mud-Dauber *Sceliphron destillatorium* has been captured in the former Belvedere west of Izola southwest of Trieste in 1911 and 1913 by MAIDL (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in the vicinity of Bohinj westnorthwest of Zelezniki northwest of Ljubljana in 2000 by CREUTZBURG (personal communication 2013), in Kranj (formerly Krain) northnorthwest of Ljubljana (formerly Laibach) in 1911 by MAIDL (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Piran (formerly Pirano) westsouthwest of Trieste in 1909 by MAIDL (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Portoroz southeast of Piran in 1959 by HEINRICH (specimens in the collection of the Senckenberg Museum of Natural History in Frankfurt am Main in Germany; KOPELKE, personal communication 2001; PETERS, personal communication 2013) and in 1960 by HEINRICH (specimen in the collection of the Museum of Natural History in Karlsruhe;

FRICKE, personal communication 2013, VERHAAGH, personal communication 2013), in Secovlje southsoutheast of Piran by JOZAN (specimen in the collection of the Somogy County Museum in Kaposvár in Hungary; LEVENTE, personal communication 2013), in Strunjan (formerly Strugnano) eastsoutheast of Piran in 1931 by MADER (specimen in the collection of the Zoological Museum of the University of Hamburg in Germany; SCHÜTTE, personal communication 2013), and in Vipava (formerly Wippach) eastsoutheast of Nova Gorica west of Ljubljana in 1906 by HANDLIRSCH (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013).

3.13 Localities of Occurrence of *Sceliphron destillatorium* in Switzerland

The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Switzerland has been confirmed at various localities both north and south of the Alps.

3.13.1 Localities North of the Alps in Switzerland

North of the Alps in Switzerland, the Mud-Dauber *Sceliphron destillatorium* has been captured in Arbon northnortheast of St. Gallen eastnortheast of Zürich in 1995 by RICKLI (Centre Suisse de Cartographie de la Faune in Neuchâtel, personal communication 2001; RICKLI in GONSETH, IMBECK & TUSSAC 2001), in Berne in the Aare valley in 1992 (specimen in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001), in Fully northeast of Martigny eastsoutheast of Geneva in the Rhône valley before 1900 (VERNIER, BARBALAT & GONSETH 1996), in Geneva between 1850 and 1860 (specimen in the collection of SAUSSURE in the Museum of Natural History in Geneva; VERNIER, BARBALAT & GONSETH 1996; MERZ, personal communication 2001; LANDRY, personal communication 2013; Centre Suisse de Cartographie de la Faune in Neuchâtel, personal communication 2013), in Sierre (Siders) east of Geneva in the Rhône valley in 1886 by an unknown collector (specimen in the collection of the Museum of Natural History in Geneva; LANDRY, personal communication 2013) and in 1900 by WEIS (specimen in the collection of the Senckenberg Museum of Natural History in Frankfurt am Main, KOPELKE, personal communication 2001; Peters, personal communication 2013); in Sion (Sitten) east of Geneva in the Rhône valley before 1900 by CHEVRIER (specimen in the collection of the Museum of Natural History in Geneva; MERZ, personal communication 2001), in 1901 (determination by KOHL; specimen in the collection of the Zoological Museum of Zürich University; BÄCHLI, personal communication 2001) and in 1908 by STECK (specimen in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001); in Stalden south of Visp east of Geneva in 1886 (specimen in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001), in Visp east of Sierre east of Geneva in the Rhône valley in 1906 (determination by BEAUMONT; specimen in the collection of the Museum of Zoology in Lausanne; FREITAG, personal communication 2001; KNISPEL, personal communication 2001), and in Zürich in 1995 by UNGRICHT (specimen in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013).

3.13.2 Localities South of the Alps in Switzerland

South of the Alps in Switzerland, the Mud-Dauber *Sceliphron destillatorium* has been captured in Agno westsouthwest of Lugano in 1944 by BEAUMONT (specimen in the collection of the Museum of Zoology in Lausanne; FREITAG, personal communication 2001) and in 1944 by NAEF (specimens in the collection of the Museum of Natural History in Luzern; BERNASCONI, personal communication 2013), in Astano west of Lugano in 1954 by SCHENKER (specimen in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001), in Bignasco northwest of Locarno in 1952 by BUCHER (specimen in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001), in Bioggio and Sorengo at the northwestern and southwestern margin

of Lugano in 1944 by NAEF (specimens in the collection of the Museum of Natural History in Luzern; BERNASCONI, personal communication 2013), in Brè southeast of Lugano in 1999 by REZBANYAI-RESER (specimens in the collection of the Museum of Natural History in Luzern; BERNASCONI, personal communication 2013), in Brissago southwest of Locarno in 1971 by KNOLLER (specimen in the collection of the Zoological Museum of Zürich University; BÄCHLI, personal communication 2001), in Cadenazzo at the southwestern margin of Bellinzona in 1944 by NAEF (specimens in the collection of the Museum of Natural History in Luzern; BERNASCONI, personal communication 2013), in Caslano southwest of Lugano in 1924 by NADIG (specimen in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013), in Chiasso southsoutheast of Lugano in 1930 and 1935 by FONTANA (specimens in the collection of the Museum of Natural History in Lugano; POLLINI, personal communication 2001), in Gandria eastsoutheast of Lugano in 1924 by NADIG (specimen in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013), at the Monte Generoso northnortheast of Mendrisio southsoutheast of Lugano in 1995 by REZBANYAI-RESER (specimens in the collection of the Museum of Natural History in Luzern; BERNASCONI, personal communication 2013), in Genestrerio and Laveggio at the southwestern margin of Mendrisio southsoutheast of Lugano in 1999 by CARRON (Centre Suisse de Cartographie de la Faune in Neuchâtel, personal communication 2013), in Gordola eastnortheast of Locarno in 1933 by NADIG (specimens in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013) and in 1967 by EBMER (personal communication 2001); in Grono eastnortheast of Bellinzona northnortheast of Lugano in 1886 and 1888 by an unknown collector (specimens in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001), in 1913 and 1917 by STECK (specimens in the collection of the Museum of Natural History in Basel; BURCKHARDT, personal communication 2001) and in 1923 by STECK (specimens in the collection of the Museum of Natural History in Basel; SPRECHER, personal communication 2013); in Lugano in 1944 by BEAUMONT & MATTHEY and in 1957 by PETITPIERRE (specimens in the collection of the Museum of Zoology in Lausanne; FREITAG, personal communication 2001; KNISPEL, personal communication 2001), in Melide south of Lugano in 1965 (specimen in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013); in Mendrisio southsoutheast of Lugano in 1927 by an unknown collector (specimen in the collection of the Smithsonian Museum of Natural History in Washington in the United States of America; HARRIS, personal communication 2013), in 1944 by BEAUMONT (specimens in the collection of the Museum of Zoology in Lausanne; FREITAG, personal communication 2001; KNISPEL, personal communication 2001) and in 1944 by NAEF (specimens in the collection of the Museum of Natural History in Luzern; BERNASCONI, personal communication 2013); in Mergoscia northeast of Locarno in 1951 by NADIG (specimens in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013), in Meride northnorthwest of Mendrisio southsoutheast of Lugano in 1997 by REZBANYAI-RESER (specimens in the collection of the Museum of Natural History in Luzern; BERNASCONI, personal communication 2013), in Minusio eastnortheast of Locarno in 1958 by BUCHER (specimens in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001), in Mesocco (Misox) northnortheast of Roveredo north of Bellinzona northnortheast of Lugano in 1933 by NADIG (specimens in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013), in Pedrinate southsouthwest of Chiasso southsoutheast of Lugano in 2001 and 2003 by MONNERAT (Centre Suisse de Cartographie de la Faune in Neuchâtel, personal communication 2013), in Ponte Tresa southwest of Caslano southwest of Lugano in 1925 by NADIG (specimen in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013), in Porza north of Lugano in 1943 by BOVET (specimen in the collection of the Museum of Zoology in Lausanne; FREITAG, personal communication 2001); in Roveredo north of Bellinzona northnortheast of Lugano in 1926 by NADIG (specimens in the collection of the University of Zürich; STEINMANN, personal communication 2001; and in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013), in 1926 by STECK (specimens in the collection of the Museum of Natural History in Basel; SPRECHER, personal communication 2013), in 1926 probably by NADIG or by STECK (specimens in the collection of the Museum of Natural History in Geneva; LANDRY, personal communication 2013), in 1935 and 1936 by STECK (specimens in the collection of the Museum of Natural History in Basel; BURCKHARDT, personal communication 2001; and in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001) and in 1935 by STUDER (specimen in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2013); in Rovio southsoutheast of Lugano in 1919 by MASARAY (specimens in the collection of the Museum of Natural History in Basel; BURCKHARDT, personal communication 2001; and in the collection of the Museum of Natural Histo-

ry in Basel; SPRECHER, personal communication 2013), in San Vittore west of Roveredo north of Bellinzona northnortheast of Lugano in 1942 by NADIG and in 1997 by SALVIONI (specimens in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013), in Somazzo at the northnortheastern margin of Mendrisio southsoutheast of Lugano in 1996 by REZBANYAI-RESER (specimens in the collection of the Museum of Natural History in Luzern; BERNASCONI, personal communication 2013), and in Sonvico northnortheast of Lugano in 1975 by BUR (Centre Suisse de Cartographie de la Faune in Neuchâtel, personal communication 2013).

Within the Alps in Switzerland, the Mud-Dauber *Sceliphron destillatorium* has been captured in Brusio southsoutheast of Sankt Moritz in 1935 by NADIG (specimen in the collection of the Eidgenössische Technische Hochschule in Zürich; SCHMID, personal communication 2013) and in 1985 by AMIET (Centre Suisse de Cartographie de la Faune in Neuchâtel, personal communication 2001).

3.14 Localities of Occurrence of *Sceliphron destillatorium* in Germany

The collection of the Museum of Natural History in Görlitz in Germany contains a specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (SEIFERT, personal communication 2013). The isolated find of the Mud-Dauber *Sceliphron destillatorium* in Saxony which has been considered as the result of an artificial import (BURGER, personal communication to OHL 1999; OHL 2001) represents also the specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (BURGER, personal communication 2013; CREUTZBURG, personal communication 2013).

The collection of the Zoologisches Forschungsinstitut of the University of Bonn in Germany includes a specimen of the Mud-Dauber *Sceliphron destillatorium* which has probably been captured in the country of Brandenburg in an unknown year by an unknown collector that originally has been contained in the collection of RENE OBERTHÜR (PETERS, personal communication 2013) and has thus been obtained definitely before the death of RENE OBERTHÜR in 1944 and most probably between 1920 and 1940.

4 Diagnosis of Mason Nest Types of *Sceliphron destillatorium*, *Delta unguiculatum* and *Megachile (Chalicodoma) parietina*

The mason nests of the Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Hymenoptera : Sphecidae), the Delta Mud Wasp *Delta unguiculatum* (VILLERS 1789) (Hymenoptera : Eumenidae) and the Mason Bee *Megachile (Chalicodoma) parietina* (GEOFFROY in FOURCROY 1785) (Hymenoptera : Megachilidae) are fixed on the outer surface of predominantly stone substrates and subordinately also metal substrates, and the mason nests of the Mud-Dauber *Sceliphron destillatorium* are occasionally also attached on the outer and inner surfaces of wood substrates. The mason nests of the Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* are frequently cemented on the walls and below the roofs of buildings in towns and villages similarly as the mason nests of swallows (Aves : Hirundinidae), and are also constructed of a mixture of sand and loam. The mason nests of the Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* can be distinguished by morphology and orientation, aggregation and plastering, and provisioning of the nest cells. The

nesting ecology of the Delta Mud Wasp *Delta unguiculatum*, the Mason Bee *Megachile (Chalicodoma) parietina* and the Mud-Dauber *Sceliphron destillatorium* is discussed extensively in MADER (2000 a). Comments on the distinction of the mason nests of the Mason Bee *Megachile (Chalicodoma) parietina* and the Delta Mud Wasp *Delta unguiculatum* are also offered by HERRMANN (2007).

4.1 Morphology and Orientation of the Nest Cells

The nest cells of the Mud-Dauber *Sceliphron destillatorium* are elongated straight cartridges or cylinders (Plates 1/5 and 2/1 - 4), whereas the nest cells of the Mason Bee *Megachile (Chalicodoma) parietina* are shorter narrow ellipsoidal barrels (Plate 2/5) and the nest cells of the Delta Mud Wasp *Delta unguiculatum* are almost globular to large ellipsoidal pots (Plate 2/6). The elongated straight cartridge- or cylinder-like nest cells of the Mud-Dauber *Sceliphron destillatorium* are terminated at their ends by lateral opercula which are closed by caps with perpendicular angle, whereas the shorter narrow ellipsoidal barrel-like nest cells of the Mason Bee *Megachile (Chalicodoma) parietina* and the almost globular to large ellipsoidal pot-like nest cells of the Delta Mud Wasp *Delta unguiculatum* have rounded ends and either central or lateral opercula.

The elongated straight cartridge- or cylinder-like nest cells of the Mud-Dauber *Sceliphron destillatorium* with lateral opercula are often fixed in horizontal orientation and parallel with their long sides on the substrate in such a manner that at least one of the two opercula at the ends of each nest cell would bring the insect to the open air upon perforation and emergence, whereas the shorter narrow ellipsoidal barrel-like nest cells of the Mason Bee *Megachile (Chalicodoma) parietina* and the almost globular to large ellipsoidal pot-like nest cells of the Delta Mud Wasp *Delta unguiculatum* are usually placed in vertical orientation and parallel or perpendicularly with their long sides on the substrate because of the frequently central position of the opercula.

4.2 Aggregation and Plastering of the Nest Cells

The elongated straight cartridge- or cylinder-like nest cells of the Mud-Dauber *Sceliphron destillatorium*, the shorter narrow ellipsoidal barrel-like nest cells of the Mason Bee *Megachile (Chalicodoma) parietina* and the almost globular to large ellipsoidal pot-like nest cells of the Delta Mud Wasp *Delta unguiculatum* are aggregated to bundles or groups of predominantly 2 - 10 nest cells and subordinately even more nest cells which are covered by a continuous roughcast in the final stage of the construction of the mason nests, with the outer plaster considerably obliterating shape and orientation of the nest cells that are in many cases only evident before their coverage by the roughcast and later after perforation of the plaster by exit holes or upon damage of old mason nests by weathering.

The elongated straight cartridge- or cylinder-like nest cells of the Mud-Dauber *Sceliphron destillatorium*, however, are often reflected in an also elongated shape of the plastered mason nests (Plates 1/3 - 4 and 2/3 - 4) which thus allows their definite recognition also in case of coverage of the nest cells by roughcast. The elongated shape of the plastered mason nests of the Mud-Dauber *Sceliphron destillatorium* originates particularly by the lateral aggregation of several to numerous elongated straight cartridge- or cylinder-like nest cells that contact each other with their long sides and thus the opercula of the successive parallel pipes are aligned in single, double or multiple rows. Further details of the architecture of the mason nests of the Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* are discussed in MADER (2000 a).

4.3 Provisioning of the Nest Cells

Another criterion of distinction of the different mason nests includes the provisioning of the nest cells. The Mud-Dauber *Sceliphron destillatorium* provisions its nest cells with mainly black spiders, whereas

the Delta Mud Wasp *Delta unguiculatum* provisions its nest cells with mainly green caterpillars of noctuid and geometrid butterflies, and the Mason Bee *Megachile (Chalicodoma) parietina* provisions its nest cells with yellow pollen of fabaceous (formerly papilionaceous) plants.

5 Morphology and Colouration of the Females of the Mud-Dauber *Sceliphron* in Europe

The Mud-Dauber *Sceliphron destillatorium* has a very characteristical morphology of the body and a typical distribution of black colour and yellow colour which permits its easy recognition and distinction from other wasps. The determination of the Mud-Dauber *Sceliphron destillatorium* is therefore definitely possible already in the field upon observation of individuals at mason nests, on flowers or upon spider hunting without the necessity of collection of specimens. In the framework of protection of restricted populations of the Mud-Dauber *Sceliphron destillatorium* at isolated nesting sites such as in the southeastern part of Poland and surrounding areas that require support for the maintenance of stability and the spreading to new pioneering places, it is thus recommended to take photographs for documentation and verification of the identification of the Mud-Dauber *Sceliphron destillatorium* instead of capturing of specimens and collection of samples of mason nests.

The following overview includes distribution of species, distribution of black and yellow colour on the body of the females, differential diagnosis of the females, and key for determination of the females of the Mud-Dauber *Sceliphron* in Europe. The studied species of the Mud-Dauber *Sceliphron* in Europe incorporate the Palaearctic Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Figure 1), the Nearctic Mud-Dauber *Sceliphron caementarium* (DRURY 1773) (Figure 2), the Oriental Mud-Dauber *Sceliphron curvatum* (SMITH 1870) (Figure 3), the Palaearctic Mud-Dauber *Sceliphron spirifex* (LINNAEUS 1758) (Figure 4), and the Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex* (LATREILLE 1809) (Figure 5). Examinations of other species of the Mud-Dauber *Sceliphron* in Europe comprising the Oriental Mud-Dauber *Sceliphron deforme* (SMITH 1856) (Figure 6), the Palaearctic Mud-Dauber *Sceliphron funestum* KOHL 1918 (Figure 7), and the Palaearctic Mud-Dauber *Sceliphron arabs* (LEPELETIER 1845) (Figure 8) are contained in SCHMID-EGGER (2005). The distribution of black and yellow colour on the body of the Palaearctic Mud-Dauber *Sceliphron destillatorium* is illustrated in various photographs (Plates 6 and 7).

5.1 Distribution of Species of the Mud-Dauber *Sceliphron* in Europe

For the purpose of comparison and differential diagnosis, the outline of morphology and colouration of the females of the Mud-Dauber *Sceliphron* in Europe includes the Palaearctic Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Figure 1), the Nearctic Mud-Dauber *Sceliphron caementarium* (DRURY 1773) (Figure 2), the Oriental Mud-Dauber *Sceliphron curvatum* (SMITH 1870) (Figure 3), the Palaearctic Mud-Dauber *Sceliphron spirifex* (LINNAEUS 1758) (Figure 4), and the Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex* (LATREILLE 1809) (Figure 5). The distribution of the aforementioned species in Europe is briefly outlined as follows. Comments are also given on other species of the Mud-Dauber *Sceliphron* which have occasionally been discovered in Europe or occur only in parts of Southern Europe and Northern Africa that encompass mainly the Oriental Mud-Dauber *Sceliphron deforme* (SMITH 1856) (Figure 6), the Palaearctic Mud-Dauber *Sceliphron funestum* KOHL 1918 (Figure 7), and the Palaearctic Mud-Dauber *Sceliphron arabs* (LEPELETIER 1845) (Figure 8) which are discussed in SCHMID-EGGER (2005).

Up to now, the Palaearctic Mud-Dauber *Sceliphron destillatorium* and the Oriental Mud-Dauber *Sceliphron curvatum* are the only representatives of the group of Mud-Daubers occurring in Europe that

have been found in Poland (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BILANSKI, KOŁODZIEJ & PAJĄK 2012) as well as (with the exception of some specimens of the Nearctic Mud-Dauber *Sceliphron caementarium*) in Czechia and Slovakia (BOGUSCH & MACEK 2005; BOGUSCH, LISKA, LUKAS & DUDICH 2005; LUKAS, BOGUSCH & LISKA 2006).

5.1.1 The Palaearctic Mud-Dauber *Sceliphron destillatorium*

The Palaearctic Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Figure 1) is an original resident of Southern Europe which has also expanded to parts of Western and Eastern Europe by natural migration.

5.1.2 The Nearctic Mud-Dauber *Sceliphron caementarium*

The Nearctic Mud-Dauber *Sceliphron caementarium* (DRURY 1773) (Figure 2) is an original inhabitant of North America that has been artificially imported to France and other parts of Southern and Western Europe after 1944/1945 and abt. 1970, or probably even already in 1942 to Czechia in Eastern Europe (BOGUSCH & MACEK 2005), and has expanded its distribution in Europe considerably since then (literature review in MADER 2000 a, BOGUSCH & MACEK 2005).

5.1.3 The Oriental Mud-Dauber *Sceliphron curvatum*

The Oriental Mud-Dauber *Sceliphron curvatum* (SMITH 1870) (Figure 3) is an original resident of Asia from India, Pakistan, Kashmir and Nepal to Kazakhstan, Uzbekistan and Tadzikistan which has been artificially imported to Austria in Western Europe after abt. 1975 and has expanded its distribution in Europe rapidly and significantly since then (literature review in MADER 2000 a; CETKOVIC, RADOVIC & DOROVIC 2004; HELLRIGL 2004; BOGUSCH, LISKA, LUKAS & DUDICH 2005; RAHOLA 2005, SCHMID-EGGER 2005, BITSCH & BARBIER 2006; BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BITSCH 2010, PROKOFIEV & SKOMOROKHOV 2010; CETKOVIC, MOKROUSOV, PLECAS, BOGUSCH, ANTIC, DOROVIC-JOVANOVIC, KRPO-CETKOVIC & KARAMAN 2011; SCHARDT, RENKER, STAUDT & REDER 2012; FATERYGA & KOVBLYUK 2013 b; PULAWSKI 2013 a, 2013 b).

5.1.4 The Palaearctic Mud-Dauber *Sceliphron spirifex*

The Palaearctic Mud-Dauber *Sceliphron spirifex* (LINNAEUS 1758) (Figure 4) is an original inhabitant of Southern Europe and Northern Africa that has also advanced to parts of Western and Eastern Europe by natural migration.

5.1.5 The Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex*

The Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex* (LATREILLE 1809) (Figure 5) is also an original resident of Southern Europe which has still more or less remained in its primary extension in the circummediterranean belt.

5.1.6 Other Species of the Mud-Dauber *Sceliphron*

The key for the determination of the species of the Mud-Dauber *Sceliphron* in Europe of SCHMID-EGGER (2005) includes also the Oriental Mud-Dauber *Sceliphron deforme* (SMITH 1856) (Figure 6), the Palaearctic Mud-Dauber *Sceliphron funestum* KOHL 1918 (Figure 7), and the Palaearctic Mud-Dauber *Sceliphron arabs* (LEPELETIER 1845) (Figure 8), with the latter three species not being considered here. The Oriental Mud-Dauber *Sceliphron deforme* (SMITH 1856) (Figure 6) is also an original resident of Asia from Thailand to Kazakhstan as well as in Mongolia, Japan and Taiwan that has been artificially imported to Montenegro in Southern Europe and has probably expanded its distribution in Southern Europe also to other countries since then (literature review in CETKOVIC, RADOVIC & DOROVIC 2004; CETKOVIC, MOKROUSOV, PLECAS, BOGUSCH, ANTIC, DOROVIC-JOVANOVIC, KRPO-CETKOVIC & KARAMAN 2011).

The Palaearctic Mud-Dauber *Sceliphron funestum* KOHL 1918 (Figure 7) is also an original resident of Southern Europe in Turkey and Greece (including Rhodos and Kreta) which has still more or less remained in its primary extension in the circummediterranean belt (literature review in CETKOVIC, MOKROUSOV, PLECAS, BOGUSCH, ANTIC, DOROVIC-JOVANOVIC, KRPO-CETKOVIC & KARAMAN 2011). The Palaearctic Mud-Dauber *Sceliphron arabs* (LEPELETIER 1845) (Figure 8) is also an original inhabitant of Southern Europe and Northern Africa that has still more or less remained in its primary extension in the circummediterranean belt.

In the literature, sometimes also the Palaearctic Mud-Dauber *Sceliphron femoratum* (FABRICIUS 1781) (Figure 9) is mentioned which is also an original inhabitant of Southern Europe and Northern Africa that has occasionally also been found in Western and Eastern Europe (among others BEAUMONT 1945, BALTHASAR & HRUBANT 1961), but is also not considered here. Recently, even the Oriental Blue Mud-Dauber *Chalybion bengalense* (DAHLBOM 1845) which is an original inhabitant of India, China, Japan, Philippines and Australia as well as Middle East and Eastern Africa has been artificially imported to Italy in Southern Europe (MEI, PEZZI, TOGNI & DEVINCENZO 2012), and other species of the Oriental Mud-Dauber *Chalybion* have also been occasionally recorded in Europe (PAGLIANO & NEGRISOLO 2005, BITSCH 2010; MEI, PEZZI, TOGNI & DEVINCENZO 2012).

5.2 Distribution of Black and Yellow Colour on the Body of the Females of the Mud-Dauber *Sceliphron* in Europe

The following descriptions of the distribution of black and yellow colour on the body of the females of the Palaearctic Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Figure 1), the Nearctic Mud-Dauber *Sceliphron caementarium* (DRURY 1773) (Figure 2), the Oriental Mud-Dauber *Sceliphron curvatum* (SMITH 1870) (Figure 3), the Palaearctic Mud-Dauber *Sceliphron spirifex* (LINNAEUS 1758) (Figure 4), and the Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex* (LATREILLE 1809) (Figure 5) are based on the view from above which is usually documented in photographs and drawings. Descriptions of the distribution of black and yellow colour on the body of the females of the Oriental Mud-Dauber *Sceliphron deforme* (SMITH 1856) (Figure 6), the Palaearctic Mud-Dauber *Sceliphron funestum* KOHL 1918 (Figure 7), and the Palaearctic Mud-Dauber *Sceliphron arabs* (LEPELETIER 1845) (Figure 8) are contained in SCHMID-EGGER (2005). The distribution of black and yellow colour on the body of the Palaearctic Mud-Dauber *Sceliphron destillatorium* is illustrated in various photographs (Plates 6 and 7).

The distribution of black and yellow colour on the body is illustrated in good drawings allowing comparative determination of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in SCHÄFFER (1766), CHRIST (1791), KOHL (1918), BEAUMONT (1964), ZAHRADNIK & SEVERA (1976); VERNIER, BARBALAT & GONSETH (1996); BITSCH, BARBIER, GAYUBO, SCHMIDT & OHL (1997) and MADER (2000 a); the Nearctic Mud-Dauber *Sceliphron caementarium* in WESTWOOD (1837) and LECLERCQ & CLAPAREDE (1978), and the Palaearctic Mud-Dauber *Sceliphron spirifex* in CHRIST (1791) and GRANDI (1937, 1961). The distribution of black and yellow colour on the body is also illustrated in good photographs allowing comparative determination of the Oriental Mud-Dauber *Sceliphron curva-*

tum in GEPP (1995), GUSENLEITNER (1995), SCHMID-EGGER (2005); BURY, SUDOŁ, ZIĘBA & ZYŁA (2009), PROKOFIEV & SKOMOROKHOV (2010) and BLÖSCH (2012); the Palaearctic Mud-Dauber *Sceliphron spirifex* in BELLMANN (1999) and BLÖSCH (2000); the Palaearctic Mud-Dauber *Sceliphron destillatorium* in STALLING (2002); BURY, SUDOŁ, ZIĘBA & ZYŁA (2009); KOSIBOWICZ (2009) and BLÖSCH (2012); and the Nearctic Mud-Dauber *Sceliphron caementarium* in BLÖSCH (2012).

Comprehensive descriptions of morphology and colour distribution on the body are contained for the Palaearctic Mud-Dauber *Sceliphron destillatorium* in CHRIST (1791), KOHL (1918), BALTHASAR (1972), DOLLFUSS (1991); BITSCH, BARBIER, GAYUBO, SCHMIDT & OHL (1997) and SCHMID-EGGER (2005); the Nearctic Mud-Dauber *Sceliphron caementarium* in WESTWOOD (1837), KOHL (1918), PORTER (1926), BOHART & MENKE (1963), VECHT & BREUGEL (1968); BITSCH, BARBIER, GAYUBO, SCHMIDT & OHL (1997) and SCHMID-EGGER (2005); the Oriental Mud-Dauber *Sceliphron curvatum* in VECHT (1984), HENSEN (1986), DOLLFUSS (1991); BITSCH, BARBIER, GAYUBO, SCHMIDT & OHL (1997) and SCHMID-EGGER (2005); the Palaearctic Mud-Dauber *Sceliphron spirifex* in CHRIST (1791), MANSION (1913), KOHL (1918); BITSCH, BARBIER, GAYUBO, SCHMIDT & OHL (1997) and SCHMID-EGGER (2005); and the Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex* in KOHL (1918), DOLLFUSS (1991); BITSCH, BARBIER, GAYUBO, SCHMIDT & OHL (1997) and SCHMID-EGGER (2005). Keys for the determination of the species of the Mud-Dauber *Sceliphron* in Europe are given by DOLLFUSS (1991), KAZENAS (1998), VERNIER (2003), SCHMID-EGGER (2005) and JACOBS (2007). An overview drawing displaying the names of the different parts of the body of digger wasps and an index explaining the names of the different parts of the body of digger wasps have been published by DOLLFUSS (1991).

5.2.1 The Palaearctic Mud-Dauber *Sceliphron destillatorium*

The body of the female of the Palaearctic Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Figure 1) reaches a length of 22 - 29 mm (KOHL 1918, SCHMID-EGGER 2005). The most striking element of the body of the Palaearctic Mud-Dauber *Sceliphron destillatorium* is the thin needle- or thread-like yellow petiole which connects the black thorax and the black abdomen as a straight line without incisions. The petiole represents the first tergite of the abdomen, whereas the lobate abdomen behind the petiole starts with the second tergite. While the lobate abdomen inserting at the distal end of the yellow needle- or thread-like petiole as well as the caput of the Mud-Dauber *Sceliphron destillatorium* are entirely black, the thorax above the proximal end of the yellow needle- or thread-like petiole is also mainly black, but exhibits two yellow spots which correspond to the scales on the insertion fields of the fore wings (tegulae) and one yellow line running perpendicularly to the axis of the body across the metanotum in the middle part of the thorax. The legs of the Mud-Dauber *Sceliphron destillatorium* are mainly yellow with several black intervals, and the wings are slightly brownish transparent with yellowish tint. The antennae of the Mud-Dauber *Sceliphron destillatorium* are also black and exhibit a characteristic rolling, with the exception of the insertion intervals of the antennae (scapes) which are also yellow. In some species of the Mud-Dauber *Sceliphron*, the typical yellow colour could be replaced by orange, light brown, light red or even black colour (BOHART & MENKE 1963, 1976). The distribution of black and yellow colour on the body of the Palaearctic Mud-Dauber *Sceliphron destillatorium* is illustrated in various photographs (Plates 6 and 7).

5.2.2 The Nearctic Mud-Dauber *Sceliphron caementarium*

The body of the female of the Nearctic Mud-Dauber *Sceliphron caementarium* (DRURY 1773) (Figure 2) reaches a length of 24 - 28 mm (KOHL 1918, SCHMID-EGGER 2005). The Nearctic Mud-Dauber *Sceliphron caementarium* which has been artificially imported from North America to France and other parts of Southern and Western Europe after 1944/1945 and abt. 1970, or probably even already in 1942 to Czechia in Eastern Europe (BOGUSCH & MACEK 2005), and has expanded its distribution in Europe considerably since then (literature review in MADER 2000 a, BOGUSCH & MACEK 2005) exhibits a very variable distribution of black and yellow colour on the body (KOHL 1918, PORTER 1926,

BOHART & MENKE 1963, VECHT & BREUGEL 1968; HAMON, BITSCH, SCHWARTZ, MALDES, DELMAS, ADAMSKI & TUSSAC 1989; SCHMID-EGGER 2005). The European populations of the Mud-Dauber *Sceliphron caementarium* are mainly characterized by yellow bands across the pronotum in the proximal part, across scutellum and metanotum in the middle part, and across the distal part of the propodeum behind the dorsal field at the distal margin of the otherwise black thorax; a black needle- or thread-like petiole, and a predominantly to entirely yellow second abdominal tergite while the abdomen behind the petiole is otherwise entirely black (LECLERCQ & CLAPAREDE 1978), whereas some North American populations of the Mud-Dauber *Sceliphron caementarium* could be almost wholly black (VECHT & BREUGEL 1968).

The most typical features for the discrimination of *Sceliphron destillatorium* (Figure 1) and *Sceliphron caementarium* (Figure 2) in Europe are thus the yellow needle- or thread-like petiole of *Sceliphron destillatorium* in contrast to the black needle- or thread-like petiole of *Sceliphron caementarium*, the single yellow line on the thorax of *Sceliphron destillatorium* in contrast to the four yellow stripes on the thorax of *Sceliphron caementarium*, and the entirely black abdomen behind the petiole of *Sceliphron destillatorium* in contrast to the yellow second abdominal tergite of the otherwise also wholly black abdomen of *Sceliphron caementarium*. Similarly as *Sceliphron destillatorium*, also the European populations of *Sceliphron caementarium* are mainly characterized by yellow scales on the insertion fields of the fore wings (tegulae), predominantly yellow legs with several black intervals, and yellow insertion intervals (scapes) of the otherwise black antennae. Coxa, trochanter and femur of the hind legs of *Sceliphron caementarium* are entirely black, whereas the hind legs of *Sceliphron destillatorium* exhibit a black coxa, a yellow trochanter, a yellow proximal part of the femur and a black distal part of the femur. The wings of *Sceliphron caementarium* are intensely brownish transparent and are thus considerably darker than the wings of *Sceliphron destillatorium* and *Sceliphron curvatum* (Figure 3) that are slightly brownish transparent with yellowish tint, whereas the wings of *Sceliphron spirifex* (Figure 4) are slightly brownish transparent without yellowish tint.

5.2.3 The Oriental Mud-Dauber *Sceliphron curvatum* and the Palaearctic Mud-Dauber *Sceliphron spirifex*

The body of the female of the Oriental Mud-Dauber *Sceliphron curvatum* (SMITH 1870) (Figure 3) reaches a length of 17 - 22 mm (KOHL 1918, VECHT 1984, DOLLFUSS 1991, SCHMID-EGGER 2005), and the body of the female of the Palaearctic Mud-Dauber *Sceliphron spirifex* (LINNAEUS 1758) (Figure 4) reaches a length of 20 - 29 mm (KOHL 1918, SCHMID-EGGER 2005). The Oriental Mud-Dauber *Sceliphron curvatum* which is an original resident of Asia from India, Pakistan, Kashmir and Nepal to Kazakhstan, Uzbekistan and Tadzikistan that has been artificially imported to Austria in Western Europe after abt. 1975 and has expanded its distribution in Europe rapidly and significantly since then (literature review in MADER 2000 a; CETKOVIC, RADOVIC & DOROVIC 2004; HELLRIGL 2004; BOGUSCH, LISKA, LUKAS & DUDICH 2005; RAHOLA 2005, SCHMID-EGGER 2005, BITSCH & BARBIER 2006; BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BITSCH 2010, PROKOFIEV & SKOMOROKHOV 2010; CETKOVIC, MOKROUSOV, PLECAS, BOGUSCH, ANTIC, DOROVIC-JOVANOVIC, KRPO-CETKOVIC & KARAMAN 2011; SCHARDT, RENKER, STAUDT & REDER 2012; FATERYGA & KOVBLYUK 2013 b; PULAWSKI 2013 a, 2013 b) has a black or brown to reddish brown needle- or thread-like petiole connecting the black or brown to reddish brown thorax and the black or brown to reddish brown abdomen behind the petiole in contrast to the yellow needle- or thread-like petiole of the Palaearctic Mud-Daubers *Sceliphron destillatorium* (Figure 1), *Sceliphron spirifex* and *Sceliphron madraspatanum tubifex* (Figure 5), whereas the Nearctic Mud-Dauber *Sceliphron caementarium* (Figure 2) has also a black needle- or thread-like petiole. *Sceliphron curvatum* is highlighted by the largest distribution of black or brown to reddish brown colour and the smallest distribution of yellow colour of all the Mud-Daubers occurring in Europe. The insertion intervals of the antennae (scapes) and the scales on the insertion fields of the fore wings (tegulae) of *Sceliphron curvatum* and *Sceliphron spirifex* are black or brown to reddish brown in contrast to yellow insertion intervals of the antennae (scapes) and yellow scales on the insertion fields of the fore wings (tegulae) of *Sceliphron destillatorium* and *Sceliphron caementarium*, whereas *Sceliphron madraspatanum tubifex* exhibits black insertion intervals of the antennae (scapes) and yellow scales on the insertion fields of the fore wings (tegulae). The legs of *Sceliphron curvatum* are black or brown to reddish brown without yellow intervals in con-

trast to mainly yellow legs with several black intervals of *Sceliphron destillatorium*, *Sceliphron spirifex*, *Sceliphron caementarium* and *Sceliphron madraspatanum tubifex*.

The thorax of *Sceliphron curvatum* and *Sceliphron caementarium* in European populations is characterized by three smaller yellow regions that are separated by larger black (or brown to reddish brown in *Sceliphron curvatum*) areas, whereas the thorax of *Sceliphron madraspatanum tubifex* displays even four yellow intervals which are separated by black fields. The thorax of *Sceliphron curvatum*, *Sceliphron caementarium* and *Sceliphron madraspatanum tubifex* exhibits yellow bands running perpendicularly to the axis of the body across the pronotum in the proximal part, across the scutellum in the middle part and across the distal part of the propodeum behind the dorsal field at the distal margin of the thorax, whereas *Sceliphron caementarium* and *Sceliphron madraspatanum tubifex* have also a yellow stripe across the metanotum in the middle part of the thorax and yellow scales on the insertion fields of the fore wings (tegulae) similarly as *Sceliphron destillatorium* that is in contrast to *Sceliphron curvatum* which has a black metanotum and black tegulae similarly as *Sceliphron spirifex*. The thorax of *Sceliphron spirifex* is entirely black without any yellow spots and stripes, whereas the thorax of *Sceliphron destillatorium* is mainly black except of the yellow scales on the insertion fields of the fore wings (tegulae) and one yellow line running perpendicularly to the axis of the body across the metanotum in the middle part of the thorax. *Sceliphron madraspatanum tubifex* is the only representative of the group of Mud-Daubers occurring in Europe that has two yellow spots on the dorsal field of the propodeum in the distal part of the thorax, whereas the dorsal field is entirely black in all the other Mud-Daubers living in Europe, and the mesonotum in the middle part of the thorax is exclusively black in all the Mud-Daubers being present in Europe. The abdomen behind the petiole of *Sceliphron destillatorium*, *Sceliphron spirifex*, *Sceliphron curvatum* and *Sceliphron madraspatanum tubifex* is wholly black (or brown to reddish brown in *Sceliphron curvatum*), whereas the second tergite of the black abdomen of *Sceliphron caementarium* is in European populations often entirely yellow. Alternatively, the black or brown to reddish brown abdomen of *Sceliphron curvatum* exhibits several thin yellow lines along the boundaries of the tergites. *Sceliphron curvatum* has also two yellow spots below the base of the fore wings which are not visible from above, reddish seams on the second through fifth abdominal tergites, and sometimes also a yellow spot on the sixth abdominal tergite according to the descriptions in VECHT (1984) and DOLLFUSS (1991).

5.2.4 The Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex*

The body of the female of the Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex* (LATREILLE 1809) (Figure 5) reaches a length of 15 - 22 mm (KOHL 1918, DOLLFUSS 1991, SCHMID-EGGER 2005). *Sceliphron madraspatanum tubifex* is characterized by the greatest abundance of yellow bands and spots on the thorax of all the Mud-Daubers being present in Europe, and because it has additionally also a yellow petiole, *Sceliphron madraspatanum tubifex* is also highlighted by the largest distribution of yellow colour and the smallest distribution of black colour of all the Mud-Daubers occurring in Europe. *Sceliphron madraspatanum tubifex* has yellow scales on the insertion fields of the fore wings (tegulae) similarly as *Sceliphron destillatorium* (Figure 1) and *Sceliphron caementarium* (Figure 2), a yellow band across the pronotum in the proximal part of the thorax similarly as *Sceliphron caementarium* and *Sceliphron curvatum* (Figure 3), a yellow stripe across the scutellum in the middle part of the thorax similarly as *Sceliphron caementarium* and *Sceliphron curvatum*, a yellow line across the metanotum in the middle part of the thorax similarly as *Sceliphron destillatorium* and *Sceliphron caementarium*, a yellow band in the distal part of the propodeum behind the dorsal field at the distal margin of the thorax similarly as *Sceliphron caementarium* and *Sceliphron curvatum*, and in addition also two yellow spots on the dorsal field of the propodeum in the distal part of the thorax which are not exhibited by any other Mud-Dauber occurring in Europe. *Sceliphron madraspatanum tubifex* (Figure 5) has also black insertion intervals of the antennae (scapes) similarly as *Sceliphron spirifex* (Figure 4) and *Sceliphron curvatum*; yellow legs with various black intervals similarly as *Sceliphron destillatorium*, *Sceliphron caementarium* and *Sceliphron spirifex*; a yellow needle- or thread-like petiole similarly as *Sceliphron destillatorium* and *Sceliphron spirifex*; and an entirely black abdomen behind the petiole similarly as *Sceliphron destillatorium*, *Sceliphron spirifex* and *Sceliphron curvatum*. The wings of *Sceliphron madraspatanum tubifex* are moderately brownish transparent with yellowish tint and are not so dark as

the intensely brownish transparent wings of *Sceliphron caementarium*, but are significantly darker than the slightly brownish transparent wings with yellowish tint of *Sceliphron destillatorium* and *Sceliphron curvatum*, whereas the wings of *Sceliphron spirifex* are slightly brownish transparent without yellowish tint.

The upper part of the hind legs including coxa, trochanter and femur of *Sceliphron caementarium* is entirely black, whereas the upper part of the hind legs of *Sceliphron destillatorium*, *Sceliphron spirifex* and *Sceliphron madraspatanum tubifex* is composed of a black coxa and a black distal part of the femur in contrast to a yellow trochanter and a yellow proximal part of the femur. Apart from these differences, the legs of *Sceliphron destillatorium*, *Sceliphron caementarium*, *Sceliphron spirifex* and *Sceliphron madraspatanum tubifex* display more or less the same distribution of black and yellow colour. *Sceliphron destillatorium*, *Sceliphron caementarium*, *Sceliphron spirifex* and *Sceliphron madraspatanum tubifex* are all characterized by a black proximal part of the femur, a yellow distal part of the femur, and a yellow tibia of the fore legs and middle legs; as well as a yellow proximal part of the tibia, a black distal part of the tibia, and a yellow basitarsus of the hind legs. The tarsi of fore legs, middle legs and hind legs of *Sceliphron caementarium* and *Sceliphron madraspatanum tubifex* are predominantly black, and only some of the proximal tarsi of fore legs, middle legs and hind legs of *Sceliphron caementarium* and *Sceliphron madraspatanum tubifex* are brown, yellowish brown, brownish yellow or yellow, whereas the tarsi of fore legs, middle legs and hind legs of *Sceliphron destillatorium* and *Sceliphron spirifex* are mainly yellow, brownish yellow, yellowish brown or brown, and only the distal tarsi of the hind legs of *Sceliphron destillatorium* and *Sceliphron spirifex* are black. The legs of *Sceliphron curvatum* are wholly black or brown to reddish brown.

5.3 Differential Diagnosis of the Females of the Mud-Dauber *Sceliphron* in Europe

The comparison of the distribution of black and yellow colour on the body of the females of the Palaearctic Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Figure 1), the Nearctic Mud-Dauber *Sceliphron caementarium* (DRURY 1773) (Figure 2), the Oriental Mud-Dauber *Sceliphron curvatum* (SMITH 1870) (Figure 3), the Palaearctic Mud-Dauber *Sceliphron spirifex* (LINNAEUS 1758) (Figure 4) and the Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex* (LATREILLE 1809) (Figure 5) which occur in different extension in parts of Europe permits the delineation of distinctive features for the differential diagnosis of the mentioned species. The following descriptions of the distribution of black and yellow colour on the body of the females of the Mud-Dauber *Sceliphron* are based on the view from above which is usually documented in photographs and drawings. Descriptions of the distribution of black and yellow colour on the body of the females of the Oriental Mud-Dauber *Sceliphron deforme* (SMITH 1856) (Figure 6), the Palaearctic Mud-Dauber *Sceliphron funestum* KOHL 1918 (Figure 7), and the Palaearctic Mud-Dauber *Sceliphron arabs* (LEPELETIER 1845) (Figure 8) are contained in SCHMID-EGGER (2005).

5.3.1 The Palaearctic Mud-Dauber *Sceliphron destillatorium*

The Palaearctic Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) (Figure 1) can be determined by the single yellow stripe on the black thorax running across the metanotum, the yellow scales on the insertion fields of the fore wings (tegulae), the yellow insertion intervals of the antennae (scapes), the yellow petiole, the black abdomen behind the petiole, the yellow legs with various black intervals, the yellow trochanter of the hind legs, the yellow proximal part and the black distal part of the femur of the hind legs, the mainly yellow to brown tarsi of the legs, and the slightly brownish transparent wings with yellowish tint. The distribution of black and yellow colour on the body of the Palaearctic Mud-Dauber *Sceliphron destillatorium* is illustrated in various photographs (Plates 6 and 7).

5.3.2 The Nearctic Mud-Dauber *Sceliphron caementarium*

The Nearctic Mud-Dauber *Sceliphron caementarium* (DRURY 1773) (Figure 2) can be identified by the four yellow stripes on the black thorax running across the pronotum, across scutellum and metanotum, and across the distal part of the propodeum behind the dorsal field; the yellow scales on the insertion fields of the fore wings (tegulae), the yellow insertion intervals of the antennae (scapes), the black petiole, the yellow second abdominal tergite of the otherwise black abdomen behind the petiole, the yellow legs with various black intervals, the black trochanter and the black femur of the hind legs, the mainly black tarsi of the legs, and the intensely brownish transparent wings.

5.3.3 The Oriental Mud-Dauber *Sceliphron curvatum*

The Oriental Mud-Dauber *Sceliphron curvatum* (SMITH 1870) (Figure 3) can be distinguished by the three yellow stripes on the black or brown to reddish brown thorax running across the pronotum, across the scutellum, and across the distal part of the propodeum behind the dorsal field; the black or brown to reddish brown scales on the insertion fields of the fore wings (tegulae), the black or brown to reddish brown insertion intervals of the antennae (scapes), the black or brown to reddish brown petiole, the black or brown to reddish brown abdomen behind the petiole, the black or brown to reddish brown legs without any yellow intervals, and the slightly brownish transparent wings with yellowish tint. Alternatively, the black or brown to reddish brown abdomen of *Sceliphron curvatum* exhibits several thin yellow lines along the boundaries of the tergites.

5.3.4 The Palaearctic Mud-Dauber *Sceliphron spirifex*

The Palaearctic Mud-Dauber *Sceliphron spirifex* (LINNAEUS 1758) (Figure 4) can be recognized by the black thorax without any yellow stripes, the black scales on the insertion fields of the fore wings (tegulae), the black insertion intervals of the antennae (scapes), the yellow petiole, the black abdomen behind the petiole, the yellow legs with various black intervals, the yellow trochanter of the hind legs, the yellow proximal part and the black distal part of the femur of the hind legs, the mainly yellow to brown tarsi of the legs, and the slightly brownish transparent wings without yellowish tint.

5.3.5 The Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex*

The Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex* (LATREILLE 1809) (Figure 5) can be verified by the four yellow stripes on the black thorax running across the pronotum, across scutellum and metanotum, and across the distal part of the propodeum behind the dorsal field; the two yellow spots on the black dorsal field of the propodeum, the yellow scales on the insertion fields of the fore wings (tegulae), the black insertion intervals of the antennae (scapes), the yellow petiole, the black abdomen behind the petiole, the yellow legs with various black intervals, the yellow trochanter of the hind legs, the yellow proximal part and the black distal part of the femur of the hind legs, the mainly black tarsi of the legs, and the moderately brownish transparent wings with yellowish tint.

5.4 Key for Determination of the Females of the Mud-Dauber *Sceliphron* in Europe

The distinctive features for the differential diagnosis of the females of the Mud-Daubers *Sceliphron destillatorium* (ILLIGER 1807) (Figure 1), *Sceliphron caementarium* (DRURY 1773) (Figure 2), *Sceli-*

phron curvatum (SMITH 1870) (Figure 3), *Sceliphron spirifex* (LINNAEUS 1758) (Figure 4) and *Sceliphron madraspatanum tubifex* (LATREILLE 1809) (Figure 5) which occur in different extension in parts of Europe are summarized in the following key for the determination of the mentioned species.

Legend
A : *Sceliphron destillatorium* (ILLIGER 1807) (Figure 1)
B : *Sceliphron caementarium* (DRURY 1773) (Figure 2)
C : *Sceliphron curvatum* (SMITH 1870) (Figure 3)
D : *Sceliphron spirifex* (LINNAEUS 1758) (Figure 4)
E : *Sceliphron madraspatanum tubifex* (LATREILLE 1809) (Figure 5)

1 Legs black or brown to reddish brown without yellow intervals C
- Legs yellow with various black intervals 2

2 Abdomen behind the petiole black except of yellow second tergite ..... B
- Abdomen behind the petiole black without yellow intervals 3

3 Petiole black, tegulae black, scapes black 1
- Petiole black, tegulae yellow, scapes yellow 2
- Petiole yellow 4

4 Thorax black without yellow stripes, tegulae black, scapes black ..... D
- Thorax black with yellow stripes 5

5 Yellow stripes on thorax only on metanotum, tegulae yellow, scapes yellow ..... A
- Yellow stripes on thorax on various parts 6

6 Yellow stripes on thorax on pronotum, scutellum and propodeum 1
- Yellow stripes on thorax on pronotum, scutellum, metanotum and propodeum 7

7 Dorsal field black with two yellow spots, petiole yellow, tegulae yellow, scapes black ..... E
- Dorsal field of the propodeum black without yellow spots, petiole black 1
- Dorsal field of the propodeum black without yellow spots, petiole yellow 8

8 Trochanter and femur of hind legs black 1
- Trochanter of hind legs yellow and femur of hind legs black and yellow 9

9 Tarsi mainly black 2
- Tarsi mainly yellow to brown 4

SCHMID-EGGER (2005) presents also a key for the determination of the females and males of the Mud-Dauber *Sceliphron* in Europe and includes in addition also *Sceliphron deforme* (SMITH 1856) (Figure 6), *Sceliphron funestum* KOHL 1918 (Figure 7) and *Sceliphron arabs* (LEPELETIER 1845) (Figure 8) which are not considered here. Keys for the determination of the species of the Mud-Dauber *Sceliphron* in parts of Europe are also given by DOLLFUSS (1991), KAZENAS (1998), VERNIER (2003) and JACOBS (2007).

6 Distribution and Description of Nesting Sites of *Sceliphron destillatorium*

My overview mapping of nesting sites of masoning wasps and bees in the southeastern part of Poland in summer 2000 has resulted in the discovery of nesting sites of the Mud-Dauber *Sceliphron destillatorium* in Cięzkowice northeast of Nowy Sącz (Plate 1/6), Krosno (Plate 1/1 and 1/2), Nowy Sącz, Przemyśl (Plate 1/4), Ropa east of Nowy Sącz (Plate 1/3) and Tarnów (Plate 1/5). The nesting sites in

Nowy Sącz, Ciężkowice northeast of Nowy Sącz and Krosno are located in the Beskid Mountains and their foreland, whereas the nesting site in Tarnów is situated in the Vistula valley and its vicinity and the nesting site in Przemyśl occurs in the San valley and its vicinity. Following some comments on strategy of field mapping and potential of coverage and escape of nesting sites, examples of accidental discovery of hidden nesting sites, and positive and negative results of field investigation, the mentioned nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland which have been discovered during my field mapping in 2000 as well as examples of other nesting sites that have been documented in the literature or have been contributed by personal communications are described. The distances between the isolated localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland and surrounding regions are also outlined.

6.1 Strategy of Field Mapping and Potential of Coverage and Escape of Nesting Sites

In summer 2000, I have carried out an overview mapping of nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland in the triangle between Nowy Sącz in the west, Ustrzyki Górne southsouthwest of Przemyśl in the south and Lublin in the north. Aspects of strategy of field mapping and potential of coverage and escape of nesting sites are discussed as follows.

6.1.1 Strategy of Field Mapping

In the triangle between Nowy Sącz in the west, Ustrzyki Górne southsouthwest of Przemyśl in the south and Lublin in the north in the southeastern part of Poland, I have searched for mason nests of the Mud-Dauber *Sceliphron destillatorium* as well as of other masoning wasps and bees on the walls and below the roofs at the eastern and southern sides of prominent buildings such as particularly churches, school houses, town halls, administration houses, towers, castles and railway stations, but also various other public and private houses. I have examined a suite of older buildings with sculptures, decorations and ornamentations in 55 towns and larger villages in the investigated area in 2000. According to my experience gained during the systematical mapping of nesting sites of the Delta Mud Wasp *Delta unguiculatum* in Germany and France (MADER 2000 a), the thorough checking of a selection of potential buildings with the help of binoculars for a certain time is in most cases sufficient for either finding mason nests and confirming the examined locality as an existing nesting site of masoning wasps and bees, or arriving at the conclusion that mason nests are up to now not present at the reviewed locality which thus has so far not yet become a nesting site of masoning wasps and bees.

In the investigated area in the southeastern part of Poland, I have found mason nests of the Mud-Dauber *Sceliphron destillatorium* in 6 towns and larger villages on the walls and below the roofs of buildings which I have photographed with tele lens (Plate 1/1 - 6), whereas in 49 towns and larger villages, I have searched without success for mason nests of the Mud-Dauber *Sceliphron destillatorium* as well as of other masoning wasps and bees. Because at one of the localities where I have observed mason nests of the Mud-Dauber *Sceliphron destillatorium*, its occurrence has already been confirmed earlier by captures of specimens and also discovery of mason nests, the 5 new localities according to my overview mapping of nesting sites combine together with the 12 localities where specimens had been captured before to a total number of 17 localities with proven occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland up to 2000. Another 15 towns and villages particularly in the mountains which I have also inspected do not contain suitable buildings for nesting and are therefore not incorporated into the evaluation.

For comparison with the nesting sites of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland, I have also examined nesting sites of the Nearctic Mud-Dauber *Sceliphron caementarium* on various prominent buildings in Toronto in Ontario in Canada and in Tuscaloosa in Alabama in the United States of America in 2000.

6.1.2 Potential of Coverage and Escape of Nesting Sites

It has to be emphasized that the search for mason nests of the Mud-Dauber *Sceliphron destillatorium* as well as of other masoning wasps and bees on the walls and below the roofs at the eastern and southern sides of prominent buildings could only lead to the discovery of mason nests that are fixed on the outer walls. Mason nests which would have been constructed by the Mud-Dauber *Sceliphron destillatorium* on the inner walls of buildings could not be found by the screening of the outer walls. It has therefore to be considered that it could not be excluded that mason nests of the Mud-Dauber *Sceliphron destillatorium* could have been hidden on the inner walls of buildings in several localities in the southeastern part of Poland where I have not detected mason nests during the examination of the outer walls of buildings. I have observed mason nests of the Mud-Dauber *Sceliphron destillatorium* on the inner walls of buildings in the churches of the monasteries Kessariani (Kaisariani) and Daphni in Athens in Greece (MADER 2000 a).

In addition, my search for mason nests of the Mud-Dauber *Sceliphron destillatorium* as well as of other masoning wasps and bees has focussed on towns and large villages which contain prominent stone buildings that exhibit frequently also sculptures, decorations and ornamentations, whereas I have not examined many small villages which include considerable amounts of wooden houses, and therefore mason nests of the Mud-Dauber *Sceliphron destillatorium* that would have been attached to the outer or inner walls of wooden houses could not be detected by the screening of the outer walls of stone buildings. Mason nests of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland which have been placed on the inner walls of buildings that have been built of stone or wood have been reported by BURY, SUDOŁ, ZIE, BA & ZYŁA (2009) and BILANSKI, KOŁODZIEJ & PAJĄK (2012).

6.2 Examples of Accidental Discovery of Hidden Nesting Sites

The possibility that mason nests of the Mud-Dauber *Sceliphron destillatorium* which are attached to inner walls of buildings having been constructed of stone or wood are not identified by the strategy of field mapping and escape the systematical screening of the outer walls of prominent buildings is highlighted by the fact that the first discovery of mason nests of the Mud-Dauber *Sceliphron destillatorium* in Germany in Grenzach-Wyhlen east of Basel has been made completely accidentally when a wooden nesting box for owls which has been fixed in several m height on the inner wall of a wooden barn that is surrounded by orchards and fields south of the village has been checked and unexpectedly two mason nests of the Mud-Dauber *Sceliphron destillatorium* have been found on the inner wall of the wooden nesting box that has been attached to the inner wall of the wooden barn (STALLING 2002), and such a hidden nesting site would even have escaped a regular screening of the inner walls of selected buildings.

The same applies for the nesting sites of the Mud-Dauber *Sceliphron destillatorium* which have been discovered in Mików westnorthwest of Ustrzyki Górne by KURZAWA in 1994 (KURZAWA to SOSZYNSKI, personal communication 2001) and in Suche Rzeki southwest of Zatwarnica northnorthwest of Ustrzyki Górne by PALACZYK in 2000 (PALACZYK to SOSZYNSKI, personal communication 2001). KURZAWA has observed a mason nest of the Mud-Dauber *Sceliphron destillatorium* on the metal car body in the inner part of the wreck of a bus which has fallen by accident into a muddy meadow near the Osława creek close to Mików, with the females having reached the mason nest that has not been visible from outside through cracks and gaps in the metal car body (KURZAWA to SOSZYNSKI, personal communication 2001). PALACZYK has seen a mason nest of the Mud-Dauber *Sceliphron destillatorium* on the wooden wall below the roof in the inner part of a hut near the Rzeka creek in Suche Rzeki where wood has been stored, with the females having reached the mason nest that has not been visible from outside through cracks and gaps in the wooden wall of the hut (PALACZYK to SOSZYNSKI, personal communication 2001). The mason nests of the Mud-Dauber *Sceliphron destillatorium* which have been found in Mików westnorthwest of Ustrzyki Górne by KURZAWA in 1994 (KURZAWA to SOSZYNSKI, personal communication 2001) and in Suche Rzeki southwest of Zatwarnica northnorthwest of Ustrzyki Górne by PALACZYK in 2000 (PALACZYK to SOSZYNSKI, personal communication 2001) have been discovered similarly accidentally as the mason nests of the Mud-Dauber *Sceliphron*

destillatorium that have been identified in Grenzach-Wyhlen east of Basel by PREISS & STALLING in 1997 (STALLING 2002), and all these three nesting sites of the Mud-Dauber *Sceliphron destillatorium* would not have been identified by the strategy of field mapping and would have escaped the systematical screening of the outer walls of prominent buildings. Various examples of nesting sites of the Mud-Dauber *Sceliphron destillatorium* on stone or wood inside of houses are reported by BURY, SUDOŁ, ZIĘBA & ZYŁA (2009); BILANSKI, KOŁODZIEJ & PAJĄK (2012) and FATERYGA & KOVBLYUK (2013 a).

The possibility of gaps of detection of mason nests of the Mud-Dauber *Sceliphron destillatorium* and similarly also of the Mason Bee *Megachile (Chalicodoma) parietina* which are hidden on inner walls of buildings having been constructed of stone or wood has therefore to be considered as a potentially significant limit of the evaluation of the distribution of nesting sites by regular field mapping with systematical screening of the outer walls of prominent buildings particularly because the Mud-Dauber *Sceliphron destillatorium* and similarly also the Mason Bee *Megachile (Chalicodoma) parietina* attach their nests both on outer and inner walls, whereas the strategy of field mapping with systematical screening of the outer walls of prominent buildings provides almost total coverage of the distribution of nesting sites of the Delta Mud Wasp *Delta unguiculatum* which fixes its mason nests exclusively on outer walls where they could only be hidden in recesses, holes and ornamentations as well as below arches and roofs (MADER 2000 a).

6.3 Positive and Negative Results of Field Investigation

The positive and negative results of field investigation in the southeastern part of Poland in 2000 are illustrated along the lines of nests of the Mud-Dauber *Sceliphron destillatorium* as well as nests of the Delta Mud Wasp *Delta unguiculatum* and nests of the Mason Bee *Megachile (Chalicodoma) parietina.* Comments are also offered on specimens of the Delta Mud Wasp *Delta unguiculatum* and specimens of the Mason Bee *Megachile (Chalicodoma) parietina* according to remarks in the literature.

6.3.1 Positive Results of Search of Nests of *Sceliphron destillatorium*

During my overview mapping of nesting sites of masoning wasps and bees in the southeastern part of Poland in the triangle between Nowy Sącz in the west, Ustrzyki Górne southsouthwest of Przemyśl in the south and Lublin in the north in summer 2000, I have discovered mason nests of the Mud-Dauber *Sceliphron destillatorium* in Cięzkowice northeast of Nowy Sącz (Plate 1/6), Krosno (Plate 1/1 and 1/2), Nowy Sącz, Przemyśl (Plate 1/4), Ropa east of Nowy Sącz (Plate 1/3) and Tarnów (Plate 1/5). The nesting sites in Nowy Sącz, Cięzkowice northeast of Nowy Sącz and Krosno are located in the Beskid Mountains and their foreland, whereas the nesting site in Tarnów is situated in the Vistula valley and its vicinity and the nesting site in Przemyśl occurs in the San valley and its vicinity.

6.3.2 Negative Results of Search of Nests of *Sceliphron destillatorium*

On the other hand, I have searched without success for mason nests of the Mud-Dauber *Sceliphron destillatorium* in Annopol, Baranów Sandomierski, Biecz, Bircza, Brzeżnica, Brzozów, Chełm, Dąbrowa Tarnowska, Dubiecko, Dynów, Gorlice, Grabownica, Grybów, Jarosław, Jasło, Kazimierz Dolny, Kołaczyce, Kraśnik, Krasnystaw, Krzywcza, Kuźmina, Łancut, Lesko, Lezajsk, Łosie, Lubaczów, Lublin, Lubzina, Mielec, Nisko, Opole Lubelskie, Otfinów, Pilzno, Przeworsk, Puławy, Radymno, Ropczyce, Rzeszów, Sandomierz, Sanok, Stalowa Wola, Stróze, Szczucin, Szymbark, Tarnobrzeg, Trzciana, Tuchów, Ustrzyki Dolne and Zamośc' in the investigated area in the southeastern part of Poland in 2000, although all these localities contain various prominent stone buildings which would provide sui-

table nesting sites for the Mud-Dauber *Sceliphron destillatorium* according to the examples of nesting sites that I have confirmed in Ciężkowice northeast of Nowy Sącz (Plate 1/6), Krosno (Plate. 1/1 and 1/2), Nowy Sącz, Przemyśl (Plate 1/4), Ropa east of Nowy Sącz (Plate 1/3) and Tarnów (Plate 1/5).

I have still examined more localities during my overview mapping which include Bełzec, Dębica, Florynka, Janów Lubelski, Kańczuga, Kozłów, Lubre, Majdan Królewski, Narol, Pruchnik, Rokietnica, Stróże, Tomaszów Lubelski, Ujscie Gorlickie, Ustrzyki Górne and Wetlina where I have also not found mason nests of the Mud-Dauber *Sceliphron destillatorium*, but these additional places are difficult to assess because of the rarity or lack of prominent stone buildings, the frequent predominance of wooden houses, and/or an only scattered distribution of isolated houses in mainly linear villages, and therefore these additional localities are not incorporated into the evaluation of the results.

6.3.3 Negative Results of Search of Nests of *Delta unguiculatum* and *Megachile (Chalicodoma) parietina*

During my overview mapping of nesting sites of masoning wasps and bees in the southeastern part of Poland in the triangle between Nowy Sącz in the west, Ustrzyki Górne southsouthwest of Przemyśl in the south and Lublin in the north in summer 2000, I have also particularly looked for mason nests of the Delta Mud Wasp *Delta unguiculatum* which up to now has not been confirmed in Poland (PUŁAWSKI 1967, MADER 2000 a), but I have not discovered any mason nest which could be assigned to the Delta Mud Wasp *Delta unguiculatum* in the investigated area in the southeastern part of Poland. I have also not seen any mason nest that could be attributed to the Mason Bee *Megachile (Chalicodoma) parietina* in the investigated area in the southeastern part of Poland.

The Mason Bee *Megachile (Chalicodoma) parietina* has formerly existed for many years in an assemblage in Stolec east of Ząbkowice Śląskie south of Wrocław in Lower Silesia (DITTRICH 1924, SCHOLZ 1938, NOSKIEWICZ 1948, MACKO & NOSKIEWICZ 1954; STROJNY 1959, 1961 a, 1961 b, 1963, 1966, 1968, 1971 a, 1971 b, 1975, 1979, 1981 a, 1981 b, 1984, 1987, 1989; JANKOWSKI & POMORSKI 1996; ORGANISCIAK, DUDZIAK & DZIEDZIC 1997; MADER 2000 a) before it has become extinct abt. 25 years ago (STROJNY 1987, 1989), with today only a few old weathered mason nests (Plate 2/5) being still preserved on the wall of the quarry near Stolec where the famous population of the Mason Bee *Megachile (Chalicodoma) parietina* of unique nature in Poland has formerly lived (MADER 2000 a).

6.3.4 Negative Results of Search of Specimens of *Delta unguiculatum* and *Megachile (Chalicodoma) parietina*

In the compilations of the ponto-mediterranean wasps and bees occurring in the Dnestr valley and its surroundings in Podolia and Volhynia in KINEL & NOSKIEWICZ (1930) and KUNTZE & NOSKIEWICZ (1938), the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* are also missing which contrasts with the presence of the Mud-Dauber *Sceliphron destillatorium* and the Mud Wasp *Katamenes arbustorum*. In the overviews of the distribution of bees in the western part of Ukraina including Podolia and Volhynia of WIERZEJSKI (1868, 1874), NOSKIEWICZ (1922 a, 1922 b, 1946) and OSYCNJUK (1961 a, 1961 b, 1964) as well as in the eastern part of Ukraina of JAROSEVSKIJ (1881), the Mason Bee *Megachile (Chalicodoma) parietina* has also not been reported, and SNIEZEK (1910) has even stated that the Mason Bee *Megachile (Chalicodoma) parietina* has not been found in the mentioned area and its surroundings.

In the overviews of the distribution of wasps in the western part of Ukraina including Podolia and Volhynia of WIERZEJSKI (1868, 1874) and NIEZABITOWSKI (1902), the Delta Mud Wasp *Delta unguiculatum* has also not been noticed. PONGRACZ (1923) and KUNTZE & NOSKIEWICZ (1925) have signaled the discovery of the Mason Bee *Chalicodoma* near Puławy in the Vistula valley in Poland, and if the determination would have been correct, this record could most probably be attributed to the Mason

6.4 Description of Nesting Sites of *Sceliphron destillatorium*

The nesting sites of the Mud-Dauber *Sceliphron destillatorium* in Ciężkowice northeast of Nowy Sącz (Plate 1/6), Krosno (Plate 1/1 and 1/2), Nowy Sącz, Przemyśl (Plate 1/4), Ropa east of Nowy Sącz (Plate 1/3) and Tarnów (Plate 1/5) which I have discovered during my overview mapping in the southeastern part of Poland in the triangle between Nowy Sącz in the west, Ustrzyki Górne southsouthwest of Przemyśl in the south and Lublin in the north in summer 2000 are described as follows. The nesting sites in Nowy Sącz, Ciężkowice northeast of Nowy Sącz and Krosno are located in the Beskid Mountains and their foreland, whereas the nesting site in Tarnów is situated in the Vistula valley and its vicinity and the nesting site in Przemyśl occurs in the San valley and its vicinity.

Some comments are also offered on nesting sites of the Mud-Dauber *Sceliphron destillatorium* in Mików westnorthwest of Ustrzyki Górne which has been discovered by KURZAWA in 1994 (KURZAWA to SOSZYNSKI, person. commun. 2001), in Suche Rzeki southwest of Zatwarnica northnorthwest of Ustrzyki Górne that has been noticed by PALACZYK in 2000 (PALACZYK in WISNIOWSKI 2000; PALACZYK to SOSZYNSKI, personal communication 2001), in Lubaczów northnortheast of Przemyśl which has been observed by BURY since 2010 (BURY, personal communication 2013), in Markowa east of Rzeszów that has been found by BURY in 2009 (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BURY, personal communication 2013; Plate 3/8), in Wola Mała eastnortheast of Biłgoraj southwest of Zamość which has been recorded by SZWED in 2009 (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; SZWED, personal communication 2013; Plate 3/1 - 3/3), in Janowice southsoutheast of Sobionowice westsouthwest of Wieliczka southeast of Cracow that has been encountered by BILANSKI in 2011 (BILANSKI, KOŁODZIEJ & PAJĄK 2012; BILANSKI, personal communication 2013; Plate 3/9 and Plate 5/1 - 5/3), in Dębów near Przeworsk eastnortheast of Rzeszów which has been realized by BURY in 2013 (BURY, personal communication 2013), in Przeworsk eastnortheast of Rzeszów that has been identified by BURY in 2013 (BURY, personal communication 2013), in Rozpucie northeast of Tyrawa eastnortheast of Sanok which has been checked by BILANSKI since 2003 (BILANSKI, KOŁODZIEJ & PAJĄK 2012; BILANSKI, personal communication 2013; Plate 5/4 - 5/7), and in Srogów Górny northwest of Sanok that has been noticed by RYBA (personal communication 2013; Plate 3/4 - 3/7 and Plate 4/1 - 4/6) since at least 2000; as well as on nesting sites in various other localities which have been mentioned by BILANSKI, KOŁODZIEJ & PAJĄK (2012) in the southeastern part of Poland; LUKAS, BOGUSCH & LISKA (2006) in Slovakia; and IVANOV & FATERYGA (2003) and FATERYGA & KOVBLYUK (2013 a) in the southern part of Ukraina (Plate 4/7 - 4/9). For comparison with the nests of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland, some nests of the Nearctic Mud-Dauber *Sceliphron caementarium* in Toronto in Ontario in Canada (Plate 2/2 - 2/4) which I have studied in 2000 are also described.

6.4.1 Ropa

The most prominent mason nests of the Mud-Dauber *Sceliphron destillatorium* in the investigated area in the southeastern part of Poland in 2000 are present in Ropa east of Nowy Sącz where I have seen one new greyish brown to yellowish brown mason nest and several old brown, greyish brown, yellowish brown and grey mason nests below the roof of the Spółdzielcy Dom Towarowy at the main street west of the bridge across the Ropa river (Plate 1/3). The nesting site of the Mud-Dauber *Sceliphron destillatorium* in Ropa has already been discovered in 1996 by CELARY (1996, personal communication 2000) who has observed the females taking up mud from the wet banks of the Ropa river and transporting it to the nesting place for a distance of abt. 100 - 200 m. The main street and the bridge across the Ropa river are oriented more or less in north-south-direction in the vicinity of the Spółdzielcy Dom Towarowy in Ropa, and the Ropa river flows east of the main street in Ropa. From the Ropa river, the females of the Mud-Dauber *Sceliphron destillatorium* have flown westwards to the Spółdzielcy Dom Towarowy where they have constructed mason nests on the eastwards-facing wall below the roof. According to the differences in colour of the several mason nests at the Spółdzielcy Dom Towaro-

wy in Ropa, the females of the Mud-Dauber *Sceliphron destillatorium* having constructed the different generations of mason nests have sampled material for the erection of their mason nests at different places where they have collected sand and mud of different colour. The mason nests of the Mud-Dauber *Sceliphron destillatorium* at the Spółdzielcy Dom Towarowy in Ropa are located in the rectangular corner at the boundary between the vertical wall and the horizontal underside of the roof, and are thus attached to both the perpendicular surface of the wall and the reversely flat overhanging surface of the underside of the roof.

The large fresh elongated mason nest of the Mud-Dauber *Sceliphron destillatorium* at the Spółdzielcy Dom Towarowy in Ropa which is composed of a sequence of parallel straight pipe-like nest cells that are masked by roughcast (Plate 1/3) is the most spectacular expression of a very recent completion of a new mason nest which I have seen during my overview mapping of nesting sites in the southeastern part of Poland in 2000. According to the presence of several fresh and weathered mason nests below the roof of the building where they are placed on the orange painting of the horizontal underside of the roof and the white painting of the vertical wall and are installed in the rectangular corner at the boundary between the vertical wall and the horizontal underside of the roof, I estimate that the population of the Mud-Dauber *Sceliphron destillatorium* in Ropa exists already for at least 10 years, because the oldest mason nests are already weathered down to the outlines of the cells and have almost vanished. After the discovery of the suite of mason nests of the Mud-Dauber *Sceliphron destillatorium* at the Spółdzielcy Dom Towarowy, I have also checked numerous other buildings in Ropa, but I have not detected any mason nest on another building in Ropa.

In contrast to the combination of several new and old mason nests in Ropa east of Nowy Sącz, I have found only single fresh mason nests of the Mud-Dauber *Sceliphron destillatorium* in Ciężkowice northeast of Nowy Sącz, Krosno, Nowy Sącz, Przemyśl and Tarnów where they occur exclusively on the individual buildings which are mentioned below, with again no further mason nests having been noticed on any other buildings in the specified localities. From the 6 localities in the southeastern part of Poland where I have discovered nesting sites of the Mud-Dauber *Sceliphron destillatorium*, Ropa is thus the only place where I have seen both old and new mason nests, whereas at all the other places, I have exclusively observed a single fresh mason nest each.

6.4.2 Krosno

In Krosno, I have discovered a grey fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* at the hotel Victoria in the Ordynacka street where it is fixed on red brickstones which have been coated by red painting on the open eastwards-facing wall of the building in some distance from sculptures, decorations and ornamentations (Plate 1/1 and 1/2) and in considerable distance from the roof. Because the side view of the mason nest with hummocky shape reveals that an earlier yellow mason nest has been overbuilt by a later grey mason nest, the nesting site of the Mud-Dauber *Sceliphron destillatorium* in Krosno is probably also already established since at least a couple of years. The overbuilding confirms that the younger generation of the Mud-Dauber *Sceliphron destillatorium* in Krosno has constructed its mason nest exactly at the same spot as the older generation, and the younger generation of the Mud-Dauber *Sceliphron destillatorium* has even superimposed its grey mason nest on the substrate of the yellow mason nest which has been erected by the older generation on the substrate of the red brickstones.

The younger generation of the Mud-Dauber *Sceliphron destillatorium* in Krosno has constructed its mason nest of grey sand, whereas the older generation has built its mason nest of yellow sand, and therefore the two generations of the Mud-Dauber *Sceliphron destillatorium* have sampled material for the erection of their mason nests at different places where they have collected sand of different colour. In Krosno, I have discovered a mason nest of the Mud-Dauber *Sceliphron destillatorium* only at the hotel Victoria in the Ordynacka street, whereas I have searched for mason nests on various other buildings without success.

6.4.3 Tarnów

In Tarnów, I have seen a yellow new mason nest of the Mud-Dauber *Sceliphron destillatorium* on red brickstones below an arch on the eastwards-facing wall of the town hall on the market place (Plate 1/5). The fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* in Tarnów is composed of an assemblage of several typical elongated cartridge- or cylinder-like nest cells with lateral orientation. The fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* in Tarnów consisting of several parallel pipe-like nest cells has probably been accomplished only very recently during the years 2000 or 1999. The still incomplete coverage of the elongated cartridge- or cylinder-like nest cells by roughcast even suggests that the construction of the fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* in Tarnów has probably not yet been terminated at the moment of my observation. On the two churches close to the market place which are similarly as the town hall on the market place in Tarnów und the church in Cięzkowice northeast of Nowy Sącz built of red brickstones with ornamentations of yellow sandstones, I have not detected any traces of mason nests of the Mud-Dauber *Sceliphron destillatorium*. In Tarnów, I have discovered a mason nest of the Mud-Dauber *Sceliphron destillatorium* only at the town hall on the market place, whereas I have searched for mason nests on various other buildings without success.

6.4.4 Nowy Sącz

In Nowy Sącz, I have also noticed a grey new mason nest of the Mud-Dauber *Sceliphron destillatorium* on red brickstones below the cap of a pillar on the eastwards-facing wall of the Bazylika Swięty Małgorzaty in the Swięta Ducha street which is constructed of red brickstones and yellow sandstones. The lateral exit hole at the fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* with hummocky shape in Nowy Sącz illustrates the successful emergence of at least one generation and indicates that the nesting site has probably been established already a few years ago. The grey sand which has been utilized for the construction of the nest of the Mud-Dauber *Sceliphron destillatorium* at the Bazylika Swięty Małgorzaty in Nowy Sącz contrasts with the yellow sandstones that together with the red brickstones compose the church, with the grey sand therefore having been brought to the church from a locality outside of the market place. In Nowy Sącz, I have discovered a mason nest of the Mud-Dauber *Sceliphron destillatorium* only at the Bazylika Swięty Małgorzaty in the Swięta Ducha street, whereas I have searched for mason nests on various other buildings without success.

6.4.5 Przemyśl

In Przemyśl, I have discovered a yellow new mason nest of the Mud-Dauber *Sceliphron destillatorium* in a recess in the sculptured eastwards-facing wall at the rear side of the building of the Kasa Rolniczy in the Basztowa street which is composed of yellowish grey sandstones (Plate 1/4). The fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* in Przemyśl is located in the rectangular corner at the boundary between the left side wall and the back wall of the recess, and the horizontal pipe-like nest cells are oriented parallel to the side wall and perpendicularly to the back wall of the recess, with the closed opercula thus being situated on the open outwards-facing surface of the mason nest with knobby shape. As some terminations of the cartridge- to cylinder-like nest cells in the mason nest of the Mud-Dauber *Sceliphron destillatorium* in Przemyśl are plugged with lighter grey material which contrasts with the surrounding yellowish grey and yellow material, this mason nest has probably already been founded several years ago and has at least been once reused by recompletion of empty cells after its original establishment, its continuous masking by plaster and the emergence of an earlier generation of wasps by perforation of the surface of the nest and flyout through the exit holes. In Przemyśl, I have discovered a mason nest of the Mud-Dauber *Sceliphron destillatorium* only at the Kasa Rolniczy in the Basztowa street, whereas I have searched for mason nests on various other buildings without success.

6.4.6 Ciężkowice

In Ciężkowice northeast of Nowy Sącz, I have detected a brown fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* on yellow sandstones below an arch of a window of the church that is built of red brickstones and yellow sandstones (Plate 1/6). The elongated pipe-like nest cells which are attached parallel to the horizontal underside of the arch and perpendicularly to the vertical back wall are all closed and indicate that the mason nest of the Mud-Dauber *Sceliphron destillatorium* in Ciężkowice is probably also not older than a few years. The fist-like mason nest of the Mud-Dauber *Sceliphron destillatorium* in Ciężkowice is mainly fixed on the yellow sandstone of the arch of the window, but at the bottom the mason nest terminates on the glass of the window. In Ciężkowice, I have discovered a mason nest of the Mud-Dauber *Sceliphron destillatorium* only at the church, whereas I have searched for mason nests on various other buildings without success.

In Łancut eastnortheast of Rzeszów, I have noticed questionable mason nests that could also be of artificial origin in recesses in the wall of a house in the Cetnarskiego street, with the balls and nodules in the recesses having been coated by red painting. Because of their uncertain nature, the questionable mason nests in Łancut are not incorporated into my interpretation of biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland.

6.4.7 Mików

In Mików westnorthwest of Ustrzyki Górne, KURZAWA has discovered a nesting site of the Mud-Dauber *Sceliphron destillatorium* in 1994 (KURZAWA to SOSZYNSKI, personal communication 2001). KURZAWA has observed a mason nest of the Mud-Dauber *Sceliphron destillatorium* on the metal car body in the inner part of the wreck of a bus which has fallen by accident into a muddy meadow near the Osława creek close to Mików, with the females having reached the mason nest that has not been visible from outside through cracks and gaps in the metal car body (KURZAWA to SOSZYNSKI, personal communication 2001). It is well known that the Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* build mason nests not only on stone substrates, but occasionally also on metal substrates (literature review in MADER 2000 a). I have observed mason nests of the Mud-Dauber *Sceliphron caementarium* on metal frames of windows of churches in Toronto in Ontario in Canada (MADER 2000 a). FATERYGA (personal communication 2013) has sometimes found mason nests of the Mud-Dauber *Sceliphron destillatorium* also on metal substrates on the Crimea peninsula in Ukraina.

6.4.8 Zatwarnica

In Suche Rzeki southwest of Zatwarnica northnorthwest of Ustrzyki Górne, PALACZYK has noticed a nesting site of the Mud-Dauber *Sceliphron destillatorium* in 2000 (PALACZYK to SOSZYNSKI, personal communication 2001). PALACZYK has seen a mason nest of the Mud-Dauber *Sceliphron destillatorium* on the wooden wall below the roof in the inner part of a hut near the Rzeka creek in Suche Rzeki where wood has been stored, with the females having reached the mason nest that has not been visible from outside through cracks and gaps in the wooden wall of the hut (PALACZYK to SOSZYNSKI, personal communication 2001). It is well known that the Mud-Dauber *Sceliphron destillatorium* and the Mason Bee *Megachile (Chalicodoma) parietina* build mason nests not only on outer walls, but occasionally also on inner walls of buildings (literature review in MADER 2000 a). I have observed mason nests of the Mud-Dauber *Sceliphron destillatorium* on the inner walls of buildings in the churches of the monasteries Kessariani (Kaisariani) and Daphni in Athens in Greece (MADER 2000 a). Mason nests of the Mud-Dauber *Sceliphron destillatorium* which have been placed on the inner walls of buildings that have been built of stone or wood have been reported from the southeastern part of Poland by BURY, SUDOŁ, ZIĘBA & ZYŁA (2009) and BILANSKI, KOŁODZIEJ & PAJĄK (2012) as well as from the southern part of Ukraina by FATERYGA & KOVBLYUK (2013 a).

6.4.9 Lubaczów

In Lubaczów northnortheast of Przemyśl, BURY has observed a nesting site of the Mud-Dauber *Sceliphron destillatorium* since 2010 (BURY, personal communication 2013). BURY has noticed a mason nest of the Mud-Dauber *Sceliphron destillatorium* in a rectangular recess in the edge of two walls of a two-storey house that is constructed of stones in the Kościuszki street in the centre of the town (BURY, personal communication 2013). According to photographs which have been supplied by BURY (personal communication 2013), the nest of the Mud-Dauber *Sceliphron destillatorium* on the wall of the building in Lubaczów which is covered by white roughcast is located in the level of the second storey of the house abt. 0.5 m below the roof and in abt. 1 m distance from a window to the right, is exposed towards southeast, and is protected by the overhanging part of the roof.

The nest of the Mud-Dauber *Sceliphron destillatorium* on the wall of the building in Lubaczów has been first recorded in 2010 and has been later reused and enlarged by lateral addition of a new group of cells in 2011 (BURY, personal communication 2013). The groups of cells in both the older nest from 2010 and the younger nest from 2011 of the Mud-Dauber *Sceliphron destillatorium* on the wall of the building in Lubaczów are covered by dark brown roughcast which contrasts with the white roughcast on the surface of the wall of the house. The nest of the Mud-Dauber *Sceliphron destillatorium* on the wall of the building in Lubaczów has then not again been utilized or enlarged in 2012 and has still remained on the wall of the house in 2013.

In early 2013 before the beginning of the flight season of insects, BURY (personal communication 2013) has found another nest of the Mud-Dauber *Sceliphron destillatorium* on another wall of the same building in Lubaczów where it is placed on the framework of a window. The other nest of the Mud-Dauber *Sceliphron destillatorium* in the framework of the window in Lubaczów is fresh and does not contain emergence holes of wasps, and has therefore most probably been constructed in 2012, because BURY (personal communication 2013) could have realized it earlier if it would have originated before 2012. The second nest of the Mud-Dauber *Sceliphron destillatorium* in the framework of the window in Lubaczów confirms that the nesting site has been utilized again after construction and development of the several parts of the first nest on the wall of the building which have been terminated by flyout of wasps as being documented by various emergence holes, and testifies to the stability of the nesting site over at least three successive generations.

6.4.10 Markowa

In Markowa east of Rzeszów, BURY has found a nesting site of the Mud-Dauber *Sceliphron destillatorium* in 2009 (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BURY, personal communication 2013). BURY has discovered a mason nest of the Mud-Dauber *Sceliphron destillatorium* on the wall of a house in the main street in Markowa which is located in the edge between the vertical wall and the overhanging horizontal underside of the balcony in the first storey of the building (BURY, personal communication 2013; Plate 3/8). The nest of the Mud-Dauber *Sceliphron destillatorium* in Markowa is exposed towards northeast, is protected by the overhanging underside of the balcony, is built of alternating dark and light brown loam with patchy distribution, has not been utilized or enlarged after 2009, and has no longer been present in early 2013 before the beginning of the flight season of insects as a consequence of cleaning of the walls of the house in 2012 (BURY, personal communication 2013).

6.4.11 Wola Mała

In Wola Mała eastnortheast of Biłgoraj southwest of Zamość, SZWED has recorded a nesting site of the Mud-Dauber *Sceliphron destillatorium* in 2009 (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009). SZWED has seen a mason nest of the Mud-Dauber *Sceliphron destillatorium* on the wall in the attic of a house below the angle of the roof which is built of alternating dark, medium and light brown loam with patchy colour distribution (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009). According to photographs which

have been supplied by SZWED (personal communication 2013; Plate 3/1 - 3/3), the semiellipsoidal nest of the Mud-Dauber *Sceliphron destillatorium* in Wola Mała has irregular indentated boundaries and is completely covered by the varicoloured brown roughcast which contrasts with the white building stones and the grey mortar between the white building stones in the wall in the attic of the house. The semiellipsoidal nest of the Mud-Dauber *Sceliphron destillatorium* in Wola Mała is placed with its upper part on a horizontal layer of grey mortar between several adjacent and superimposed white building stones, and with its lower part on the white building stone below the horizontal layer of grey mortar, and is located near the ridge of the roof close to the wooden panes of the roof which are inclined towards the left at the top of the attic of the house.

The dissection of the mason nest of the Mud-Dauber *Sceliphron destillatorium* in Wola Mała by SZWED (personal communication 2013) has revealed that it has contained a suite of 7 horizontally-oriented nest cells which have been stacked to a vertical pile one above each other before the assemblage has finally been covered by a continuous layer of roughcast with patchy colour distribution that has completely obliterated the structure of the storeys of the 7 nest cells. The mosaic of varicoloured patches in the brown roughcast of the mason nest of the Mud-Dauber *Sceliphron destillatorium* in Wola Mała reflects that the nest-building female has taken sand and mud of different colour from different places in the vicinity of the house. Only one mason nest of the Mud-Dauber *Sceliphron destillatorium* has been found in the attic of the house in Wola Mała, and no more mason nests have been discovered on and in other parts of the house (SZWED, personal communication 2013).

6.4.12 Janowice

In Janowice southsoutheast of Sobionowice westsouthwest of Wieliczka southeast of Cracow, BILANSKI has discovered a nesting site of the Mud-Dauber *Sceliphron destillatorium* in 2011 (BILANSKI, KOŁODZIEJ & PAJĄK 2012). According to photographs which have been supplied by BILANSKI (personal communication 2013; Plate 3/9 and Plate 5/1 - 5/3), seven mason nests of the Mud-Dauber *Sceliphron destillatorium* have been present in Janowice in 2011 on the wall of a house below the overhanging main roof of the building which stands over abt. 1 m beyond the wall and above a roof-like shade abt. 1 m below the main roof of the building that also stands over abt. 1 m beyond the wall. The seven nests of the Mud-Dauber *Sceliphron destillatorium* on the wall of the house in Janowice are all constructed of brown loam and are arranged in a row of abt. 2 m width at the top of the wall of the house which is covered by white roughcast immediately below the overhanging main roof of the building, with three nests having a semipotato-like elliptical shape and three nests having a semicarrot- like elongated linear shape. The wall of the house in Janowice where the seven nests of the Mud-Dauber *Sceliphron destillatorium* are placed in a row of abt. 2 m width is oriented towards southeast and is protected by the overhanging main roof of the building.

The different stages of preservation or destruction of the seven nests of the Mud-Dauber *Sceliphron destillatorium* in Janowice as being documented in the photographs which have been supplied by BILANSKI (personal communication 2013) indicate that they have not been established only in one season, but have been generated during several years, thus suggesting that the Mud-Dauber *Sceliphron destillatorium* has founded the nesting site in Janowice most likely already abt. 5 years before the discovery by BILANSKI in 2011 (BILANSKI, KOŁODZIEJ & PAJĄK 2012; BILANSKI, personal communication 2013) and has then continued the installation of additional nests in various steps until 2011.

6.4.13 Dębów

In Dębów near Przeworsk eastnortheast of Rzeszów, BURY has realized a nesting site of the Mud-Dauber *Sceliphron destillatorium* in early 2013 before the beginning of the flight season of insects (BURY, personal communication 2013). According to photographs which have been supplied by BURY (personal communication 2013), six mason nests of the Mud-Dauber *Sceliphron destillatorium* with different stages of preservation have been present in Dębów in 2013 at the top of the wall of a house above the

highest windows below the overhanging eaves of the flat roof below the metal gutter where they are placed in the rectangular corner at the boundary between the vertical wall and the horizontal underside of the eaves of the flat roof, and are thus attached to both the perpendicular surface of the vertical wall and the reversely flat overhanging surface of the horizontal underside of the eaves of the flat roof. The six mason nests of the Mud-Dauber *Sceliphron destillatorium* below the overhanging eaves of the flat roof of the house in Dębów are protected by the overhanging eaves which stand over abt. 30 - 50 cm beyond the wall.

The six mason nests of the Mud-Dauber *Sceliphron destillatorium* below the overhanging eaves of the flat roof of the house in Dębów are all constructed of brown loam, have a semipotato-like elliptical shape and are arranged in a horizontal line at the top of the wall at the boundary between the varicoloured coarse pebbly roughcast of the wall and the white fine sandy roughcast of the overhanging surface of the underside of the eaves of the flat roof, with most of the six nests being spaced in distances of abt. 0.5 - 1 m from the neighbouring nests and only two nests sitting in a group with a distance of abt. 10 cm from each other. The stages of preservation of the six mason nests of the Mud-Dauber *Sceliphron destillatorium* in Dębów in 2013 include 1 new fresh mason nest with a continuous cover of roughcast and without holes of emergence of wasps, 3 old fresh mason nests with a continuous cover of roughcast and with several to numerous holes of emergence of wasps, and 2 very old weathered mason nests that are eroded down to the outlines of the nest cells on the substrate.

The different stages of preservation or destruction of the six nests of the Mud-Dauber *Sceliphron destillatorium* in Dębów as being documented in the photographs which have been supplied by BURY (personal communication 2013) indicate that they have not been established only in one season, but have been generated during several years, thus suggesting that the Mud-Dauber *Sceliphron destillatorium* has founded the nesting site in Dębów most likely already abt. 5 years before the discovery by BURY in 2013 (personal communication 2013) and has then continued the installation of additional nests in various steps until the end of the flight season of insects in 2012.

6.4.14 Przeworsk

In Przeworsk eastnortheast of Rzeszów, BURY has identified two nesting sites of the Mud-Dauber *Sceliphron destillatorium* in early 2013 before the beginning of the flight season of insects which are located in the Witosa street and in the Węgierska street (BURY, personal communication 2013). According to photographs which have been supplied by BURY (personal communication 2013), five mason nests of the Mud-Dauber *Sceliphron destillatorium* with different stages of preservation have been present in Przeworsk in 2013 that include four new fresh mason nests with a continuous cover of roughcast in the Witosa street, and one very old weathered mason nest that is eroded down to the outlines of the nest cells on the substrate in the Węgierska street.

The four new fresh mason nests of the Mud-Dauber *Sceliphron destillatorium* in the Witosa street in Przeworsk are all constructed of brown loam, have a semipotato-like elliptical to irregular shape and are placed on the pink fine sandy roughcast of the wall of a two-storey house that is built of stones below an overhanging escarpment at the top of the first floor and below the windows of the second floor where they are attached to the vertical wall just below the boundary to the overhanging escarpment, and are protected by the overhanging escarpment which stands over abt. 0.5 m beyond the wall. Most of the four nests of the Mud-Dauber *Sceliphron destillatorium* in the Witosa street in Przeworsk are spaced in distances of abt. 0.5 - 1 m from the neighbouring nests. The old weathered mason nest of the Mud-Dauber *Sceliphron destillatorium* in the Węgierska street in Przeworsk has also been constructed of brown loam and is located in a rectangular recess in the edge of two walls of a two-storey house that is built of stones abt 2 m below the inclined roof, is attached to the light yellow to light beige fine sandy roughcast of the walls, and is protected by the overhanging part of the roof which stands over abt. 1 m beyond the wall.

The different stages of preservation or destruction of the five nests of the Mud-Dauber *Sceliphron destillatorium* in Przeworsk as being documented in the photographs which have been supplied by BURY (personal communication 2013) indicate that they have not been established only in one season, but

have been generated during several years, thus suggesting that the Mud-Dauber *Sceliphron destillatorium* has founded the nesting site in the Węgierska street in Przeworsk most likely already abt. 5 years before the discovery by BURY in 2013 (personal communication 2013) and has then continued the installation of additional nests in one or several other years in the Witosa street in Przeworsk before the end of the flight season of insects in 2012.

6.4.15 Rozpucie

In Rozpucie northeast of Tyrawa eastnortheast of Sanok, BILANSKI has encountered a nesting site of the Mud-Dauber *Sceliphron destillatorium* in 2003 and has subsequently checked it again in 2009, 2010 and 2011 (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and additional observations of some nests have been contributed by NITKA in 2010 (BILANSKI, KOŁODZIEJ & PAJĄK 2012). The various nests of the Mud-Dauber *Sceliphron destillatorium* in Rozpucie have been found in different places including the attic of a house, the facade of a house, the corners of windows on the facade of a house, and the roof of a wooden shed (BILANSKI, KOŁODZIEJ & PAJĄK 2012; Plate 5/4 - 5/7). On the facade of the house in Rozpucie which is oriented towards the east, the nests of the Mud-Dauber *Sceliphron destillatorium* are arranged on the roughcast of the wall, whereas in the attic of the house and under the roof of the wooden shed, the nests are placed on and between the wooden rafters of the roofs (BILANSKI, KOŁODZIEJ & PAJĄK 2012; BILANSKI, personal communication 2013). The various nests of the Mud-Dauber *Sceliphron destillatorium* in Rozpucie are all constructed of brown loam and have a more or less elliptical shape.

According to the observations of BILANSKI in 2003, 2009, 2010 and 2011 (BILANSKI, KOŁODZIEJ & PAJĄK 2012) as well as to the documentation in photographs which have been supplied by BILANSKI (personal communication 2013), the suite of nests of the Mud-Dauber *Sceliphron destillatorium* in Rozpucie has not been established only in one season, but has been generated during several years, thus suggesting that the Mud-Dauber *Sceliphron destillatorium* has founded the nesting site in Rozpucie by construction of the first nests most likely already a few years before the discovery by BILANSKI in 2003 (BILANSKI, KOŁODZIEJ & PAJĄK 2012; BILANSKI, personal communication 2013) and has then continued the installation of additional nests in various regular or random steps between 2003 and 2011.

6.4.16 Srogów Górny

In Srogów Górny northwest of Sanok, RYBA (personal communication 2013) has noticed a nesting site of the Mud-Dauber *Sceliphron destillatorium* since at least 2000. The nests of the Mud-Dauber *Sceliphron destillatorium* in Srogów Górny have been found in various places in the attic of a wooden house where they have been first recorded in 2002 or 2003, whereas individuals flying out of and into the house have already been observed since before 2000 (RYBA, personal communication 2013). According to counts and photographs which have been supplied by RYBA (personal communication 2013; Plate 3/4 - 3/7 and 4/1 - 4/6), a suite of 27 mason nests of the Mud-Dauber *Sceliphron destillatorium* with different stages of preservation are distributed in 2013 mainly on the wooden vertical walls in the attic of the wooden house in Srogów Górny, and subordinately also on and between the wooden rafters of the roof, on the roughcast on the surface of the chimney, and near a pipe containing electrical wires in the attic of the wooden house. Most of the nests are arranged in several groups around in total four asterisk-shaped window-like holes in the wooden vertical walls in the attic of the wooden house in Srogów Górny which have formerly been open but have been closed by covering of the outer surface of the walls with white panes for the reason of isolation of the house more than 15 years ago (RYBA, personal communication 2013). Two asterisk-shaped window-like holes each are present in the walls in the attic which are oriented towards north and south, and the first nests of the Mud-Dauber *Sceliphron destillatorium* have been noticed around the asterisk-shaped window-like holes in the northern wall, whereas around the asterisk-shaped window-like holes in the southern wall, nests have appeared significantly later (RYBA, personal communication 2013). The individuals of the Mud-Dauber *Sceliphron destillatorium* fly into and out of the attic most probably through cracks and fissures at the top of the two chim-

neys around their passages through the roof near the northern and the southern walls of the house, because wasps have often been observed flying around the chimneys in the attic of the house (RYBA, personal communication 2013).

The stages of preservation of the 27 mason nests of the Mud-Dauber *Sceliphron destillatorium* in Srogów Górny in 2013 include 5 new fresh mason nests with a continuous cover of roughcast and without holes of emergence of wasps, 6 old fresh mason nests with a continuous cover of roughcast and with several to numerous holes of emergence of wasps, 5 old weathered mason nests with several to numerous holes of emergence of wasps and with open nest cells due to partial destruction of the roughcast by erosion, 5 very old weathered mason nests that are eroded down to the outlines of the nest cells on the substrate, and 6 assemblages of isolated nest cells which are not covered by roughcast (RYBA, personal communication 2013). The nests of the Mud-Dauber *Sceliphron destillatorium* that have formerly been attached to the chimney are no longer preserved, because they have broken apart and have fallen down to the floor as a consequence of the significant changes of the temperature of the surface of the chimney due to heating in winter, with only one exception of a new fresh nest which is still sitting on the surface of the chimney (RYBA, personal communication 2013).

The observations of RYBA (personal communication 2013) since at least 2000 and the documentation of the different stages of preservation of the 27 mason nests of the Mud-Dauber *Sceliphron destillatorium* in Srogów Górny in 2013 testify to an existence of the nesting site at least since 15 years and the regular to random installation of new nests in the attic of the wooden house during the succession of the years. The Mud-Dauber *Sceliphron destillatorium* has founded the nesting site in Srogów Górny by construction of the first nests at least a few years before 2000 and has then continued the installation of additional nests in various regular or random steps between 2000 and 2012. It is possible that the first nests of the Mud-Dauber *Sceliphron destillatorium* have already been erected in the attic of the wooden house in Srogów Górny even considerably before 2000, but the memory of RYBA (personal communication 2013) and his family reaches definitely only back more or less to 2000. Individuals of the Mud-Dauber *Sceliphron destillatorium* have been registered in Srogów Górny regularly around and sometimes even within the house since at least 2000 by RYBA (personal communication 2013) and his family and have been considered as normal and common.

The mason nests of the Mud-Dauber *Sceliphron destillatorium* in Srogów Górny occur exclusively in the attic of the wooden house, whereas no mason nests have been found on the outer walls of the wooden house, on and in the stable and the cottage next to the house, and on and in other buildings in the surroundings of the house (RYBA, personal communication 2013). Individuals of the Mud-Dauber *Sceliphron destillatorium* have been regularly observed flying into, within and out of the attic of the house; flying in the garden near the house and visiting flowers, and flying in the fields around the village (RYBA, personal communication 2013). During the last years, high activity of numerous to abundant individuals of the Mud-Dauber *Sceliphron destillatorium* has occurred in 2010 and 2011 when also various additional nests have originated, whereas only low activity of only a few to several individuals has taken place in 2012 (RYBA, personal communication 2013) probably as a result of the exceptionally severe winter in 2012 (MADER 2013). The nests of the Mud-Dauber *Sceliphron destillatorium* are constructed of light brown, medium brown or dark brown loam, with the different colours of different nests reflecting different sources of material of the different females building the nests during the succession of the years, whereas nests with mosaic-like patterns of patches of different colour of the loam that document the provenance of the material for the erection of individual nests from different sources are only exceptionally developed in Srogów Górny and constitute only a few examples within the suite of 27 nests in 2013.

The assemblages of isolated nest cells which are not covered by roughcast (Plate 4/1 - 4/2) in the attic of the house in Srogów Górny have been first observed in 2008, whereas the mason nests with complete or partial cover by roughcast depending on the stage of preservation or erosion (Plate 3/7 and Plate 4/3 - 4/6) of the Mud-Dauber *Sceliphron destillatorium* have already been first recorded in 2002 or 2003 (RYBA, personal communication 2013). Although always exclusively typical yellow and black individuals of the Palaearctic Mud-Dauber *Sceliphron destillatorium* have been observed within and around the house in Srogów Górny since at least 2000 and brown to reddish brown or black individuals of the Oriental Mud-Dauber *Sceliphron curvatum* have never been encountered within and around the house in Srogów Górny at least since the first discovery of assemblages of isolated nest cells which are not covered by roughcast in 2008 (RYBA, personal communication 2013), the striking differences in

nest types between the assemblages of isolated nest cells which are not covered by roughcast and the mason nests with complete or partial cover by roughcast depending on the stage of preservation or erosion does not definitely exclude the possibility that the assemblages of isolated nest cells which are not covered by roughcast have been constructed by the Oriental Mud-Dauber *Sceliphron curvatum* which could have existed together with the Palaearctic Mud-Dauber *Sceliphron destillatorium* that has built the mason nests with complete or partial cover by roughcast depending on the stage of preservation or erosion. The enigma of the striking differences in nest types between the assemblages of isolated nest cells which are not covered by roughcast and the mason nests with complete or partial cover by roughcast depending on the stage of preservation or erosion could only be resolved by future observation of wasps emerging from or building and provisioning the isolated nest cells which are not covered by roughcast in Srogów Górny.

6.4.17 Various Other Nests

Various nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland have been mentioned by BILANSKI, KOŁODZIEJ & PAJĄK (2012), and some nesting sites of the Mud-Dauber *Sceliphron destillatorium* in Slovakia have been reported by LUKAS, BOGUSCH & LISKA (2006). The various nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland which have been contributed by BILANSKI, KOŁODZIEJ & PAJĄK (2012) have been encountered in the attics of houses and cottages, on the facades of houses, in corners of windows or facades on the outer walls of houses, in corners of windows on the inner walls of houses, in holes and structures in the walls of houses, under the roofs of houses, on soffits or ceilings of roofs of buildings, on the inner sides of wooden sheds, on the walls of garages, and on the inner sides of tin garages. In addition to various nests on and in buildings, a suite of nests without details of occurrence are also mentioned.

6.4.17.1 Nests on and in Buildings

Nests of the Mud-Dauber *Sceliphron destillatorium* in the attics of houses have been discovered in Zyznów southsoutheast of Strzyzów northnortheast of Krosno in 2009 by SZURLEJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Rymanów southeast of Krosno in 2011 by MATEUSIAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Tymowa southeast of Bochnia eastsoutheast of Cracow in 2010 by FIDZINSKA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Lutowiska southsoutheast of Ustrzyki Dolne in 2010 by HEBDA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Dybków eastsoutheast of Sieniawa southeast of Lezajsk eastnortheast of Rzeszów in 2006 and 2010 by MIKULSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Turza near Sokołów Małopolski northnortheast of Rzeszów in 2009 and 2010 by BILANSKI & KOŁODZIEJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Koziarnia southsoutheast of Rudnik southeast of Nisko northnortheast of Rzeszów in 2010 by SOWA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Zmysłówka near Lezajsk eastnortheast of Rzeszów in 2011 by KASPRZAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012). Nests of the Mud-Dauber *Sceliphron destillatorium* in the attics of cottages have been seen in Hermanowice southsoutheast of Przemyśl in 2010 by PŁOCICA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Chrewt at the southeastern margin of Lake Solina southsouthwest of Ustrzyki Dolne in 2003 (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

Nests of the Mud-Dauber *Sceliphron destillatorium* on the facades of houses have been noticed in Lubla southsouthwest of Frysztak northwest of Krosno in 2010 by ZIELINSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Pielgrzymka near Osiek Jasielski northwest of Nowy Zmigród southwest of Krosno in 2010 by FELENCZAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Kalwaria Zebrzydowska southsouthwest of Cracow in 2011 by BILANSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Czajkowa northnortheast of Mielec northeast of Tarnów in 2010 by WRONA (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

Nests of the Mud-Dauber *Sceliphron destillatorium* in corners of windows or facades on the outer walls of houses have been identified in Turza near Sokołów Małopolski northnortheast of Rzeszów in 2009

and 2010 by BILANSKI & KOŁODZIEJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012). Nests of the Mud-Dauber *Sceliphron destillatorium* in corners of windows on the inner walls of houses have been recorded in Dybków eastsoutheast of Sieniawa southeast of Lezajsk eastnortheast of Rzeszów in 2006 and 2010 by MIKULSKI (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Cieplice north of Sieniawa southeast of Lezajsk eastnortheast of Rzeszów in 2009 and 2010 by STARZAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012). Nests of the Mud-Dauber *Sceliphron destillatorium* in holes and structures in the walls of houses have been confirmed in Posada Zarszyńska southsouthwest of Zarszyn west of Sanok in 2010 by LESNIAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

Nests of the Mud-Dauber *Sceliphron destillatorium* under the roofs of houses have been verified in Biała Nizna northeast of Grybów east of Nowy Sącz in 2011 by WIDLAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012). Nests of the Mud-Dauber *Sceliphron destillatorium* on soffits or ceilings of roofs of buildings have been documented in Zydowskie in the Magura National Park southsouthwest of Nowy Zmigród southwest of Krosno in 2010 by SERAFIN (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

Nests of the Mud-Dauber *Sceliphron destillatorium* on the inner sides of wooden sheds have been recorded in Rymanów southeast of Krosno in 2011 by MATEUSIAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Krzeszów southeast of Rudnik southeast of Nisko northnortheast of Rzeszów from 2003 to 2007 by SERAFIN (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

Nests of the Mud-Dauber *Sceliphron destillatorium* on the walls of garages have been encountered in Zmysłówka near Lezajsk eastnortheast of Rzeszów in 2011 by KASPRZAK (BILANSKI, KOŁODZIEJ & PAJĄK 2012). Nests of the Mud-Dauber *Sceliphron destillatorium* on the inner sides of tin garages have been confirmed in Uherce Mineralny southeast of Sanok in 2011 by ŁABAJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Mchawa northnorthwest of Baligród southwest of Ustrzyki Dolne in 2011 by ŁABAJ (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

Nests of the Mud-Dauber *Sceliphron destillatorium* on and in buildings have also been reported from the Crimea peninsula in the southern part of Ukraina (IVANOV & FATERYGA 2003, FATERYGA & KOVBLYUK 2013 a; Plate 4/7 - 4/9) and from Kazakhstan (KAZENAS 1998, 2001, 2002) where they occur also predominantly in the attics of houses, on the facades of houses, in corners of windows or facades on the outer walls of houses, and under the roofs of houses as well as also under bridges, in recesses of walls and below large rocks.

6.4.17.2 Nests Without Details of Occurrence

Nests without information of details on their location have been reported in the southeastern part of Poland in Bazanówka westsouthwest of Pakoszówka northwest of Sanok in 2010 by PLAZA (BILANSKI, KOŁODZIEJ & PAJĄK 2012), in Orzechówka southeast of Strzalków southeast of Radomsko northeast of Częstochowa in 2010 by MORAJKO (BILANSKI, KOŁODZIEJ & PAJĄK 2012), and in Pocyrchle near Nowa Sarzyna northnorthwest of Lezajsk northeast of Rzeszów in 2010 by SOWA (BILANSKI, KOŁODZIEJ & PAJĄK 2012).

Nests without information of details on their location have been mentioned in Slovakia in Devínska Nová Ves west of Bratislava in 2005 (JURSIKOVA in LUKAS, BOGUSCH & LISKA 2006), in Záturcie near Martin northnorthwest of Banská Bystrica in 1987 (STRAKA in LUKAS, BOGUSCH & LISKA 2006), in Lucenec southeast of Zvolen south of Banská Bystrica in 2004 (JANSKY in LUKAS, BOGUSCH & LISKA 2006), at the Zabia hora near Bohunický Rohác northeast of Bohunice northnortheast of Bátovce northeast of Levice east of Nitra in 1997 (BATOVSKY in LUKAS, BOGUSCH & LISKA 2006), in Herlany northeast of Kosice in 1996 (JANSKY in LUKAS, BOGUSCH & LISKA 2006), in Komárno westnorthwest of Budapest in 1968 (ROZKOSNY in LUKAS, BOGUSCH & LISKA 2006), and in the Panónsky haj near Súr southsouthwest of Pezinok northeast of Bratislava in 2000 (LUKAS in LUKAS, BOGUSCH & LISKA 2006).

Mason nests of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland have also been observed in Ropa east of Nowy Sącz in 1996 by CELARY (CELARY 1996, personal communication 2000) and in Wetlina-Moczarne southsouthwest of Przemyśl in 2000 by WISNIOWSKI (WISNIOWSKI

2000; WISNIOWSKI to CELARY, personal communication 2000). At these localities, the observed mason nests of the Mud-Dauber *Sceliphron destillatorium* have been constructed under the roofs of houses consisting either of stone or of wood, and the females have taken up mud from the wet banks of rivers and have transported it to the nesting places. Mason nests of the Mud-Dauber *Sceliphron destillatorium* in the western part of Ukraina have already been described by ŁOMNICKI (1870) from Dzvenihorod southwest of Kamjanec-Podilskyj and by WIERZEJSKI (1874) from Skala-Podilska northwest of Kamjanec-Podilskyj where they have been fixed on the walls below the roofs of houses which have been built either of stone or of wood. Mason nests of the Mud-Dauber *Sceliphron destillatorium* on the Crimea peninsula in the southern part of Ukraina are described and discussed by IVANOV & FATERYGA (2003) and FATERYGA & KOVBLYUK (2013 a), with at some localities even extensive clusters of mason nests of the Mud-Dauber *Sceliphron destillatorium* up to abt. 1 m diameter and abt. 0.5 m height having been created by construction of individual mason nests by various females of the Mud-Dauber *Sceliphron destillatorium* in clusters and aggregations (FATERYGA & KOVBLYUK 2013 a) including lateral juxtaposition and vertical multistoreying of individual mason nests according to photographs which have been supplied by FATERYGA (personal communication 2013). The complex patterns of clusters and aggregations of mason nests of the Mud-Dauber *Sceliphron destillatorium* are mainly constructed in case of insufficient shelter from the rain, whereas simple nests without clusters and aggregations predominate in case of sufficient shelter from the rain (FATERYGA & KOVBLYUK 2013 a). Structure and composition of mason nests of the Mud-Dauber *Sceliphron spirifex* are analyzed by application of geological and petrographical methods by POLIDORI, TROMBINO, FUMAGALLI & ANDRIETTI (2005).

6.5 Nests of the Nearctic Mud-Dauber *Sceliphron caementarium* in Toronto

For comparison with the mason nests of the Palaearctic Mud-Dauber *Sceliphron caementarium* which I have discovered in Ciężkowice northeast of Nowy Sącz (Plate 1/6), Krosno (Plate 1/1 and 1/2), Nowy Sącz, Przemyśl (Plate 1/4), Ropa east of Nowy Sącz (Plate 1/3) and Tarnów (Plate 1/5) in the southeastern part of Poland in 2000, I have studied mason nests of the Nearctic Mud-Dauber *Sceliphron caementarium* in the centre of the city of Toronto in Ontario in Canada (Plate 2/2 - 2/4) in 2000. In the centre of the city of Toronto, numerous mason nests of the Nearctic Mud-Dauber *Sceliphron caementarium* are fixed on various old buildings that are constructed of natural building stones where they are attached below overhanging roofs and balconies as well as on the frames and arches of windows and doors on a light grey, yellowish grey or greyish yellow sandstone which is comparable with the Schilfsandstein in the Middle Keuper (Upper Triassic) in Germany concerning substrate ecology and quality as natural building stone, or are placed on yellow or red brickstones. Particularly impressive and typical mason nests of the Nearctic Mud-Dauber *Sceliphron caementarium* in Toronto are present on different buildings in Church street, Yonge street and Front street.

The light grey, yellowish grey or greyish yellow sandstones that have been used as natural stones in various old buildings in Toronto derive from Grimsby Sandstone, Thorold Sandstone and Whirlpool Sandstone in the Cataract Formation in the Lower Silurian which crop out in the Niagara Escarpment southeast of the town. The mason nests of the Nearctic Mud-Dauber *Sceliphron caementarium* in Toronto consist mainly of light grey, yellowish grey or greyish yellow sand that derives from decomposition of the natural building stones from Grimsby Sandstone, Thorold Sandstone and Whirlpool Sandstone in the various old buildings in the town by weathering.

7 Distances between Localities of Occurrence of *Sceliphron destillatorium* in Poland, Ukraina and Slovakia

The distances between the localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland and surrounding regions provide important information for the interpretation of biogeography and migration. The distances between the localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland, Ukraina and Slovakia are compiled as follows. Important gates for the migration of the Mud-Dauber *Sceliphron destillatorium* from Slovakia to Poland are passes in the Carpathian Mountains with moderate elevation.

7.1 Distances between Localities of Occurrence of *Sceliphron destillatorium* in Poland and Ukraina

Lviv (formerly Lwów or Lemberg) in the western part of Ukraina where the occurrence of the Mud-Dauber *Sceliphron destillatorium* has already been verified in 1862 (SCHMIDT-GOEBEL 1876) is situated abt. 100 km east of Przemyśl where I have discovered a single fresh mason nest during my overview mapping in 2000. In the Dnestr valley southeast of Lviv, KINEL & NOSKIEWICZ (1930) have confirmed the occurrence of the Mud-Dauber *Sceliphron destillatorium* at various localities, with the northwesternmost place being Volcynec northeast of Ivano-Frankivsk that is situated abt. 175 km southeast of Przemyśl and abt. 100 km southsoutheast of Lviv. Czesławice westnorthwest of Lublin where the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been proven in Poland for the first time already abt. 50 years ago by ANASIEWICZ (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) is situated abt. 200 km northnorthwest of Lviv and abt. 170 km northnorthwest of Przemyśl. Ustrzyki Dolne (SOSZYNSKI & SOSZYNSKI 1985, WISNIOWSKI 2000; WISNIOWSKI to CELARY, personal communication 2000) and Ustrzyki Górne (SOSZYNSKI & SOSZYNSKI 1985) where the occurrence of the Mud-Dauber *Sceliphron destillatorium* has also been verified already abt. 40 - 50 years ago are located abt. 100 km and abt. 120 km, respectively, southwest of Lviv. Łubne southsouthwest of Przemyśl where the occurrence of the Mud-Dauber *Sceliphron destillatorium* has been noticed already abt. 50 years ago (PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) is situated abt. 35 km southwest of Ustrzyki Dolne and abt. 35 km northwest of Ustrzyki Górne.

7.2 Distances between Localities of Occurrence of *Sceliphron destillatorium* in Poland and Slovakia

On the other side of the Carpathian Mountains, the closest localities to the boundary of Poland where the Mud-Dauber *Sceliphron destillatorium* has already been encountered abt. 50 - 140 years ago are Roznava, Turna, Kamenany, Sobrance, Drahnov and Malé Ozorovce in Slovakia as well as Uzhorod in Ukraina. Sobrance and Drahnov in Slovakia south of Poland on the other side of the Carpathian Mountains where already MOCSARY (1875, 1897) as well as PASZLAVSZKY (1884) and MOCSARY (1897), respectively, have confirmed the occurrence of the Mud-Dauber *Sceliphron destillatorium* are situated abt. 50 km and abt. 75 km, respectively, southsouthwest of Ustrzyki Górne and abt. 80 km and abt. 100 km, respectively, southsouthwest of Ustrzyki Dolne. Malé Ozorovce in Slovakia south of Poland on the other side of the Carpathian Mountains where already CHYZER (1902, in ZAVADIL 1934) has verified the occurrence of the Mud-Dauber *Sceliphron destillatorium* is situated abt. 90 km southwest of Ustrzyki Górne and abt. 110 km southsouthwest of Ustrzyki Dolne. Uzhorod in Ukraina south of Poland on the other side of the Carpathian Mountains where already VAVRA (in ZAVADIL, SUSTERA & BATA 1937) has confirmed the occurrence of the Mud-Dauber *Sceliphron destillatorium* is situated

abt. 60 km southsouthwest of Ustrzyki Górne and abt. 90 km southsouthwest of Ustrzyki Dolne. Sobrance, Drahnov, Malé Ozorovce and Uzhorod are also located abt. 110 km and abt. 125 km, respectively, southsoutheast of Krosno where I have discovered a single fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* during my overview mapping in 2000, and are also situated abt. 130 km and abt. 140 km, respectively, southeast of Ropa east of Nowy Sącz where already CELARY (1996) has noticed a nesting site of the Mud-Dauber *Sceliphron destillatorium* in 1996 and where I have interpreted the assemblage of old weathered mason nests and fresh undamaged mason nests as documenting the existence of a limited population of the Mud-Dauber *Sceliphron destillatorium* already for at least 10 years before 2000. Roznava, Kamenany and Turna in Slovakia where the occurrence of the Mud-Dauber *Sceliphron destillatorium* has again already been proven by FRITSCH (1878), PFEFFER (in ZAVADIL, SUSTERA & BATA 1937) and BOUCEK (in HOFFER 1954), respectively, are situated abt. 100 km and abt. 120 km, respectively, southsouthwest of Ropa east of Nowy Sącz, and abt. 150 km and abt. 170 km, respectively, southwest of Krosno.

The nesting site of the Mud-Dauber *Sceliphron destillatorium* in Ropa which I consider to be established at least since 10 years before 2000 is located abt. 25 km east of Nowy Sącz, abt. 25 km southsoutheast of Ciężkowice northeast of Nowy Sącz, abt. 45 km southsoutheast of Tarnów and abt. 50 km westsouthwest of Krosno where I have discovered a single fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* at each place during my overview mapping in 2000, and is also situated abt. 7 km westsouthwest of Szymbark where already CELARY (1996) has encountered the Mud-Dauber *Sceliphron destillatorium* in 1994 and 1995. Przemyśl which again is one of the 5 places where I have noticed a single fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* during my overview mapping in 2000 is situated abt. 40 km northnortheast of Ustrzyki Dolne, abt. 70 km eastnortheast of Krosno, abt. 130 km eastsoutheast of Tarnów and abt. 130 km eastnortheast of Ropa.

7.3 Mountain Passes between Localities of Occurrence of *Sceliphron destillatorium* in Poland and Slovakia

Roznava, Turna, Kamenany, Sobrance, Drahnov and Malé Ozorovce in Slovakia south of the Carpathian Mountains are separated from Nowy Sącz, Ropa, Krosno, Muszyna, Ustrzyki Dolne, Ustrzyki Górne, Nasiczne, Zatwarnica, Wetlina, Łubne and Mików in the southeastern part of Poland north of the Carpathian Mountains by staggered chains of high mountain ridges where five main passes with moderate elevations provide gates for migration of the Mud-Dauber *Sceliphron destillatorium*. These five main passes in the Carpathian Mountains are the Tylicz Pass between Bardejov in Slovakia and Krynica southsoutheast of Nowy Sącz in Poland with an elevation of 683 m, the Dujawa Pass between Zborov in Slovakia and Konieczna southeast of Nowy Sącz in Poland with an elevation of 556 m, the Dukla Pass between Svidnik in Slovakia and Dukla south of Krosno in Poland with an elevation of 500 m, the Łupków Pass between Medzilaborce in Slovakia and Lesko southsoutheast of Sanok as well as west of Ustrzyki Dolne in Poland with an elevation of 640 m, and the Uzok Pass between Uzok southsouthwest of Turka in Ukraina and Ustrzyki Górne in Poland with an elevation of 852 m. Between these five main passes, also various subordinate passes occur with an elevation between abt. 500 m and abt. 800 m each. In addition to these passes, another gate through the Carpathian Mountains is constituted by the Poprad valley which leads from Poprad north of Roznava via Stará Lubovna northeast of Poprad, Muszyna southsouthwest of Krynica and Rytro south of Nowy Sącz to the Dunajec valley at the southwestern border of Nowy Sącz. The significance of the passes in the Carpathian Mountains for the migration of the Mud-Dauber *Sceliphron destillatorium* from Slovakia to Poland has already been stressed by CELARY (1996).

8 Population Dynamics and Protection Requirement of *Sceliphron destillatorium*

The occurrence of only single fresh mason nests of the Mud-Dauber *Sceliphron destillatorium* on ex-

clusively individual buildings while no more mason nests have been discovered on any other buildings in Ciężkowice northeast of Nowy Sącz (Plate 1/6), Krosno (Plate 1/1 and 1/2), Nowy Sącz, Przemyśl (Plate 1/4) and Tarnów (Plate 1/5) in 2000 testifies to the establishment of only very small populations at these localities in the southeastern part of Poland which have probably been founded only a few years before 2000 and that require protection in order to secure their maintenance and to enable the future spreading into the surroundings from these places after 2000. The fate of the unnecessary extinction of the Mason Bee *Megachile (Chalicodoma) parietina* in Stolec east of Ząbkowice Śląskie south of Wrocław in Lower Silesia which has been the only assemblage of this outstanding and spectacular wild bee in Poland (STROJNY 1963, 1987, 1989; MADER 2000 a) is outlined as a warning example confirming tragically the possible consequences for virginal populations of the Mud-Dauber *Sceliphron destillatorium* in case of excessive capturing of specimens by irresponsible and careless entomologists as well as damage or removal of mason nests from the walls of houses for the reason of cleaning of buildings or collection of samples.

8.1 Population Dynamics of *Sceliphron destillatorium*

The populations of the Mud-Dauber *Sceliphron destillatorium* in Ciężkowice northeast of Nowy Sącz (Plate 1/6), Krosno (Plate 1/1 and 1/2), Nowy Sącz, Przemyśl (Plate 1/4) and Tarnów (Plate 1/5) in 2000 are estimated to comprise only a few females each and are considered as pioneering settlements at isolated places in otherwise still uninhabited regions, with the scattered nesting sites being separated from each other by considerable distances. The very recent installation of the populations of the Mud-Dauber *Sceliphron destillatorium* in the 5 mentioned towns in 2000 is particularly reflected by the lack of old weathered mason nests which should occur together with new undamaged mason nests in case of an already longer existence of the populations, such as applying for the assemblage of the Mud-Dauber *Sceliphron destillatorium* in Ropa east of Nowy Sącz (Plate 1/3) where the joint occurrence of several old weathered mason nests and new undamaged mason nests in 2000 documents an existence of a limited population at this place for at least 10 years, and such as also applying for the suite of seven mason nests of the Mud-Dauber *Sceliphron destillatorium* in Janowice southeast of Cracow in 2011 (BILANSKI, KOŁODZIEJ & PAJĄK 2012; BILANSKI, personal communication 2013) where the different stages of preservation or destruction indicate that the seven nests have not been established only in one season, but have been generated during several years, thus suggesting that the Mud-Dauber *Sceliphron destillatorium* has founded the nesting site in Janowice most likely already abt. 5 years before the discovery by BILANSKI in 2011 (BILANSKI, KOŁODZIEJ & PAJĄK 2012; BILANSKI, personal communication 2013) and has then continued the installation of additional nests in various steps until 2011. The interpretation of the existence of the nesting sites in Ropa and Janowice already since abt. 5 - 10 years before their discovery is confirmed by the observations of RYBA (personal communication 2013) at the nesting site in Srogów Górny northwest of Sanok which exists at least since 2000 and consists of a suite of old weathered mason nests and new undamaged mason nests in 2013.

The population of the Mud-Dauber *Sceliphron destillatorium* in Ropa has already been verified in 1996 by CELARY (1996, personal communication 2000) by captures of specimens and observation of mason nests, with this nesting site therefore having already been known since 5 years before my field investigations in 2000, and thus it could be assumed that the foundation of this nesting site has happened at least again a few years earlier. The restricted population of the Mud-Dauber *Sceliphron destillatorium* in Ropa has already reached some stability as being indicated by the successful development of at least several generations from the old weathered mason nests and the renewed construction, provisioning and closure of fresh mason nests, whereas the virginal populations of the Mud-Dauber *Sceliphron destillatorium* in Ciężkowice northeast of Nowy Sącz, Krosno, Nowy Sącz, Przemyśl and Tarnów which have up to 2000 only been confirmed by the discovery of a single fresh mason nest each are considered as still being metastable and could even be extinguished again under unfavourable conditions, for example if some females would be captured by predatory animals or irresponsible and careless entomologists and/or if the mason nests would be damaged or removed for the reason of cleaning of buildings or collection of samples.

8.2 Protection Requirement of *Sceliphron destillatorium*

In order to enable a continuous development of the pioneering populations of the Mud-Dauber *Sceliphron destillatorium* in Ciężkowice northeast of Nowy Sącz, Krosno, Nowy Sącz, Przemyśl and Tarnów as well as to support the possibility of further expansion from these initial settlements to other localities in the surroundings where new populations could be founded in the near future, I recommend all entomologists to understand their responsibility for the protection of rare and endangered species and to renounce from collection of specimens of the Mud-Dauber *Sceliphron destillatorium* and samples of its mason nests at any place in the southeastern part of Poland and surrounding areas. The Mud-Dauber *Sceliphron destillatorium* is a very characteristical insect (Figure 1) which can be easily identified with certainty already in the field, and for the purpose of documentation, it is absolutely sufficient to take photographs instead of capturing of specimens. I also propose that every entomologist who encounters the Mud-Dauber *Sceliphron destillatorium* in the field should try to follow the females to the nesting sites on the walls and below the roofs of buildings and should endeavour to confirm the occurrence of mason nests in order to contribute to the mapping of established populations of the Mud-Dauber *Sceliphron destillatorium* as being revealed by the presence of nesting sites. The observation of mason nests of the Mud-Dauber *Sceliphron destillatorium* on the walls and below the roofs of buildings could be facilitated and supported by the use of binoculars or a tele lens of a camera.

It should also be emphasized that mason nests of the Mud-Dauber *Sceliphron destillatorium* must not be damaged or removed at any place in the southeastern part of Poland and surrounding areas, and again it is recommended to take pictures for adequate documentation of the mason nests and to permit their identification as belonging to the Mud-Dauber *Sceliphron destillatorium*. The owners of the houses where the mason nests of the Mud-Dauber *Sceliphron destillatorium* are attached on the walls and below the roofs should understand their responsibility in nature conservation, and should tolerate the mason nests on the walls of their houses and should not destroy them for the purpose of cleaning of buildings.

8.3 Possible Consequences of Excessive Capturing of Specimens and Damage or Removal of Mason Nests for Virginal Populations of *Sceliphron destillatorium*

Irresponsible and careless entomologists who have excessively captured specimens in some years as being confirmed by the presence of whole suites of females deriving from only a few seasons in some collections and who have also damaged or removed mason nests on the wall of the quarry have considerably contributed to the extinction of the unique population of the Mason Bee *Megachile (Chalicodoma) parietina* in Stolec east of Ząbkowice Śląskie south of Wrocław in Lower Silesia which has been the only assemblage of this outstanding and spectacular wild bee in Poland (STROJNY 1963, 1987, 1989; MADER 2000 a), with today only a few relicts of old weathered mason nests (Plate 2/5) on the wall of the quarry still testifying to the insufficient protection and the failure of prevention of the extinction of this endangered wild bee at its isolated and exclusive place of former occurrence in Poland.

The example of the tragical and unnecessary extinction of the extraordinarily attractive and famous population at the unique nesting site of the Mason Bee *Megachile (Chalicodoma) parietina* in Stolec east of Ząbkowice Śląskie south of Wrocław in Lower Silesia in the southwestern part of Poland which has been caused in considerable extent by irresponsible and careless entomologists as a consequence of excessive capturing of specimens and damage or removal of mason nests should be understood as a painful lesson and a serious warning in order to avoid the repetition of these mistakes at the nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland and surrounding areas as well as at the nowadays unique nesting site of the Mason Bee *Megachile (Chalicodoma) parietina* at the Goldberg in the Nördlinger Ries in the southwestern part of Germany (MADER 2001 a, 2001 c). Unexpected recent new occurrences of the Mason Bee *Megachile (Chalicodoma) parietina* in the southwestern part of Germany have been found in the Neckar valley south to southwest of Stuttgart (WESTRICH 2008) and in the southern Saar area (WEIGAND 2012) probably in the Saar val-

ley west to northwest of Saarbrücken, with these two recent new populations of the Mason Bee *Megachile (Chalicodoma) parietina* also requiring protection in a similar manner as outlined above which has already been supported by the remarkable responsibility of both authors who have not published the detailed localities of occurrence but have only referred to the regions where the localities are situated (WESTRICH 2008, WEIGAND 2012).

The renewed confirmation of the Mud-Dauber *Sceliphron destillatorium* in Ustrzyki Dolne and in Wetlina in 2000 (WISNIOWSKI 2000; WISNIOWSKI to CELARY, personal communication 2000) after its original discovery in Ustrzyki Dolne in 1973 (SOSZYNSKI & SOSZYNSKI 1985) and in Wetlina in 1968 (SLIWINSKI in SOSZYNSKI & SOSZYNSKI 1985) as well as its verification in Nasiczne in 1999 (PALACZYK in WISNIOWSKI 2000; PALACZYK to SOSZYNSKI, personal communication 2001), in Berehy Górne in 2000 (WISNIOWSKI 2000) and in Zatwarnica in 2000 (PALACZYK to SOSZYNSKI, personal communication 2001) would support the interpretation of already more or less stable populations in the Bieszczady Mountains at least in Ustrzyki Dolne and in Wetlina in 2000 where the Mud-Dauber *Sceliphron destillatorium* has been encountered repeatedly with a time difference of abt. 30 years, and has also shown that fortunately the excessive capturing of 11 females in only one season in Ustrzyki Dolne in 1973 according to the account of the collected material which is published in SOSZYNSKI & SOSZYNSKI (1985) has not endangered or even extinguished the population of the Mud-Dauber *Sceliphron destillatorium* at this place and its surroundings. Such an excessive capturing of specimens of the Mud-Dauber *Sceliphron destillatorium* as being documented in the account of the collected material in Ustrzyki Dolne which is published in SOSZYNSKI & SOSZYNSKI (1985) must not be repeated at virginal nesting sites of the Mud-Dauber *Sceliphron destillatorium*, because it could easily result in vanishing of the restricted populations and thus extinction of the pioneering nesting sites that would then be the immediate effect of the careless behaviour of irresponsible entomologists.

9 Biogeography and Migration of *Sceliphron destillatorium*

Concerning the immigration of the Mud-Dauber *Sceliphron destillatorium* into southeastern Poland, two possibilities have been discussed in the literature so far which include the Podolian-Volhynian route from the east and the Transcarpathian route from the south. SOSZYNSKI & SOSZYNSKI (1985) have preferred the Podolian-Volhynian route via the Dnestr valley and then across the watershed between the source region of the Dnestr southwest of Sambir southwest of Lviv (formerly Lwów or Lemberg) and the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl as the most probable immigration street of the Mud-Dauber *Sceliphron destillatorium* to the localities Ustrzyki Dolne, Ustrzyki Górne, Wetlina and Łubne southeast of Sanok as well as Czesławice westnorthwest of Lublin which have been the only known places of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland at that time. Based on the new confirmations in Ropa and Szymbark east of Nowy Sącz north of the Carpathian Mountains in Poland (CELARY 1996) as well as on the earlier records in Roznava (FRITSCH 1878, MOCSARY 1897), Trencín (MOCSARY 1897) and Sobrance (MOCSARY 1875, 1897) south of the Carpathian Mountains in Slovakia, CELARY (1996) has favoured an immigration of the Mud-Dauber *Sceliphron destillatorium* into southeastern Poland along the Transcarpathian route from the south via several passes across the Carpathian Mountains instead of along the Podolian-Volhynian route from the east via the Dnestr valley and then across the watershed between the source region of the Dnestr southwest of Sambir southwest of Lviv and the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl. CELARY (1996) has concluded that the Mud-Dauber *Sceliphron destillatorium* has most probably reached the localities Ropa and Szymbark east of Nowy Sącz as well as Ustrzyki Dolne, Ustrzyki Górne, Wetlina and Łubne southeast of Sanok via the Transcarpathian route across the Carpathian Mountains towards the north, and the only contribution of the Podolian-Volhynian route via the Dnestr valley towards the west to the immigration of the Mud-Dauber *Sceliphron destillatorium* into southeastern Poland has been its arrival in Czesławice westnorthwest of Lublin which is situated in considerable distance in the north from the assemblages of the other localities in the south. The subsequent observation of the Mud-Dauber *Sceliphron destillatorium* in Muszyna southsouthwest of Krynica southsoutheast of Nowy Sącz near a gate

and a pass in the Carpathian Mountains in Poland (CELARY 1998) has also supported the interpretation of the role of the Transcarpathian route for the immigration of the Mud-Dauber *Sceliphron destillatorium* into southeastern Poland by CELARY (1996). SOSZYNSKI & SOSZYNSKI (1985) have also already considered the possibility of an immigration of the Mud-Dauber *Sceliphron destillatorium* into southeastern Poland via the Transcarpathian route from the south across the Carpathian Mountains and have given it only a low probability, but they have not excluded it completely.

The discovery of nesting sites in Ciężkowice northeast of Nowy Sącz (Plate 1/6), Krosno (Plate 1/1 and 1/2), Nowy Sącz, Przemyśl (Plate 1/4) and Tarnów (Plate 1/5) in 2000 which represent new localities where the occurrence of the Mud-Dauber *Sceliphron destillatorium* has not been known before, as well as the confirmation of the nesting site in Ropa east of Nowy Sącz (Plate 1/3) as a place that is already established since some time during my overview mapping in 2000, the contribution of unpublished information of captures of specimens in Mików and Zatwarnica westnorthwest to northnorthwest of Ustrzyki Górne up to 2000 (SOSZYNSKI, personal communication 2001), and particularly the records of various additional localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in southeastern Poland (WISNIOWSKI 2007; BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; KOSIBOWICZ 2009; KOWALCZYK, KURZAC & SOSZYNSKI 2009; BILANSKI, KOŁODZIEJ & PAJĄK 2012; JAROSIEWICZ 2012; BURY, personal communication 2013; CELARY, personal communication 2013; JAROSIEWICZ, personal communication 2013; KOSIBOWICZ, personal communication 2013; RYBA, personal communication 2013) and south of the Carpathian Mountains in Slovakia (TOTH, TOTHOVA & LUKAS 2005; LUKAS, BOGUSCH & LISKA 2006) after 2000 lead me to the interpretation that both the Podolian-Volhynian route from the east and the Transcarpathian route from the south have been significant immigration streets for the Mud-Dauber *Sceliphron destillatorium* into southeastern Poland. CELARY (1996) has even postulated the Moravian-Silesian route from the west as a third immigration street which could bring the Mud-Dauber *Sceliphron destillatorium* from the surroundings of Vsetín (ZAVADIL & SNOFLAK 1948, BALTHASAR 1972) in Moravia in eastern Czechia to Silesia in southwestern Poland. The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Moravia in eastern Czechia at a group of localities close to the Moravian-Silesian gate which have up to 2000 included in addition to Vsetín also Mikuluvka, Milotice, Bystrice pod Hostýnem, Kromeríz, Olomouc and Litovel (compilation of records in ZAVADIL, SUSTERA & BATA 1937; ZAVADIL 1939, 1948 and HOFFER 1954) and have after 2000 also been supplemented by additional places (LUKAS, BOGUSCH & LISKA 2006) guides me to the interpretation that the Moravian-Silesian route from the west is a realistical immigration street which will probably direct in future or has even possibly already directed the Mud-Dauber *Sceliphron destillatorium* from Moravia in Czechia to Silesia in southwestern Poland.

According to the results of my overview mapping of nesting sites in 2000 as well as earlier captures of specimens that have been reported in the literature up to 2000 (VECHT & BREUGEL 1968, SOSZYNSKI & SOSZYNSKI 1985; CELARY 1996, 1998; WISNIOWSKI 2000) and have been contributed by unpublished information up to 2000 (CELARY, personal communication 2000; SOSZYNSKI, personal communication 2001), the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has up to 2000 only been confirmed at 17 isolated localities which are dispersed in a large area and are separated by considerable distances from the neighbouring places. 16 of these 17 localities are situated in an area with an extension of abt. 150 km in west-east-direction and abt. 100 km in north-south-direction, whereas the last locality is situated again abt. 150 km north of this region. Within the large area, slight aggregations of several localities occur only in two regions which comprise the surroundings of Nowy Sącz where 5 localities are assembled (Nowy Sącz, Ropa, Szymbark, Muszyna and Ciężkowice) as well as the interval of the Bieszczady Mountains between Ustrzyki Górne and the Łupków Pass where 7 localities are grouped (Ustrzyki Górne, Nasiczne, Zatwarnica, Wetlina, Berehy Górne, Łubne and Mików). If Nowy Sącz and its vicinity as well as Ustrzyki Górne and its surroundings would be counted as one point each, the distribution of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland up to 2000 would encompass 7 dispersed points including Nowy Sącz and its vicinity, Tarnów, Krosno, Przemyśl, Ustrzyki Dolne, Ustrzyki Górne and its surroundings, and Czesławice, with all these places being separated by distances of abt. 20 - 50 km or more from the next localities.

The scattered distribution of the in total 17 localities of confirmation of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland up to 2000 and the spread of these 17 places in various valleys that are separated by watersheds has in 2000 not yet allowed a final comprehensive interpretation of the directions and streets of migration at that stage of field investigation and literature

evaluation. The discovery of 79 additional localities of confirmation of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland after 2000 (WISNIOWSKI 2007; BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; KOSIBOWICZ 2009; KOWALCZYK, KURZAC & SOSZYNSKI 2009; BILANSKI, KOŁODZIEJ & PAJĄK 2012; JAROSIEWICZ 2012; BURY, personal communication 2013; CELARY, personal communication 2013; JAROSIEWICZ, personal communication 2013; KOSIBOWICZ, personal communication 2013; RYBA, personal communication 2013) and the spread of these 79 places in various valleys that are separated by watersheds, however, has in 2013 now provided sufficient material to permit a definite comprehensive interpretation of the significance of the Podolian-Volhynian route from the east and the Transcarpathian route from the south for the arrival of the Mud-Dauber *Sceliphron destillatorium* at the different localities in the southeastern part of Poland as well as a reconstruction of the sequence of the steps of wandering and distribution. Biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* in Poland and surrounding countries are illustrated in various distribution maps in the appendix.

9.1 Main Migration Streets in Europe

The main migration streets of the Mud-Dauber *Sceliphron destillatorium* in Europe have started from the Black Sea, the Caspian Sea and the Mediterranean Sea, and subordinately also from Lake Aral east of the Caspian Sea. From the Black Sea, the Mud-Dauber *Sceliphron destillatorium* has wandered along the valleys of Danube, Dnestr and Dnepr in upstream direction, and from the Azov Sea which is an appendix to the Black Sea, the Mud-Dauber *Sceliphron destillatorium* has advanced along the valleys of Don and Kuban in upstream direction. From the Caspian Sea, the Mud-Dauber *Sceliphron destillatorium* has followed the valleys of Volga, Ural and Kura in upstream direction. From Lake Aral east of the Caspian Sea, the Mud-Dauber *Sceliphron destillatorium* has progressed the valleys of Amudarija and Syrdarija in upstream direction. From the Mediterranean Sea, the Mud-Dauber *Sceliphron destillatorium* has migrated along the eastern coasts of Ionian Sea, Adriatic Sea, Tyrrhenian Sea and Ligurian Sea as well as along the Rhône valley in upstream direction. Biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* in Poland and surrounding countries are illustrated in various distribution maps in the appendix.

9.1.1 Migration Streets from the Black Sea

The distribution of the published records of the Mud-Dauber *Sceliphron destillatorium* in Europe and its eastern surroundings reveals three main migration streets from the Black Sea which comprise the Danube valley, the Dnestr valley and the Dnepr valley that have been followed in upstream direction. Subordinate migration streets from the Black Sea (including the appendix of the Azov Sea) incorporate the Don valley and the Kuban valley which also have been advanced in upstream direction. The abundance of localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* within and around the Danube valley as well as within the network of valleys of tributaries of the Danube valley underlines the significance of the Danube valley as the most important migration street from the Black Sea.

9.1.1.1 Migration along the Danube Valley

The first migration street from the Black Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Danube valley in upstream direction where it has wandered from the Black Sea along the boundary between Romania and Ukraina, across Romania, along the boundary between Romania and Bulgaria, along the boundary between Romania and Serbia (formerly Yugoslavia), across Serbia, along the boundary between Serbia and Croatia, across Hungary, and along the boundary between Hungary and Slovakia into Austria where it has advanced beyond Vienna and has already reached Krems (WERNER 1927, MADER 2000 a) and Linz (MARTZY in GUSENLEITNER 1996 a, SCHWARZ 1999). Because SCHÄFFER (1766) has figured the Mud-Dauber *Sceliphron destillatorium* in his collection of pictures of insects from Regensburg, with the assignment of the drawing in SCHÄFFER (1766) to the Mud-Dauber *Sceliphron destillatorium* having been later confirmed by PANZER (1804), KOHL (1918)

and VECHT & BREUGEL (1968), the further migration along the Danube valley in upstream direction beyond Linz in Austria could have brought the Mud-Dauber *Sceliphron destillatorium* even to Regensburg in Germany.

In the northern vicinity of Linz in Austria, the Mud-Dauber *Sceliphron destillatorium* has crossed the narrow watershed between the Danube valley and the Vltava (Moldau) valley, and has then wandered along the Vltava valley in downstream direction via Kaplice (formerly Kaplitz) southeast of Český Krumlov (formerly Krumau) north of Linz (KIRCHNER 1854) to Prague (STARY in HOFFER 1954) and Revnícov west of Prague (HOFFER 1954) in Czechia. The farther downstream migration along the Vltava valley and subsequently the Elbe (Labe) valley could bring the Mud-Dauber *Sceliphron destillatorium* to Dresden and beyond in Germany, with its occurrence in the latter area having already been once registered in Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 (specimen in the collection of the Museum of Natural History in Görlitz in Germany; SEIFERT, personal communication 2013).

Similarly as the Mud-Dauber *Sceliphron destillatorium*, also the Mason Bee *Megachile (Chalicodoma) parietina* has overstepped the narrow watershed between the Danube valley and the Vltava valley north of Linz in Austria and has advanced along the Vltava valley in downstream direction where it has been recorded in České Budejovice (formerly Budweis) (KIRCHNER 1857, PFLEGER in BATA 1939) and around Prague (BATA 1939, 1942; LUKAS 1979) in Czechia. The Mason Bee *Megachile (Chalicodoma) parietina* has even migrated along the Vltava valley in downstream direction up to its mouth north of Prague where it has entered the Elbe valley which it has followed up to the region of Dresden where it has been recorded in Hoflößnitz in the western part of Radebeul westnorthwest of Dresden (MÜLLER 1944). The Mason Bee *Megachile (Chalicodoma) parietina* has therefore already outlined the potential of farther migration of the Mud-Dauber *Sceliphron destillatorium* beyond Prague in Czechia to Dresden and beyond in Germany.

9.1.1.2 Migration along the Dnestr Valley

The second migration street from the Black Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Dnestr valley in upstream direction where it has wandered from the Black Sea along the boundary between Ukraina and Moldavia and across Moldavia, and then across Ukraina via the nearer and farther surroundings of Lviv where numerous places of occurrence have been confirmed between Kamjanec-Podilskyj and Lviv (BELKE 1853, 1858 a, 1859; WIERZEJSKI 1868, 1874; SCHMIDT-GOEBEL 1876, KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938, KUNTZE 1939) up to the source region of the Dnestr near the boundary to Poland southwest of Lviv from where it has immigrated into Poland.

In a combination of both migration streets, the Mud-Dauber *Sceliphron destillatorium* could also have reached the Dnestr valley between Kamjanec-Podilskyj and Ivano-Frankivsk southeast of Lviv in Ukraina by wandering from the Black Sea along the terminal interval of the Danube valley in upstream direction up to the mouth of the Prut into the Danube east of Galati in Romania, and then by advance along the Prut valley in upstream direction along the boundary between Romania and Moldavia into Ukraina up to the source region of the Prut west of Kolomyja, and finally by overstepping of the narrow watershed between the Prut valley between Cernivci and Kolomyja and the Dnestr valley between Kamjanec-Podilskyj and Ivano-Frankivsk southeast of Lviv. The migration along the Prut valley in upstream direction has brought the Mud-Dauber *Sceliphron destillatorium* to Iaşi (LEHRER & SCUTARU 1963) in Romania and to Kalinovci (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930) in the Ceremos valley close to its termination into the Prut valley westnorthwest of Cernivci in the Bukovina south of the Dnestr valley southeast of Ivano-Frankivsk and southwest of Kamjanec-Podilskyj in Ukraina.

9.1.1.3 Migration along the Dnepr Valley

The third migration street from the Black Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Dnepr valley in upstream direction where it has wandered from the Black Sea beyond Kijiv

(GOROBCHISHIN 1998, 2005) and then farther along the Prypjat valley northnorthwest of Kijiv in upstream direction across Ukraina and Belarus where it has been recorded in Pinsk east of Brest (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013) and from where it could also have reached Poland beyond the source region of the Prypjat east of Lublin and south of Brest, as well as farther along the Desna valley northnortheast of Kijiv in upstream direction where it has arrived in Brjansk (KOLESNIKOV 1977) between Kijiv and Moscow. North of Kijiv, the Mud-Dauber *Sceliphron destillatorium* has also utilized the Teteriv valley as a wandering path in upstream direction which has brought it to Zytomyr (Zitomir) (specimen in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), and westnorthwest of Dnipropetrovsk, the Mud-Dauber *Sceliphron destillatorium* has also advanced the Psel valley in upstream direction that has guided it to Sumy (GOROBCHISHIN 2005) and has also followed the Vorskia valley in upstream direction which has led it to Poltava (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001; and in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001).

Near the mouth of the Dnepr into the Black Sea southwest of Cherson (Gola Prystan), the Mud-Dauber *Sceliphron destillatorium* has also entered the Inhulec valley and has followed it in upstream direction via Darivka eastnortheast of Cherson to Bandurivka east of Znamjanka southsoutheast of Kijiv (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), and near the mouth of the Pivdennij Buh into the Black Sea south of Mikolaiv, the Mud-Dauber *Sceliphron destillatorium* has also entered the Inhul valley and has succeeded it in upstream direction to Kirovohrad southsoutheast of Kijiv (specimen in the collection of the Zoological Museum of the University of Hamburg in Germany; SCHÜTTE, personal communication 2013) and Panceve northwest of Kirovohrad (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001). The abundance of localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* within and around the Dnepr valley as well as within the network of valleys of tributaries of the Dnepr valley underlines the significance of the Dnepr valley as another important migration street from the Black Sea in addition to the predominant migration street of the Danube valley.

9.1.1.4 Migration along the Don Valley

The first migration street from the Azov Sea which is an appendix of the Black Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Don valley in upstream direction where it has started at the termination of the Don valley near Rostov-on-Don and has followed it in upstream direction where it has accessed the region of Voronez (MINORANSKIJ, CHARCENKO & FOMICEV 1970; FOMICEV & MINORANSKIJ 1971). Beyond Voronez, the Mud-Dauber *Sceliphron destillatorium* has probably farther wandered along the Don valley in upstream direction up to its source region in the area between Tula and Rjazan where it could have bridged across the watershed between the source region of the Don valley and the Oka valley around Rjazan which would have brought it to the Dankov district in the Rjazan province southeast of Moscow (specimen in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001).

From the Don valley eastnortheast of Rostov-on-Don, the Mud-Dauber *Sceliphron destillatorium* has also diverted into the Donec valley and has succeeded it in turn in upstream direction where it has arrived in Slovjansk (JAROSEVSKIJ 1881), Charkiv (BELECKIJ 1873, JAROSEVSKIJ 1881) and Belgorod (specimen in the collection of the University of Niznij Novgorod in Russia; MOKROUSOV, personal communication 2013), and has also advanced from the Donec valley into the Oskil valley where it has reached Kupjansk (IVANOV 1872) and Valujki (VELITSCHKOVSKY & KOHL 1913, VELITSCHKOVSKY in KOHL 1918) east of Charkiv.

9.1.1.5 Migration along the Kuban Valley

From the Black Sea (including the appendix of the Azov Sea), the Mud-Dauber *Sceliphron destillatorium* has not only migrated towards the west along the Danube valley in upstream direction as well as towards north, northwest and northeast along the valleys of Dnestr, Dnepr and Don in upstream direction, but also towards east and southeast along the Kuban valley in upstream direction.

The second migration street from the Azov Sea which is an appendix of the Black Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Kuban valley (RADDE 1899) in upstream direction from Temrjuk westnorthwest of Novorossijsk to Krasnodar and Stavropol (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) and farther to Karacajevsk (ROMANOVA 1969) south of Stavropol in the Caucasus Mountains.

9.1.2 Migration Streets from the Caspian Sea

The distribution of the published records of the Mud-Dauber *Sceliphron destillatorium* in Europe and its eastern surroundings reveals three main migration streets from the Caspian Sea east of the Black Sea which comprise the Volga valley, the Ural valley and the Kura valley that have been followed in upstream direction. The abundance of localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* within and around the Volga valley as well as within the network of valleys of tributaries of the Volga valley underlines the significance of the Volga valley as the most important migration street from the Caspian Sea.

9.1.2.1 Migration along the Volga Valley

The first migration street from the Caspian Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Volga valley in upstream direction where it has wandered from the Caspian Sea from Astrachan (EVERSMANN 1848, 1849; BECKER 1866, MORAWITZ 1890, KOHL 1918) to Volgograd (formerly Sarepta; BECKER 1880, STRAND 1915, EVERSMANN in KOHL 1918; MINORANSKIJ, CHARCENKO & FOMICEV 1970; FOMICEV & MINORANSKIJ 1971), Kamysin (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013) and Saratov (EVERSMANN 1848, 1849). From the Volga valley around Saratov, the Mud-Dauber *Sceliphron destillatorium* has crossed the watershed between the Volga valley and the Sura valley and has reached Penza (KERENSKIJ 1919) in the Sura valley northnorthwest of Saratov. The successive wandering along the Volga valley in upstream direction has guided the Mud-Dauber *Sceliphron destillatorium* to the Samara (formerly Kujbysev) province (specimen in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) and farther to Kazan (MINORANSKIJ, CHARCENKO & FOMICEV 1970; FOMICEV & MINORANSKIJ 1971, MINORANSKIJ 1971), Tatarstan southeast of Kazan (MOKROUSOV 2010) and Niznij Novgorod (formerly Gorki) westnorthwest of Kazan (MOKROUSOV 2010; specimens in the collection of the University of Niznij Novgorod in Russia; MOKROUSOV, personal communication 2013).

The Mud-Dauber *Sceliphron destillatorium* has then entered the Oka valley from the Volga valley in Niznij Novgorod eastnortheast of Moscow and has followed it in upstream direction to the Dankov district in the Rjazan province southeast of Moscow (specimen in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001). South of Kazan, the Mud-Dauber *Sceliphron destillatorium* has also accessed the Kama valley and has then in turn diverted into the Belaja valley which it has succeeded in upstream direction to Ufa (specimen in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) in the western foreland of the Ural Mountains.

9.1.2.2 Migration along the Ural Valley

The second migration street from the Caspian Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Ural valley in upstream direction where it has wandered from the Caspian Sea via Atyrau (formerly Gurjev) and Oral (formerly Uralsk) to Orynbor (formerly Orenburg) and farther to the eastern foreland of the Ural Mountains (EVERSMANN 1848, 1849). The Delta Mud Wasp *Delta unguiculatum* has also been noticed in Orynbor (formerly Orenburg) (RADOSZKOVSKY 1865) more or less at the same time as the Mud-Dauber *Sceliphron destillatorium* (EVERSMANN 1848, 1849) and has thus also followed the migration street from the Caspian Sea along the Ural valley in upstream direction.

9.1.2.3 Migration along the Kura Valley

The third migration street from the Caspian Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Kura valley in upstream direction where it has wandered from the Caspian Sea from its mouth west of Baku via Gence (formerly Elisabethpol, Jelisawetpol or Gjandza) and Chanlar (formerly Helenendorf) in Azerbajdzhan to Tbilisi (formerly Tiflis) in Georgia (KOHL 1918).

From the Kura valley southwest of Baku, the Mud-Dauber *Sceliphron destillatorium* has also diverted into the Araks (formerly Araxes) valley and has succeeded it in turn in upstream direction where it has arrived near Nachicevan (formerly Nachtschewan) southeast of Jerevan (formerly Eriwan) (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Bilav near Nachicevan southeast of Jerevan in Azerbajdzhan (specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), and even in Jerevan (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013) beyond the source region of the Araks.

9.1.3 Migration Streets from Lake Aral East of the Caspian Sea

The distribution of the published records of the Mud-Dauber *Sceliphron destillatorium* in Europe and its eastern surroundings reveals two main migration streets from Lake Aral east of the Caspian Sea which comprise the Amudarija valley and the Syrdarija valley that have been followed in upstream direction. The abundance of localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* within and around the Syrdarija valley as well as within the network of valleys of tributaries of the Syrdarija valley underlines the significance of the Syrdarija valley as the most important migration street from Lake Aral east of the Caspian Sea.

9.1.3.1 Migration along the Amudarija Valley

The first migration street from Lake Aral east of the Caspian Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Amudarija valley in upstream direction where it has wandered from Lake Aral to Cardzev (MJARCEVA 1963, 1968) and Kerki in Turkmenistan (KOHL 1918) as well as to Buchara in Uzbekistan (KOHL 1918) and Kuljab southeast of Dusanbe in Tadzikistan (POPOV in GUSSAKOVSKIJ 1935).

Beyond Cardzev and Kerki, the Mud-Dauber *Sceliphron destillatorium* has continued from the Amudarija valley into the Surchandarija valley where it has advanced up to its source region in the vicinity of Dusanbe in Tadzikistan (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013).

9.1.3.2 Migration along the Syrdarija Valley

The second migration street from Lake Aral east of the Caspian Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Syrdarija valley in upstream direction where it has wandered from Lake Aral via Kazaly (formerly Kazalinsk) (specimen in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), Kyzylorda (formerly Ksyl-Orda) (KAZENAS 1972, 1998, 2002) and Ciili eastsoutheast of Kyzylorda (KAZENAS 1998, 2002) in Kazakhstan to Chozent (formerly Leninabad) in Tadzikistan (specimen in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001), to the region around Taskent in Uzbekistan (KOHL 1918, ISLAMOV 1986; specimen in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001), to the region around Fergana southeast of Taskent in Uzbekistan (specimen in the collection of the Museum of Natural History in Geneva in Switzerland; MERZ, personal communication 2001; LANDRY, personal communication 2013), and to the region around Zalalabad eastsoutheast of Taskent in Kirgisia (specimen in the collection of the University of Niznij Novgorod in Russia; MOKROUSOV, personal communication 2013).

Beyond Taskent and Fergana, the Mud-Dauber *Sceliphron destillatorium* has continued from the Syrdarija valley into the Naryn valley where it has advanced beyond Taskömir eastsoutheast of Taskent (specimens in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences in Novosibirsk; DANILOV, personal communication 2013) up to Przevalsk near Lake Issyk-Kul southeast of Almaty (formerly Alma-Ata) in Kirgisia (specimen in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv; ROMASENKO, personal communication 2001). The upstream migration along the Syrdarija valley and the Naryn valley has guided the Mud-Dauber *Sceliphron destillatorium* up to an elevation of abt. 3,000 m above sea level in the mountains in Uzbekistan (ISLAMOV 1986).

Southwest of Taskent, the Mud-Dauber *Sceliphron destillatorium* has utilized the passage of the Syrdarija valley through Lake Sardara for the overstepping from the margin of Lake Sardara to the margin of the adjacent Lake Aydar-Kul (Ajdarköl) in short distance south of Lake Sardara, and has migrated along the margin of Lake Aydar-Kul (Ajdarköl) which has brought it to Zysak (formerly Sidzak) northeast of Samarqand (formerly Samarkand) southwest of Taskent (ISLAMOV 1986), and to the Nuratan Tau (Khrebet Nuratau) Mountains and the Chajat (Khayat) valley near Andebaraut north to northwest of Samarqand southwest of Taskent in Uzbekistan (KALUZA, personal communication 2013).

9.1.4 Migration Streets from the Mediterranean Sea

The migration of the Mud-Dauber *Sceliphron destillatorium* from the Mediterranean Sea along the Rhône valley in upstream direction has enabled its wandering around the mountain range of the Alps into Middle Europe between the Alps in the east and the Central Massiv in the west, and similarly, the migration of the Mud-Dauber *Sceliphron destillatorium* from the Black Sea along the Danube valley in upstream direction has enabled its wandering around the mountain range of the Alps into Middle Europe between the Alps in the west and the Carpathian Mountains in the east. The abundance of localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* within and around the Rhône valley as well as within the network of valleys of tributaries of the Rhône valley underlines the significance of the Rhône valley as the most important migration street from the Mediterranean Sea.

9.1.4.1 Migration along the Rhône Valley

The main migration streets of the Mud-Dauber *Sceliphron destillatorium* from the Mediterranean Sea extend along the eastern coasts of Ionian Sea and Adriatic Sea which have guided it from Greece via Albania, Makedonia, Serbia (formerly Yugoslavia), Bosna-Hercegovina, Croatia and Slovenia to northern Italy; along the eastern coasts of Tyrrhenian Sea and Ligurian Sea that have led it from southern Italy to northern Italy and southern France, along the western coast of the Mediterranean Sea which has brought it from eastern Spain to southern France, and then along the Rhône valley in upstream di-

rection that has guided the Mud-Dauber *Sceliphron destillatorium* from southern France via eastern France to western Switzerland.

In western Switzerland, the Mud-Dauber *Sceliphron destillatorium* has prograded along the Rhône valley in upstream direction beyond Lake Léman (Lac de Genève) up to Martigny (FREY-GESSNER in KOHL 1883, HUBER 1916), Fully northeast of Martigny (VERNIER, BARBALAT & GONSETH 1996), Sion (Sitten) (SCHULTHESS-RECHBERG in KOHL 1918), Sierre (Siders) (FREY-GESSNER in KOHL 1883, HUBER 1916) and Visp (specimen in the collection of the Museum of Zoology in Lausanne; FREITAG, personal communication 2001; KNISPEL, personal communication 2001) in the upper reach of the Rhône valley as well as to Stalden in the Vispa valley south of Visp (specimen in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001).

9.1.4.2 Migration beyond the Rhône Valley around Lake Léman and along the Aare Valley

In Switzerland, the Mud-Dauber *Sceliphron destillatorium* has not terminated its advance from the Mediterranean Sea in the upper reach of the Rhône valley, but has also wandered along the margins of Lake Léman, Lake Neuchâtel and Lake Bienne and then along the Aare valley in downstream direction from where it has dispersed towards the east to Zürich (UNGRICHT 1995; UNGRICHT in VERNIER, BARBALAT & GONSETH 1996) and towards the west to Basel (KOHL 1883, HUBER 1916; TÖPFL in VERNIER, BARBALAT & GONSETH 1996; SCHANOWSKI in SCHMID-EGGER 2005) at the southern margin of the Upper Rhine Graben at the boundary to Germany (including Grenzach-Wyhlen abt. 5 km east of Basel on the other side of the boundary in Germany; STALLING 2002). A specimen of the Mud-Dauber *Sceliphron destillatorium* has also been captured in Arbon northnortheast of St. Gallen eastnortheast of Zürich at the southern margin of Lake Constance in 1995 (RICKLI in GONSETH, IMBECK & TUSSAC 2001) which is again close to the boundary to Germany. Significant confirmations of individuals of the Mud-Dauber *Sceliphron destillatorium* have also been made in Corcelles west of Neuchâtel southwest of Basel in 1995 (VERNIER, BARBALAT & GONSETH 1996) at the northwestern margin of Lake Neuchâtel, and in Dornach south of Basel in 1995 (TÖPFL in VERNIER, BARBALAT & GONSETH 1996) in the Birs valley south of the Rhine valley.

The collection of the Museum of Natural History in Berne contains also a specimen of the Mud-Dauber *Sceliphron destillatorium* that has been captured in Berne in the Aare valley in 1992 (HUBER, personal communication 2001) which underlines the migration path from Lake Léman via Lake Neuchâtel and Lake Bienne into the Aare valley in downstream direction, and the further wandering along the Aare valley in downstream direction beyond Berne has then guided the Mud-Dauber *Sceliphron destillatorium* to the vicinity of Zürich where it has probably entered the Limmat valley at its mouth into the Aare valley and has followed the Limmat valley in upstream direction to Zürich. Around Solothurn northnortheast of Berne, the Mud-Dauber *Sceliphron destillatorium* has probably overstepped the watershed between the Aare valley around Solothurn and the source region of the Birs valley around Moutier, and has then advanced the Birs valley in downstream direction via Dornach to Basel where the Birs valley terminates into the Rhine valley. Having reached the Rhine valley in Basel along the above outlined migration path, the Mud-Dauber *Sceliphron destillatorium* has achieved the potential of further spreading along the Rhine valley in downstream direction across the boundary between Switzerland and Germany to Freiburg and beyond as well as in upstream direction to Lake Constance.

After its arrival in Zürich by migration along the Aare valley in downstream direction and the Limmat valley in upstream direction, the Mud-Dauber *Sceliphron destillatorium* has probably bridged the watershed between the Limmat valley and Lake Zürich in the vicinity of Zürich in the west and southwest and the Thur valley between Wattwil eastsoutheast of Zürich and Wil eastnortheast of Zürich in the east and northeast, has subsequently followed the Thur valley in downstream direction up to the mouth of the Sitter valley into the Thur valley southwest of Sittersdorf northeast of St. Gallen, has then advanced the Sitter valley in upstream direction up to the region north of St. Gallen, and has finally drifted across the watershed between the Sitter valley and Lake Constance towards the northeast to Arbon northnortheast of St. Gallen eastnortheast of Zürich at the southern margin of Lake Constance. The Mud-Dauber *Sceliphron destillatorium* has definitely reached Zürich and other localities in Switzerland not by artificial dragging in or passing in (UNGRICHT 1995), but by natural spread-

ing along the above sketched migration paths.

9.1.4.3 Migration around the Mountain Range of the Alps

The migration of the Mud-Dauber *Sceliphron destillatorium* from the Mediterranean Sea along the eastern coasts of Ionian Sea and Adriatic Sea from Greece via Albania, Makedonia, Serbia (formerly Yugoslavia), Bosna-Hercegovina, Croatia and Slovenia to northern Italy; as well as along the eastern coasts of Tyrrhenian Sea and Ligurian Sea from southern Italy to northern Italy and southern France, has been terminated by the mountain range of the Alps between Italy and Slovenia in the south and Switzerland and Austria in the north.

The wandering of the Mud-Dauber *Sceliphron destillatorium* around the mountain range of the Alps into Middle Europe has been possible by advance from the Mediterranean Sea along the Rhône valley in upstream direction which has guided it from southern France via eastern France to western Switzerland along a transit route west of the Alps, and by progradation from the Black Sea along the Danube valley in upstream direction that has led it from Romania via Serbia, Hungary and Slovakia to Austria along a transit route east of the Alps. The Mud-Dauber *Sceliphron destillatorium* has used the migration street of the Danube valley east of the Alps as a passage between the Alps in the west and the Carpathian Mountains in the east, and has used the migration street of the Rhône valley west of the Alps as a passage between the Alps in the east and the Central Massiv in the west.

9.1.5 Further Migration Streets from the Danube Valley along Tributary Valleys

Further migration streets of the Mud-Dauber *Sceliphron destillatorium* from the Danube valley have included the valleys of Morava (March), Váh, Nitra, Hron, Ipoly (Ipel), Tisza, Drava (Drau), Sava, Timiş (Tamis), Olt, Argeş, Ialomiţa, Cerna, Nera and Prut which are all tributaries of the Danube and have been followed in upstream direction, and further diversion has then guided the Mud-Dauber *Sceliphron destillatorium* into the valleys of various side rivers and spring streams of the aforementioned tributaries of the Danube that again have been advanced in upstream direction for various distances and sometimes even up to the source regions. The abundance of localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* within and around the Danube valley as well as within the network of valleys of tributaries of the Danube valley underlines the significance of the Danube valley as the most important migration street from the Black Sea.

9.1.5.1 Migration along the Valleys of Morava, Váh, Nitra, Hron and Ipoly

From the Danube valley at the boundary between Slovakia and Austria west of Bratislava (formerly Preßburg), the Mud-Dauber *Sceliphron destillatorium* has migrated along the Morava (March) valley in upstream direction from Devín west of Bratislava via Moravský Jan, Hodonín, Chropov, Bzenec, Moravský Písek, Uherské Hradiste, Velehrad, Salas and Kromeríz to Olomouc, Hodolany and Litovel as well as along the Becva valley which terminates into the Morava valley northnorthwest of Kromeríz in upstream direction to Prerov, Milotice, Mikuluvka and Vsetín in Moravia in Czechia. From the Danube valley at the boundary between Hungary and Slovakia, the Mud-Dauber *Sceliphron destillatorium* has wandered from Komárno along the Váh valley in upstream direction via Trnava, Sedlisko near Soros, Trencín, Zlatovce, Opatová and Horné Srnie to Martin and further to the vicinity of Dobsiná; from Komárno along the Nitra valley in upstream direction via Mana, Nitra, Dolné Stitare, Drazovce and Zobor to Diviaky; from Esztergom via the Hron valley from Stúrovo, Kamenica and Kamenin via Levice, Velká Vápenná, Batovce, Bohunický Rohác, Jablonovce, Banská Stiavnica and Zvolen to Banská Bystrica and Dobsiná; and from Esztergom along the Ipoly (Ipel) valley in upstream direction to Ipolytarnóc, Lucenec, Filakovo and Hajnacka and from there by overstepping of the narrow watershed between the source region of the Ipoly and the source regions of several tributaries of the Sajó and the Bódva via Kamenany, Plesivec, Silica, Domica, Roznava, Turna, Turnianské Podhradie and Seleska to

Kosice (formerly Kaschau) in Slovakia.

North of Trencín, the Mud-Dauber *Sceliphron destillatorium* has overstepped the narrow watershed between the Váh valley and the Becva valley by diverting from the Váh valley into the Vlára valley and then by bridging between the source regions of Vlára and Becva, and has then migrated along the Becva valley in downstream direction which again has guided it to Vsetín, Mikuluvka, Milotice and Prerov in Moravia in Czechia. The Mud-Dauber *Sceliphron destillatorium* has arrived in Bystrice pod Hostýnem either by entering a side valley of the Morava valley near Kromeríz or by branching into a side valley of the Becva valley near Milotice. The splitoff into the Dyje (Thaya) valley which terminates into the Morava valley southsouthwest of Hodonín has enabled the Mud-Dauber *Sceliphron destillatorium* to wander along the Dyje valley in upstream direction to Breclav, Lednice, Sedlec, Mikulov and Znojmo as well as after the branching of the Dyje valley into the Svitava valley and the Svratka valley at the southern margin of Brno along the Svitava valley in upstream direction to Brno (formerly Brünn), Blansko and Svitavy (formerly Zwittau), and the diversion from the Dyje valley into the Litava valley south of Brno has then brought the Mud-Dauber *Sceliphron destillatorium* along the Litava valley in upstream direction to Slavkov and Herspice east and eastsoutheast of Brno in Moravia in Czechia.

The continuation of the upstream migration of the Mud-Dauber *Sceliphron destillatorium* along the Morava valley beyond Olomouc, Hodolany and Litovel, and subsequently the overstepping across the narrow watershed between the Morava valley and the Odra valley east of Olomouc on the one hand; as well as the further downstream wandering along the Becva valley beyond Vsetín, Mikuluvka, Milotice and Prerov, and subsequently the crossing of the narrow watershed between the Becva valley and the Odra valley around Noví Jicín and Odry on the other hand, could bring the Mud-Dauber *Sceliphron destillatorium* to the Moravian-Silesian gate southsouthwest of Ostrava in Moravia in Czechia where it could then immigrate into Silesia in the southwestern part of Poland along the Odra valley in downstream direction. The assemblage of a suite of localities close to the Moravian-Silesian gate southsouthwest of Ostrava which include Vsetín, Mikuluvka, Milotice, Prerov, Bystrice pod Hostýnem, Kromeríz, Olomouc and Litovel (compilation of records in ZAVADIL, SUSTERA & BATA 1937; ZAVADIL 1939, 1948; ZAVADIL & SNOFLAK 1948, HOFFER 1954, BALTHASAR 1972; LUKAS, BOGUSCH & LISKA 2006) allows the postulation that the Moravian-Silesian route from the west is a realistical immigration street which will probably direct in future or has even possibly already directed the Mud-Dauber *Sceliphron destillatorium* from Moravia in Czechia to Silesia in the southwestern part of Poland.

9.1.5.2 Migration along the Tisza Valley

Northwest of Belgrade in Serbia (formerly Yugoslavia), the Mud-Dauber *Sceliphron destillatorium* has also entered the Tisza valley from the Danube valley, and has followed the Tisza valley in upstream direction across Hungary up to Tokaj near the boundaries to Slovakia and Ukraina. The diversion from the Tisza valley into the Sajó valley and then into the Hornád (Hernád) valley has again guided the Mud-Dauber *Sceliphron destillatorium* along the Hornád valley in upstream direction to Kosice and Presov and then further to the vicinity of Dobsiná; the diversion from the Tisza valley into the Sajó valley and then into the Slaná valley has again guided the Mud-Dauber *Sceliphron destillatorium* along the Slaná valley in upstream direction via Domica, Plesivec, Silica and Roznava to Dobsiná; and the diversion from the Tisza valley into the Bodrog valley and the Laborec valley has again guided the Mud-Dauber *Sceliphron destillatorium* along the Bodrog valley and the Laborec valley in upstream direction to Vinicky, Somotor, Královský Chlmec, Trebisov, Drahnov, Sobrance and Malé Ozorovce near Michalovce east of Kosice as well as to Humenné, Snina and Dolina Chotinka northeast of Kosice in Slovakia.

The successive splitoff of the Latorica (Latorycja) valley from the Bodrog valley and the Uh (Uz) valley from the Laborec valley has subsequently enabled the Mud-Dauber *Sceliphron destillatorium* to arrive in Uzhorod, Kamjanycja northeast of Uzhorod and Mukaceve in Ukraina as well as in Leles, Ulické Krivé and Nová Sedlica in Slovakia by wandering along the Latorica valley and the Uh valley in upstream direction. Southeast of Miskolc in Hungary, the Mud-Dauber *Sceliphron destillatorium* has entered the Sajó valley from the Tisza valley and has migrated in upstream direction beyond the splitoff of the Bodva valley from the Sajó valley north of Miskolc, and has again reached Roznava, Turna, Turnianské Podhradie, Seleska and Kosice (formerly Kaschau) in Slovakia by wandering along the Bodva valley in upstream direction.

9.1.5.3 Migration along the Valleys of Drava and Sava

Near Osijek northwest of Novi Sad northwest of Belgrade, the Mud-Dauber *Sceliphron destillatorium* has also entered the Drava (Drau) valley from the Danube valley, and has followed the Drava valley in upstream direction along the boundary between Croatia and Hungary, across Croatia and across Slovenia into Austria where it has reached the region of Klagenfurt in Carinthia. South of Nagykanizsa, the Mud-Dauber *Sceliphron destillatorium* has further diverted from the Drava valley into the Mura (Mur) valley, and has wandered along the Mura valley in upstream direction along the boundary between Croatia and Hungary as well as between Croatia and Slovenia, and across Slovenia into Austria where it has advanced beyond Graz in the Steiermark.

In Belgrade, the Mud-Dauber *Sceliphron destillatorium* has also entered the Sava (formerly Save) valley from the Danube valley, and has migrated along the Sava valley in upstream direction across Serbia (formerly Yugoslavia), along the boundary between Serbia and Bosna-Hercegovina, along the boundary between Bosna-Hercegovina and Croatia, and across Croatia into Slovenia up to Kranj (formerly Krain) northnorthwest of Ljubljana (formerly Laibach). East of Szeged in Hungary, the Mud-Dauber *Sceliphron destillatorium* has diverted into the Mureş (Maros) valley from the Tisza valley and has advanced along the Mureş valley in upstream direction into Romania where it has arrived in the surroundings of Alba Iulia, Aiud and Târgu Mureş in the area between the Carpathian Mountains and the Apuseni Mountains.

9.1.5.4 Migration along the Valleys of Timiş Olt, Argeş, Ialomiţa, Cerna, Nera and Prut

Northeast of Belgrade in Serbia, the Mud-Dauber *Sceliphron destillatorium* has also entered the Timiş (Tamis) valley from the Danube valley and has wandered along the Timiş valley in upstream direction into Romania where it has reached Reşiţa at the northern margin of the western tip of the Carpathian Mountains. The Mud-Dauber *Sceliphron destillatorium* could even have crossed the Carpathian Mountains by following the Olt valley in upstream direction from the Danube valley which has probably guided it to Sibiu (formerly Hermannstadt) and Beclean (formerly Bethlen) at the northern margin of the Carpathian Mountains, or it has prograded to Sibiu either by drifting from the Mureş valley around Alba Iulia towards eastsoutheast or by bridging of the watershed between the Mureş valley around Alba Iulia and the Olt valley around Sibiu.

Southeast of Bucharest in Romania, the Mud-Dauber *Sceliphron destillatorium* has also entered the Argeş valley from the Danube valley, has wandered along the Argeş valley in upstream direction, and has also diverted into the Dimboviţa valley from the Argeş valley which it has in turn followed in upstream direction to Bucharest. Eastnortheast of Bucharest in Romania, the Mud-Dauber *Sceliphron destillatorium* has also entered the Ialomiţa valley from the Danube valley and has migrated along the Ialomiţa valley in upstream direction that has brought it to Amara northnorthwest of Slobozia. Westnorthwest of Craiova in Romania, the Mud-Dauber *Sceliphron destillatorium* has also entered the Cerna valley and the Nera valley from the Danube valley and has succeeded along the Cerna valley and the Nera valley in upstream direction to Baile Herculane (formerly Herkulesbad or Herkulesfürdö) southsoutheast of Reşiţa and other localities in the Banat Mountains southsoutheast of Timis,oara.

Eastnortheast of Galati in Romania, the Mud-Dauber *Sceliphron destillatorium* has also entered the Prut valley from the Danube valley and has advanced along the Prut valley in upstream direction which has guided it to Iaşi (LEHRER & SCUTARU 1963) in Romania and to Kalinovci (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930) in the Ceremos valley close to its termination into the Prut valley westnorthwest of Cernivci in the Bukovina south of the Dnestr valley southeast of Ivano-Frankivsk and southwest of Kamjanec-Podilskyj in Ukraina. The significance of the Danube valley as immigration street for the wandering of thermophilous insects into Germany has also been emphasized by FROMMER (2012) who has outlined the Danubian route along the Danube valley in upstream direction.

9.2 Migration along the Podolian-Volhynian Route into Poland from the East

The significance of the Podolian-Volhynian route as migration street of the Mud-Dauber *Sceliphron destillatorium* into Poland from the east is illustrated by the reconstruction of its most probable arrival in Przemyśl and Czesławice westnorthwest of Lublin up to 2000; in Sanok and in the vicinity of Rzeszów after 2000; in Lubaczów, Tomaszów Lubelski and Antoniówka eastsoutheast of Zamość northnortheast of Przemyśl as well as in Swidnik southeast of Lublin after 2000; and at localities in the Bieszczady Mountains southsouthwest of Przemyśl up to 2000 and after 2000. The wandering of the Mud-Dauber *Sceliphron destillatorium* along the Podolian-Volhynian route to the region between Ivano-Frankivsk and Kamjanec-Podilskyj southeast of Lviv in the western part of Ukraina as well as along the northern margin of the Black Sea is also outlined. Comments are also offered on the population dynamics of the Mud-Dauber *Sceliphron destillatorium* in the Bieszczady Mountains, and on limits of field mapping by occurrence of hidden nesting sites on inner walls of buildings. Biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* in Poland and surrounding countries are illustrated in various distribution maps in the appendix.

9.2.1 Migration to the Region between Ivano-Frankivsk and Kamjanec-Podilskyj

The migration from the Black Sea along the Dnestr valley in upstream direction has guided the Mud-Dauber *Sceliphron destillatorium* to the region between Ivano-Frankivsk and Kamjanec-Podilskyj southeast of Lviv in the western part of Ukraina where its occurrence has been confirmed in Volcynec northeast of Ivano-Frankivsk in the Bystrycja valley close to its mouth into the Dnestr valley before 1868 (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930, KUNTZE 1939), in Ustecko eastsoutheast of Ivano-Frankivsk in the Dnestr valley before 1927 (KINEL & NOSKIEWICZ 1930), in Nyrkiv eastsoutheast of Ivano-Frankivsk in the Dzurin valley close to its termination into the Dnestr valley before 1938 (KUNTZE & NOSKIEWICZ 1938), in Zaliscyky eastsoutheast of Ivano-Frankivsk in the Dnestr valley before 1927 (KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), in Bilce-Zolote eastsoutheast of Ivano-Frankivsk in the Seret valley close to its mouth into the Dnestr valley before 1938 (KUNTZE & NOSKIEWICZ 1938), in Sinkiv eastsoutheast of Ivano-Frankivsk in the Dnestr valley before 1927 (KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), in Horosova westsouthwest of Kamjanec-Podilskyj in the Dnestr valley before 1938 (KUNTZE & NOSKIEWICZ 1938), in Kryvce west of Kamjanec-Podilskyj in the Niclava valley close to its termination into the Dnestr valley before 1938 (KUNTZE & NOSKIEWICZ 1938), in Melnycja-Podilska westsouthwest of Kamjanec-Podilskyj in the Dnestr valley before 1927 (KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), in Dzvenihorod westsouthwest of Kamjanec-Podilskyj in the Dnestr valley in 1869 (ŁOMNICKI 1870, KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), in Okopy southsouthwest of Kamjanec-Podilskyj at the mouth of the Zbruc valley into the Dnestr valley before 1938 (KUNTZE & NOSKIEWICZ 1938), in Skala-Podilska in the Zbruc valley tributing to the Dnestr valley northwest of Kamjanec-Podilskyj before 1874 (WIERZEJSKI 1874, KINEL & NOSKIEWICZ 1930), and in Kamjanec-Podilskyj in the Smotryc valley close to its termination into the Dnestr valley before 1853 (BELKE 1853, 1858 a, 1859).

Similarly as the valleys of Smotryc, Zbruc, Seret, Dzurin, Niclava and Bystrycja, the Mud-Dauber *Sceliphron destillatorium* has probably also accessed other side valleys of the Dnestr valley in the region between Ivano-Frankivsk and Kamjanec-Podilskyj and its surroundings, and has followed the side valleys of the Dnestr valley in upstream direction. From the region between Ivano-Frankivsk and Kamjanec-Podilskyj, the Mud-Dauber *Sceliphron destillatorium* has continued its wandering along the Dnestr valley in upstream direction as well as the entering of side valleys of the Dnestr valley. The diversion from the Dnestr valley into the courses of Scyrec, Zubrja, Davydivka and Bibrka and the advance along these creeks in upstream direction has brought the Mud-Dauber *Sceliphron destillatorium* to Lviv where it has already been observed in 1862 (SCHMIDT-GOEBEL 1876). From Lviv in the surroundings of the Dnestr valley, the Mud-Dauber *Sceliphron destillatorium* has only still been separated

by a distance of abt. 100 km from Przemyśl in the San valley. The further progradation along the Dnestr valley in upstream direction beyond the mouths of Scyrec, Zubrja, Davydivka and Bibrka south of Lviv has led the Mud-Dauber *Sceliphron destillatorium* into the source region of the Dnestr around Sambir southwest of Lviv and southeast of Przemyśl.

The migration from the Black Sea along the terminal interval of the Danube valley up to the mouth of the Prut into the Danube east of Galati in Romania, and then the wandering along the Prut valley in upstream direction along the boundary between Romania and Moldavia into Ukraina up to the source region of the Prut west of Kolomyja has guided the Mud-Dauber *Sceliphron destillatorium* into the Bukovina where it has been encountered in Kalinovci in the Ceremos valley close to its termination into the Prut valley westnorthwest of Cernivci southeast of Ivano-Frankivsk and southwest of Kamjanec-Podilskyj before 1868 (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930).

9.2.2 Migration along the Northern Margin of the Black Sea

In the collection of the Museum of Natural History in Stuttgart in Germany, a specimen of the Mud-Dauber *Sceliphron destillatorium* is contained which has been captured in Odessa near the mouth of the Dnestr into the Black Sea in the western part of Ukraina before 1900 (OSTEN, personal communication 2001), thus confirming that the Mud-Dauber *Sceliphron destillatorium* is resident at the northwestern margin of the Black Sea since more than 100 years, and similarly, the collection of the University of Simferopol in Ukraina contains several specimens of the Mud-Dauber *Sceliphron destillatorium* which have been captured in Simferopol, Sevastopol southwest of Simferopol, Catyrdah southeast of Simferopol, Jevpatorija westnorthwest of Simferopol, Kiparisnoe westsouthwest of Alusta southeast of Simferopol, Krasnogorskoe westsouthwest of Bilohirsk (formerly Belogorsk) eastnortheast of Simferopol, Sajtana near Kipcak on the Tarchankut peninsula northwest of Simferopol, Samokhvalovo near Bachcysaraj southwest of Simferopol, Simeiz near Alupka south of Simferopol, and Sudak southwest of Feodosija eastsoutheast of Simferopol on the Crimea peninsula in the southern part of Ukraina between 1849 and 1901 (SHORENKO 2005 a; PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012) that also testify to the existence of the Mud-Dauber *Sceliphron destillatorium* at the northern margin of the Black Sea (including the Azov Sea which is an appendix to the Black Sea) since more than 100 years. The occurrence of the Mud-Dauber *Sceliphron destillatorium* has also been confirmed at various other localities at the northwestern and western margin of the Black Sea in the Danube delta and its surroundings between Odessa in Ukraina in the northnortheast and Varna in Bulgaria in the south.

In 1991, even the Nearctic Mud-Dauber *Sceliphron caementarium* which has been artificially imported from North America to France and other parts of Western Europe after 1944/1945 and abt. 1970 (literature review in MADER 2000 a, BOGUSCH & MACEK 2005) has been encountered in Odessa at the northwestern margin of the Black Sea (ANTROPOV 1993), and it is therefore not excluded that the Nearctic Mud-Dauber *Sceliphron caementarium* (DRURY 1773) will repeat the migration of the Palaearctic Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807) from the Black Sea along the Dnestr valley in upstream direction and will also arrive in Poland at some time or other in the future. Consecutively, the Nearctic Mud-Dauber *Sceliphron caementarium* has also continued its advance in eastern direction along the northern margin of the Black Sea and has been found in Kerc eastnortheast of Simferopol in 2003 and in Feodosija eastsoutheast of Simferopol in 2010 on the Crimea peninsula eastsoutheast of Odessa (SHORENKO 2007, SHORENKO & KONOVALOV 2010; PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012; FATERYGA & KOVBLYUK 2013 a). An outstanding migration during the last decades has also been confirmed for the Oriental Mud-Dauber *Sceliphron curvatum* (SMITH 1870) which is an original resident of Asia from India, Pakistan, Kashmir and Nepal to Kazakhstan, Uzbekistan and Tadzikistan that has been artificially imported to Austria in Western Europe after abt. 1975 and has expanded its distribution in Europe rapidly and significantly since then (literature review in MADER 2000 a; CETKOVIC, RADOVIC & DOROVIC 2004; HELLRIGL 2004; BOGUSCH, LISKA, LUKAS & DUDICH 2005; RAHOLA 2005, SCHMID-EGGER 2005, BITSCH & BARBIER 2006; BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BITSCH 2010, PROKOFIEV & SKOMOROKHOV 2010; CETKOVIC, MOKROUSOV, PLECAS, BOGUSCH, ANTIC, DOROVIC-JOVANOVIC, KRPO-CETKOVIC & KARAMAN 2011; SCHARDT, RENKER, STAUDT & REDER 2012; FATERYGA & KOVBLYUK 2013 b; PU-

LAWSKI 2013 a, 2013 b).

9.2.3 Migration to Przemyśl

The early confirmation of the Mud-Dauber *Sceliphron destillatorium* in the western part of Ukraina in Lviv abt. 100 km east of Przemyśl where specimens have already been captured in 1862 (SCHMIDT-GOEBEL 1876), in Volcynec abt. 175 km southeast of Przemyśl and abt. 100 km southsoutheast of Lviv where it has already been noticed before 1868 (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930, KUNTZE 1939), in Skala-Podilska northwest of Kamjanec-Podilskyj abt. 190 km southeast of Lviv where it has already been confirmed before 1874 (WIERZEJSKI 1874, KINEL & NOSKIEWICZ 1930), in Dzvenihorod southwest of Kamjanec-Podilskyj abt. 220 km southeast of Lviv where it has already been observed in 1869 (ŁOMNICKI 1870, KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), in Kamjanec-Podilskyj abt. 225 km southeast of Lviv where it has already been recorded before 1853 (BELKE 1853, 1858 a, 1859), and in Kalinovci westnorthwest of Cernivci in the Bukovina abt. 200 km southsoutheast of Lviv where it has already been found before 1868 (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930), as well as at a suite of other localities in the Dnestr valley between Ivano-Frankivsk and Kamjanec-Podilskyj southeast of Lviv where specimens have been encountered already more than 80 years ago (KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938, KUNTZE 1939), with the northwesternmost place apart from Lviv being Volcynec northeast of Ivano-Frankivsk that is situated abt. 175 km southeast of Przemyśl and abt. 100 km southsoutheast of Lviv, suggests an immigration of the Mud-Dauber *Sceliphron destillatorium* from the Black Sea along the Dnestr valley in upstream direction to Lviv and from there across the narrow watershed between the source region of the Dnestr southwest of Sambir southwest of Lviv and the upper reach of the San near Przemyśl where I have discovered a recently established nesting site during my overview mapping in 2000 (Plate 1/4), and subsequently further records have been achieved in the vicinity of Przemyśl after 2000 (BURY, SUDOŁ, ZIE, BA & ZYŁA 2009; BILANSKI, KOŁODZIEJ & PAJĄK 2012).

The significance of the Dnestr valley as the Podolian-Volhynian migration street is illustrated by the chain of localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* that have been reported by BELKE (1853, 1858 a, 1859), WIERZEJSKI (1868, 1874), ŁOMNICKI (1870), KINEL & NOSKIEWICZ (1930), KUNTZE & NOSKIEWICZ (1938) and KUNTZE (1939) which are distributed between Kamjanec-Podilskyj abt. 225 km southeast of Lviv and Volcynec northeast of Ivano-Frankivsk abt. 100 km southsoutheast of Lviv. The landscape from Volcynec via Lviv to Przemyśl is gently undulatory and contains only low hillocks with less than 500 m elevation and only shallow incisions of little rivers and creeks, and would therefore be an ideal ground for the wandering of the Mud-Dauber *Sceliphron destillatorium* towards northwest and west.

9.2.4 Migration to Sanok and the Vicinity of Rzeszów

The presence of a single fresh mason nest of the Mud-Dauber *Sceliphron destillatorium* in Przemyśl in 2000 contrasts with the lack of further nesting sites in the San valley between Sandomierz and Sanok where I should have found at least some other nesting sites if they would have been established in 2000, and this constellation again emphasizes that the San valley has only been reached very recently by the installation of the Mud-Dauber *Sceliphron destillatorium* in Przemyśl during the last years before 2000. The results of my systematical mapping of nesting sites of the Delta Mud Wasp *Delta unguiculatum* in Germany and France (MADER 2000 a) as well as the successful discovery of 6 nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland in 2000 with the same strategy of field investigation lead to conclusion that if the Mud-Dauber *Sceliphron destillatorium* would already have been present at considerably more localities in the southeastern part of Poland in 2000, I should at least have noticed some more nesting sites during my screening of prominent buildings in various towns and larger villages in the triangle between Nowy Sącz in the west, Ustrzyki Górne southsouthwest of Przemyśl in the south and Lublin in the north.

After 2000, the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the San valley between

Sandomierz and Sanok has been recorded at various additional localities (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BILANSKI, KOŁODZIEJ & PAJĄK 2012; RYBA, personal communication 2013), thus confirming the subsequent spreading of the Mud-Dauber *Sceliphron destillatorium* in the San valley from Przemyśl in upstream direction via Dynów and Dydnia to Sanok and beyond to Zagórz, Uherce Mineralne and Lake Solina as well as in downstream direction via Sieniawa, Lezajsk, Koziarnia, Krzeszów and Rudnik towards Sandomierz after 2000. The existence of the nesting site of the Mud-Dauber *Sceliphron destillatorium* in Srogów Górny northwest of Sanok at least since 2000 (RYBA, personal communication 2013) indicates that the subsequent spreading from Przemyśl where the nesting site has probably also been founded already several years before 2000 along the San valley in upstream direction has possibly even already started before 2000, or that the vicinity of Sanok has already been reached by the Mud-Dauber *Sceliphron destillatorium* before 2000 independently from its arrival in Przemyśl by overstepping from the source region of the Dnestr southwest of Sambir southwest of Lviv to the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl and subsequent downstream wandering along the San valley to the vicinity of Sanok.

The further expansion of the Mud-Dauber *Sceliphron destillatorium* from the San valley between Przemyśl and Sandomierz after 2000 would also have guided it from the surroundings of Sieniawa and Lezajsk via the Wisłok valley in upstream direction and subsequently the Mleczka valley in upstream direction to Przeworsk, Dębów, Markowa, Kańczuga and Husów in the vicinity of Rzeszów, and the further expansion of the Mud-Dauber *Sceliphron destillatorium* from the San valley between Przemyśl and Sanok after 2000 would also have led it from Dynów by overstepping of the narrow watershed between the San valley and the source region of the Mleczka valley north of Dynów and subsequently by wandering along the Mleczka valley in downstream direction again to Przeworsk, Dębów, Markowa, Kańczuga and Husów in the vicinity of Rzeszów.

9.2.5 Migration to Lubaczów, Tomaszów Lubelski and Antoniówka

Similarly as the Mud-Dauber *Sceliphron destillatorium* has bridged across the narrow watershed between the source region of the Dnestr southwest of Sambir southwest of Lviv and the upper reach of the San near Przemyśl as well as between the source region of the Dnestr southwest of Sambir southwest of Lviv and the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl before 2000, the Mud-Dauber *Sceliphron destillatorium* has also overstepped the narrow watershed between the source region of the Verescycja (Veresica) which tributes to the Dnestr northwest of Lviv and the source region of Lubaczówka and Tanew which tribute to the San northeast of Przemyśl after 2000, and has then wandered along the Lubaczówka in downstream direction to Lubaczów and Stare Oleszyce as well as along the Tanew in downstream direction to Tomaszów Lubelski, Józefów and Biłgoraj.

Additionally, the Mud-Dauber *Sceliphron destillatorium* has also bridged the narrow watershed between the source region of the Dnestr southwest of Lviv and the source region of the Solokija northwest of Lviv after 2000, and has then wandered along the Solokija in upstream direction to Tomaszów Lubelski and Antoniówka eastsoutheast of Zamość, and has also overstepped the narrow watershed between the source region of the Solokija eastsoutheast of Tomaszów Lubelski and the source region of the Huczwa eastnortheast of Tomaszów Lubelski which has again brought it to Tomaszów Lubelski and further along the Huczwa in downstream direction to Antoniówka eastsoutheast of Zamość. The Huczwa terminates into the Bug near Hrubieszów eastnortheast of Zamość.

Alternatively, the Mud-Dauber *Sceliphron destillatorium* could also have arrived in Tomaszów Lubelski, Józefów, Biłgoraj and Antoniówka after 2000 by further spreading from the already existing occurrences in Przemyśl before 2000 as well as around Sieniawa, Lezajsk and Rudnik after 2000 in the San valley by upstream migration along the Lubaczówka from the vicinity of Sieniawa to Lubaczów and Stare Oleszyce; by upstream wandering along the Tanew from the vicinity of Rudnik to Biłgoraj, Józefów and Tomaszów Lubelski; and by bridging of the narrow watershed between the source region of the Tanew south of Tomaszów Lubelski, the source region of the Solokija eastsoutheast of Tomaszów Lubelski and the source region of the Huczwa eastnortheast of Tomaszów Lubelski as well as by subse-

quent downstream migration along the Huczwa to Antoniówka eastsoutheast of Zamość.

9.2.6 Migration to Czesławice

Similarly as the arrival of the Mud-Dauber *Sceliphron destillatorium* in Przemyśl is interpreted as a result of the continuous migration from Kamjanec-Podilskyj, Volcynec and Lviv towards northwest and west along the Podolian-Volhynian route from the east and then across the watershed between the source region of the Dnestr southwest of Sambir southwest of Lviv and the upper reach of the San near Przemyśl as well as between the source region of the Dnestr southwest of Sambir southwest of Lviv and the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl, the Mud-Dauber *Sceliphron destillatorium* could also have reached Czesławice westnorthwest of Lublin where its occurrence has been proven in Poland for the first time in 1962 by ANASIEWICZ (PULAWSKI, personal communication in VECHT & BREUGEL 1968; PULAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) along the same sequence and then by successive further wandering along the San valley in downstream direction via Sanok and Przemyśl to Sandomierz, and subsequently along the Vistula valley in downstream direction towards Puławy and from there to the vicinity of Lublin.

The second possibility of the arrival of the Mud-Dauber *Sceliphron destillatorium* in Czesławice westnorthwest of Lublin along the Podolian-Volhynian route from the east would include the migration from the Black Sea along the Dnestr valley in upstream direction towards the northwest to the region of Lviv and then its successive further wandering from the vicinity of Lviv towards northnorthwest over a distance of abt. 200 km with subsequently stepwise bridging of watersheds between tributaries of Bug, Dnestr and San until its arrival in the source region of the Wieprz north of Tomaszów Lubelski and then migration along the Wieprz valley in downstream direction beyond Lublin.

The third possibility of the arrival of the Mud-Dauber *Sceliphron destillatorium* in Czesławice westnorthwest of Lublin along the Podolian-Volhynian route from the east would comprise the migration from the Black Sea along the Dnepr valley in upstream direction towards the north up to the mouth of the Prypjat into the Dnepr north of Kijiv, along the Prypjat valley in upstream direction towards the west via Pinsk east of Brest (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013) beyond its source region east of Lublin and south of Brest, and then across the Bug valley and across the Wieprz valley into the surroundings of Lublin. The occurrence of the Mud-Dauber *Sceliphron destillatorium* in the Dnepr valley and its tributaries between Cherson (Gola Prystan) and Kijiv is documented by various specimens in the collection of the Institute of Zoology of the Academy of Sciences of Ukraina in Kijiv (ROMASENKO, personal communication 2001), with the oldest records confirming the establishment of the Mud-Dauber *Sceliphron destillatorium* in this region since almost 100 years, and the migration of the Mud-Dauber *Sceliphron destillatorium* along the Dnepr valley and its tributaries in upstream direction beyond Kijiv is verified by the distribution of localities of its occurrence in GOROBCHISHIN (2005).

9.2.7 Migration to Swidnik

Similarly as the Mud-Dauber *Sceliphron destillatorium* has reached Czesławice westnorthwest of Lublin before 2000 along the Podolian-Volhynian route either from the Black Sea along the Dnestr valley in upstream direction towards the northwest and then across the watershed between the source region of the Dnestr southwest of Sambir southwest of Lviv and the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl, along the San valley in downstream direction and subsequently along the Vistula valley in downstream direction towards Puławy and from there to the vicinity of Lublin; or from the Black Sea along the Dnepr valley in upstream direction towards the north up to the mouth of the Prypjat into the Dnepr north of Kijiv, along the Prypjat valley in upstream direction towards the west via Pinsk east of Brest (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of

America; PULAWSKI, personal communication 2013) beyond its source region east of Lublin and south of Brest, and then across the Bug valley and across the Wieprz valley into the surroundings of Lublin, the Mud-Dauber *Sceliphron destillatorium* has also arrived in Swidnik southeast of Lublin after 2000 along the Podolian-Volhynian route as outlined above, with the most probable migration street to Swidnik having been along the Wieprz valley in downstream direction after stepwise bridging of watersheds between tributaries of Bug, Dnestr and San until its appearance in the source region of the Wieprz north of Tomaszów Lubelski and from there via Józefów and Biłgoraj to the surroundings of Zamość and further to the vicinity of Lublin.

The bridging from the Bug valley southwest of Novovolynsk into the Wieprz valley at its source north of Tomaszów Lubelski and the downstream migration along the Wieprz valley would also have brought the Mud-Dauber *Sceliphron destillatorium* to Tomaszów Lubelski, Józefów and Biłgoraj and beyond to Swidnik. The downstream migration of the Mud-Dauber *Sceliphron destillatorium* along the Bug valley would also have included the possibility of its entrance into the Huczwa valley near Hrubieszów and its wandering along the Huczwa in upstream direction again to Antoniówka and Tomaszów Lubelski.

9.2.8 Migration to Localities in the Bieszczady Mountains Southsouthwest of Przemyśl

Aspects of the migration of the Mud-Dauber *Sceliphron destillatorium* to localities in the Bieszczady Mountains southsouthwest of Przemyśl are discussed along the lines of bridging of watersheds and migration along side valleys as follows.

9.2.8.1 Bridging of Watersheds

From the source region of the Dnestr southwest of Lviv and southeast of Przemyśl, the Mud-Dauber *Sceliphron destillatorium* could also have reached the localities Ustrzyki Dolne (SOSZYNSKI & SOSZYNSKI 1985, WISNIOWSKI 2000; WISNIOWSKI to CELARY, personal communication 2000), Ustrzyki Górne (SOSZYNSKI & SOSZYNSKI 1985), Zatwarnica (PALACZYK to SOSZYNSKI, personal communication 2001), Nasiczne (PALACZYK in WISNIOWSKI 2000; PALACZYK to SOSZYNSKI, personal communication 2001), Berehy Górne (WISNIOWSKI 2000), Wetlina (SOSZYNSKI & SOSZYNSKI 1985, WISNIOWSKI 2000; WISNIOWSKI to CELARY, personal communication 2000), Łubne (PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) and Mików (KURZAWA to SOSZYNSKI, personal communication 2001) in the Bieszczady Mountains southsouthwest of Przemyśl where it has been confirmed by captures of specimens up to 2000 by crossing of the narrow watershed which separates the source region of the Dnestr southwest of Sambir southwest of Lviv from the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl.

From the source region of the Dnestr between Ustrzyki Dolne in the northwest and Turka in the southeast, the Mud-Dauber *Sceliphron destillatorium* could have overstepped very easily across the narrow watershed of only abt. 5 km width to the source region of the Ruka that terminates into the San, and could then have followed the San valley in downstream direction towards Lake Solina and beyond. Additionally, the Mud-Dauber *Sceliphron destillatorium* could also have diverted from the Dnestr valley into the Misanec valley, could have bridged across the narrow watershed of only abt. 2 km width between the source regions of Misanec and Czarna, and could then have advanced along the Czarna valley in downstream direction which would also have brought it into the San valley at Lake Solina between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl.

In the course of its further expansion from the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl regardless of whether it has reached these places via the Podolian-Volhynian route from the east or via the Transcarpathian route from the south, the Mud-Dauber *Sceliphron destillatorium* could also have arrived in Przemyśl after its migration along the San valley in downstream direction. Because the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl has already been confirmed by captures of spe-

cimens abt. 40 years ago, it is certainly possible that the wandering along the San valley in downstream direction could have enabled the Mud-Dauber *Sceliphron destillatorium* to reach Przemyśl where the single fresh mason nest on an individual building gives evidence that the virginal population has probably only been established a few years before 2000.

The lack of further nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the San valley particularly between Lesko southeast of Sanok and Przemyśl in 2000 could then be explained by drifting along the San valley which has considerably accelerated the downstream advance of the Mud-Dauber *Sceliphron destillatorium* to Przemyśl and has prevented its installation at other places along the migration street of the San valley except of hidden places such as Srogów Górny northwest of Sanok, or could also be the result of shortcutting of the loop of the San valley between Lesko southeast of Sanok and Przemyśl by drifting across the watershed which is composed of moderate hillocks with up to abt. 400 - 700 m elevation that are separated by shallow incisions of minor tributaries of the San.

9.2.8.2 Migration along Side Valleys

From the San valley downstream of the mouth of the Ruka valley, the Mud-Dauber *Sceliphron destillatorium* could have reached Ustrzyki Górne by entering and upstream wandering of the Wołosaty valley, could have arrived in Nasiczne by entering and upstream migration of the Dwernik valley and its source creeks, could have come to Zatwarnica by diversion into the Głęboki creek, could have advanced to Łubne by entering and upstream wandering of the Hoczewka valley and subsequently the Jabłonka valley, and could have prograded to Mików by entering and upstream migration of the Osława valley, with all these rivers and creeks being southwestern tributaries of the San in the Bieszczady Mountains. From Lake Solina, the Mud-Dauber *Sceliphron destillatorium* could have accessed Wetlina by entering and upstream wandering of the Solinka valley and subsequently the Wetlina valley.

The Mud-Dauber *Sceliphron destillatorium* could have reached Ustrzyki Dolne even without overstepping of any watershed and also without crossing of any mountain pass by wandering along the Dnestr valley in upstream direction up to the mouth of the Strwiąz into the Dnestr eastnortheast of Sambir, and then by migrating along the Strwiąz valley in upstream direction that leads directly to Ustrzyki Dolne where the Strwiąz pinches out a few km northwest of the town. The narrow interval of the Strwiąz valley between Chyriv and Ustrzyki Dolne which passes in some places through forest should not have inhibited the migration of the Mud-Dauber *Sceliphron destillatorium* in comparison to the proven wandering of the Silk Bee *Colletes daviesanus* (MADER 1999 a) and the Delta Mud Wasp *Delta unguiculatum* (MADER 2000 a) for similar distances of abt. 15 - 20 km along narrow river valleys crossing forest regions in the Palatinate Forest and in the Vosges at the western margin of the Upper Rhine Graben in Germany and France. The arrival of the Mud-Dauber *Sceliphron destillatorium* in Ustrzyki Dolne by migration along the Strwiąz valley in upstream direction is confirmed by the observation of a male and a female on flowers at the margin of the Strwiąz near Ustrzyki Dolne in 2000 by WISNIOWSKI (2000).

The Mud-Dauber *Sceliphron destillatorium* could thus have wandered to Przemyśl, Ustrzyki Dolne, Ustrzyki Górne, Nasiczne, Zatwarnica, Wetlina, Berehy Górne, Łubne and Mików before 2000 both along the Podolian-Volhynian route via the Dnestr valley in upstream direction and then across the watershed between the source region of the Dnestr southwest of Sambir southwest of Lviv and the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl as well as the upper reach of the San near Przemyśl towards northwest, west and southwest, and along the Transcarpathian route from Sobrance, Drahnov and Malé Ozorovce in Slovakia as well as from Uzhorod and Mukaceve in Ukraina via the Łupków Pass and/or the Uzok Pass across the Carpathian Mountains towards north and northnortheast.

After 2000, the Mud-Dauber *Sceliphron destillatorium* in the Bieszczady Mountains has further dispersed from Ustrzyki Dolne, Ustrzyki Górne, Nasiczne, Zatwarnica, Wetlina, Berehy Górne, Łubne and Mików along the San valley in both upstream and downstream direction to Łupków, Lutowiska, Chrewt and Uherce Mineralne as well as along the San valley, the Hoczewka valley and subsequently the Jabłonka valley either in upstream direction from Sanok via Zagórz and Uherce Mineralne to Mchawa or in downstream direction from Łubne to Mchawa and beyond via Uherce Mineralne and

9.2.9 Population Dynamics in the Bieszczady Mountains

Aspects of the population dynamics of the Mud-Dauber *Sceliphron destillatorium* in the Bieszczady Mountains in the southeastern part of Poland are discussed along the lines of stone and wood substrates, temporary and permanent populations, and severity of the winter as follows.

9.2.9.1 Stone and Wood Substrates

Ustrzyki Górne, Wetlina and Ļubne which I have examined during my overview mapping in 2000, as well as probably also Nasiczne, Zatwarnica, Berehy Górne and Mików that I have not visited, are typical mountain villages with scattered distribution of mainly wooden houses and rarity or even absence of prominent stone buildings, and are thus not too much attractive to most of the masoning wasps and bees for nesting according to my experience in mapping of nesting sites of the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a). In contrast to the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* which fix their mason nests usually on stone substrates and sometimes also on metal substrates but not on wood substrates, however, the Mud-Dauber *Sceliphron destillatorium* constructs its mason nests repeatedly also on wood substrates (BIEGELEBEN 1928, ROTARIDES 1934; MAZEK-FIALLA 1935 a, 1935 b, 1936 a, 1936 b; STALLING 2002; BURY, SUDOĻ, ZIĘBA & ZYŁA 2009; BILANSKI, KOŁODZIEJ & PAJĄK 2012).

The Mud-Dauber *Sceliphron destillatorium* does therefore probably place its mason nests also on wooden houses in the mountain villages which, however, could be difficult to discover, because they could be hidden below the roofs, behind edges and margins, or even on the inner sides of wood elements of the houses. In Suche Rzeki southwest of Zatwarnica northnorthwest of Ustrzyki Górne, a nesting site of the Mud-Dauber *Sceliphron destillatorium* has been discovered on the wooden wall below the roof in the inner part of a hut in 2000 (PALACZYK to SOSZYNSKI, personal communication 2001) which confirms the possibility of nesting of the Mud-Dauber *Sceliphron destillatorium* also on the walls and below the roofs of wooden houses in mountain villages. Various examples of nesting sites of the Mud-Dauber *Sceliphron destillatorium* on stone or wood inside of houses are reported by BURY, SUDOĻ, ZIĘBA & ZYŁA (2009); BILANSKI, KOŁODZIEJ & PAJĄK (2012) and FATERYGA & KOVBLYUK (2013 a).

Because the observations of KURZAWA in Mików westnorthwest of Ustrzyki Górne (KURZAWA to SOSZYNSKI, personal communication 2001), of PALACZYK in Suche Rzeki southwest of Zatwarnica northnorthwest of Ustrzyki Górne (PALACZYK in WISNIOWSKI 2000; PALACZYK to SOSZYNSKI, personal communication 2001), of RYBA (personal communication 2013) in Srogów Górny northwest of Sanok, and of BURY, SUDOĻ, ZIĘBA & ZYŁA (2009) and BILANSKI, KOŁODZIEJ & PAJĄK (2012) at various places as well as of PREISS & STALLING in Grenzach-Wyhlen east of Basel (STALLING 2002) have revealed that mason nests of the Mud-Dauber *Sceliphron destillatorium* could also be hidden on inner walls where they are not visible from outside, it has also to be considered that mason nests of the Mud-Dauber *Sceliphron destillatorium* could have escaped my attention in the examined localities if they would have been attached at discrete places on inner walls of buildings having been constructed of stone or wood.

9.2.9.2 Temporary and Permanent Populations

In contrast to the mountain villages where predominantly wooden houses are often separated by larger empty spaces and are sometimes even dispersed in the valley and on the mountain slopes, Ustrzyki Dolne is a continuous town which contains numerous prominent stone buildings where I should have found mason nests of the Mud-Dauber *Sceliphron destillatorium* if they would have been present there in 2000 at not too much hidden places. The lack of success in discovery of mason nests of the Mud-

Dauber *Sceliphron destillatorium* in Ustrzyki Dolne during my overview mapping in 2000 in contrast to the confirmation of its occurrence at this locality by captures of specimens in the middle of the town (SOSZYNSKI & SOSZYNSKI 1985, WISNIOWSKI 2000; WISNIOWSKI to CELARY, personal communication 2000) could testify to an only temporary immigration of the Mud-Dauber *Sceliphron destillatorium* into the source region of the San and its surroundings where it has probably up to 2000 not established permanent populations at all the recorded places.

On the other hand, the renewed confirmation of the Mud-Dauber *Sceliphron destillatorium* in Ustrzyki Dolne and in Wetlina in 2000 (WISNIOWSKI 2000; WISNIOWSKI to CELARY, personal communication 2000) after its original discovery in Ustrzyki Dolne in 1973 (SOSZYNSKI & SOSZYNSKI 1985) and in Wetlina in 1968 (SLIWINSKI in SOSZYNSKI & SOSZYNSKI 1985) as well as its verification in Nasiczne in 1999 (PALACZYK in WISNIOWSKI 2000; PALACZYK to SOSZYNSKI, personal communication 2001), in Berehy Górne in 2000 (WISNIOWSKI 2000) and in Zatwarnica in 2000 (PALACZYK to SOSZYNSKI, personal communication 2001) would support the interpretation of already more or less stable populations at least in Ustrzyki Dolne and in Wetlina in 2000 where the Mud-Dauber *Sceliphron destillatorium* has been encountered repeatedly with a time difference of abt. 30 years, and has also shown that fortunately the excessive capturing of 11 females in only one season in Ustrzyki Dolne in 1973 according to the account of the collected material which is published in SOSZYNSKI & SOSZYNSKI (1985) has not endangered or even extinguished the population of the Mud-Dauber *Sceliphron destillatorium* at this place and its surroundings.

Particularly the aggregation of 7 localities between Ustrzyki Górne and Mików in a belt-like pattern in the Bieszczady Mountains, with all of them being situated in the system of the southwestern side valleys of the San valley, underlines the outstanding significance of this region for the installation and development of a limited province of occurrence of the Mud-Dauber *Sceliphron destillatorium* where the populations have probably already reached some degree of stability in 2000. This conclusion having already been drawn in 2000 has subsequently been confirmed by the discovery of additional occurrences of the Mud-Dauber *Sceliphron destillatorium* in the Bieszczady Mountains in Łupków, Lutowiska, Chrewt and Mchawa after 2000 (BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BILANSKI, KOŁODZIEJ & PAJĄK 2012) which fit into the belt-like pattern in the system of the southwestern side valleys of the San valley and expand the aggregation to 11 localities, thereby considerably increasing the significance of the Bieszczady Mountains as a substantial province of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland.

9.2.9.3 Severity of the Winter

In order to examine the possible influence of the harsh conditions in the winter in the Bieszczady Mountains in the southeastern part of Poland on the temporary or permanent establishment of populations of the Mud-Dauber *Sceliphron destillatorium* at localities in mountain valleys, comparison is made with the occurrence of the Mud-Dauber *Sceliphron destillatorium* in various regions north of 50 degrees northern latitude in Russia where still more severe winters are developed than in the Bieszczady Mountains in the southeastern part of Poland south of 50 degrees northern latitude.

The rich population of the Nearctic Mud-Dauber *Sceliphron caementarium* in Toronto in Ontario in Canada (MADER 2000 a; Plate 2/2 - 4) as well as the occurrences of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in Poim west of Penza in the Sura valley northnorthwest of Saratov (KERENSKIJ 1919) and in Brjansk in the Desna valley between Kijiv and Moscow (KOLESNIKOV 1977) in abt. 53.25 degrees northern latitude, in the Samara (formerly Kujbysev) province in the Volga valley (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) in abt. 53.25 degrees northern latitude, in the Dankov district in the Rjazan province southeast of Moscow in the Oka valley that tributes to the Volga valley (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) in abt. 54.5 degrees northern latitude, in Ufa eastnortheast of Samara in the Belaja valley which tributes to the Kama valley that terminates into the Volga valley (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) in abt. 54.75 degrees northern latitude, in Kazan northnorthwest of Samara in the Volga valley (MINORAN-

SKIJ, CHARCENKO & FOMICEV 1970; FOMICEV & MINORANSKIJ 1971, MINORANSKIJ 1971) in abt. 55.75 degrees northern latitude, and in Niznij Novgorod eastnortheast of Moscow in the Volga valley (specimens in the collection of the University of Niznij Novgorod in Russia; MOKROUSOV, personal communication 2013) in abt. 56.25 degrees northern latitude, as well as in Volgograd (formerly Sarepta) in the Volga valley (BECKER 1880, STRAND 1915, EVERSMANN in KOHL 1918) in abt. 48.75 degrees northern latitude in Russia where the winter is usually very cold underline that the harsh conditions in the winter in the Bieszczady Mountains in the southeastern part of Poland are certainly not the limiting factor for a persistent installation of continuous populations of the Mud-Dauber *Sceliphron destillatorium* at localities in mountain valleys.

The winter stability of the Mud-Dauber *Sceliphron destillatorium* is especially illustrated by its occurrence in Volgograd which is particularly well-known for its very cold winters, because the severe winter of Volgograd has had a decisive impact on the further course of the Second World War.

9.2.10 Limits of Field Mapping by Occurrence of Hidden Nesting Sites on Inner Walls

The possibility that mason nests of the Mud-Dauber *Sceliphron destillatorium* which are attached to inner walls of buildings having been constructed of stone or wood are not identified by the strategy of field mapping and escape the systematical screening of the outer walls of prominent buildings is highlighted by the fact that the first discovery of mason nests of the Mud-Dauber *Sceliphron destillatorium* in Germany in Grenzach-Wyhlen east of Basel has been made completely accidentally when a wooden nesting box for owls which has been fixed in several m height on the inner wall of a wooden barn that is surrounded by orchards and fields south of the village has been checked and unexpectedly two mason nests of the Mud-Dauber *Sceliphron destillatorium* have been found on the inner wall of the wooden nesting box that has been attached to the inner wall of the wooden barn (STALLING 2002), and such a hidden nesting site would even have escaped a regular screening of the inner walls of selected buildings.

The same applies for the nesting sites of the Mud-Dauber *Sceliphron destillatorium* which have been discovered in Mików westnorthwest of Ustrzyki Górne by KURZAWA in 1994 (KURZAWA to SOSZYNSKI, personal communication 2001) and in Suche Rzeki southwest of Zatwarnica northnorthwest of Ustrzyki Górne by PALACZYK in 2000 (PALACZYK to SOSZYNSKI, personal communication 2001). KURZAWA has observed a mason nest of the Mud-Dauber *Sceliphron destillatorium* on the metal car body in the inner part of the wreck of a bus which has fallen by accident into a muddy meadow near the Osława creek close to Mików, with the females having reached the mason nest that has not been visible from outside through cracks and gaps in the metal car body (KURZAWA to SOSZYNSKI, personal communication 2001). PALACZYK has seen a mason nest of the Mud-Dauber *Sceliphron destillatorium* on the wooden wall below the roof in the inner part of a hut near the Rzeka creek in Suche Rzeki where wood has been stored, with the females having reached the mason nest that has not been visible from outside through cracks and gaps in the wooden wall of the hut (PALACZYK to SOSZYNSKI, personal communication 2001). The mason nests of the Mud-Dauber *Sceliphron destillatorium* which have been found in Mików westnorthwest of Ustrzyki Górne by KURZAWA in 1994 (KURZAWA to SOSZYNSKI, personal communication 2001) and in Suche Rzeki southwest of Zatwarnica northnorthwest of Ustrzyki Górne by PALACZYK in 2000 (PALACZYK to SOSZYNSKI, personal communication 2001) have been discovered similarly accidentally as the mason nests of the Mud-Dauber *Sceliphron destillatorium* that have been identified in Grenzach-Wyhlen east of Basel by PREISS & STALLING in 1997 (STALLING 2002), and all these three nesting sites of the Mud-Dauber *Sceliphron destillatorium* would not have been identified by the strategy of field mapping and would have escaped the systematical screening of the outer walls of prominent buildings. Various examples of nesting sites of the Mud-Dauber *Sceliphron destillatorium* on stone or wood inside of houses are reported by BURY, SUDOŁ, ZIĘBA & ZYŁA (2009); BILANSKI, KOŁODZIEJ & PAJĄK (2012) and FATERYGA & KOVBLYUK (2013 a).

The possibility of gaps of detection of mason nests of the Mud-Dauber *Sceliphron destillatorium* and similarly also of the Mason Bee *Megachile (Chalicodoma) parietina* which are hidden on inner walls of

buildings having been constructed of stone or wood has therefore to be considered as a potentially significant limit of the evaluation of the distribution of nesting sites by regular field mapping with systematical screening of the outer walls of prominent buildings particularly because the Mud-Dauber *Sceliphron destillatorium* and similarly also the Mason Bee *Megachile (Chalicodoma) parietina* attach their nests both on outer and inner walls, whereas the strategy of field mapping with systematical screening of the outer walls of prominent buildings provides almost total coverage of the distribution of nesting sites of the Delta Mud Wasp *Delta unguiculatum* which fixes its mason nests exclusively on outer walls where they could only be hidden in recesses, holes and ornamentations as well as below arches and roofs (MADER 2000 a).

9.3 Migration along the Transcarpathian Route into Poland from the South

The significance of the Transcarpathian route as migration street of the Mud-Dauber *Sceliphron destillatorium* into Poland from the south is illustrated by the reconstruction of its most probable arrival in Ropa and Szymbark east of Nowy Sącz, Muszyna southsoutheast of Nowy Sącz, Ciężkowice northeast of Nowy Sącz, Tarnów, Nowy Sącz and Krosno up to 2000, as well as in the vicinities of Jasło, Mielec, Rzeszów, Cracow, Pinczów, Koniecpol and Tomaszów Mazowiecki after 2000. An outline of the wandering of the Mud-Dauber *Sceliphron destillatorium* to localities in the Bieszczady Mountains southsouthwest of Przemyśl in Poland along the Podolian-Volhynian route from the east or along the Transcarpathian route from the south up to 2000 and after 2000 is also given. Biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* in Poland and surrounding countries are illustrated in various distribution maps in the appendix.

9.3.1 Migration to Localities in the Bieszczady Mountains Southsouthwest of Przemyśl

Aspects of the migration of the Mud-Dauber *Sceliphron destillatorium* to localities in the Bieszczady Mountains southsouthwest of Przemyśl are discussed along the lines of crossing of mountain passes, bridging of watersheds and migration along side valleys as follows.

9.3.1.1 Crossing of Mountain Passes

The continuation of the expansion along the Podolian-Volhynian route across the watershed between the source region of the Dnestr southwest of Sambir southwest of Lviv and the upper reach of the San near Przemyśl as well as between the source region of the Dnestr southwest of Sambir southwest of Lviv and the source region of the San between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl towards west and southwest beyond Ustrzyki Dolne, Ustrzyki Górne, Nasiczne, Zatwarnica, Wetlina, Berehy Górne, Łubne and Mików could also have brought the Mud-Dauber *Sceliphron destillatorium* along the Transcarpathian route inversely from north to south instead of normally from south to north via the Łupków Pass and/or the Uzok Pass to Sobrance, Drahnov and Malé Ozorovce around Michalovce east of Kosice in Slovakia near the boundary to Ukraina where it has already been encountered more than 110 years ago in Malé Ozorovce (CHYZER 1902, CHYZER in ZAVADIL 1934) and even more than 130 years ago in Sobrance (MOCSARY 1875, 1897) and in Drahnov (PASZLAVSZKY 1884, MOCSARY 1897), as well as via the Uzok Pass to Uzhorod and Mukaceve in Ukraina near the boundary to Slovakia where it has already been recorded more than 75 years ago (GREGOR in ZAVADIL, SUSTERA & BATA 1937; VAVRA in ZAVADIL, SUSTERA & BATA 1937).

The inverse utilization of the Transcarpathian route via the Łupków Pass and/or the Uzok Pass from north to south instead of from south to north, however, is unprobable, because the Mud-Dauber *Sceliphron destillatorium* has arrived in Sobrance, Drahnov and Malé Ozorovce around Michalovce east of Kosice in Slovakia as well as in Uzhorod and Mukaceve in Ukraina significantly earlier than in Ustrzyki

Dolne, Ustrzyki Górne, Nasiczne, Zatwarnica, Wetlina, Berehy Górne, Łubne and Mików in Poland. The Mud-Dauber *Sceliphron destillatorium* has therefore rather migrated from Sobrance, Drahnov and Malé Ozorovce around Michalovce east of Kosice in Slovakia as well as from Uzhorod and Mukaceve in Ukraina along the Transcarpathian route via the Łupków Pass and/or the Uzok Pass normally from south to north and has wandered from Sobrance, Drahnov and Malé Ozorovce around Michalovce east of Kosice in Slovakia as well as from Uzhorod and Mukaceve in Ukraina to Mików, Łubne, Berehy Górne, Wetlina, Zatwarnica, Nasiczne, Ustrzyki Górne and Ustrzyki Dolne in Poland in northwards and northnortheastwards direction.

The Uzok Pass separates the source region of the Uz (Uh) east of Uzok in the south and the source region of the San northnortheast of Uzok in the north, and an overstepping of the Mud-Dauber *Sceliphron destillatorium* from the source region of the Uz via the Uzok Pass to the source region of the San northnortheast of Uzhorod over a distance of abt. 5 - 10 km would be one of the shortest connections between the source regions of two rivers on the opposite sides of the Carpathian Mountains. The Mud-Dauber *Sceliphron destillatorium* could thus have arrived in the San valley between its spring and Lake Solina along the Transcarpathian route by bridging from the source region of the Uz across the Uzok Pass to the source region of the San, as well as along the Podolian-Volhynian route by overstepping from the source region of the Dnestr across the narrow watershed to the source region of the Ruka which terminates into the San and by connecting from the source region of the Misanec that diverts from the Dnestr across the narrow watershed to the source region of the Czarna which leads to Lake Solina. The downstream migration along the San valley from the Uzok Pass to Lake Solina and beyond would then have brought the Mud-Dauber *Sceliphron destillatorium* to Ustrzyki Górne, Nasiczne, Zatwarnica, Wetlina, Berehy Górne, Łubne and Mików by entering of various southwestern side valleys of the San valley and wandering along them in upstream direction.

9.3.1.2 Bridging of Watersheds and Migration along Side Valleys

The early records of the Mud-Dauber *Sceliphron destillatorium* in Kamjanec-Podilskyj (BELKE 1853, 1858 a, 1859), Skala-Podilska (WIERZEJSKI 1874, KINEL & NOSKIEWICZ 1930), Dzvenihorod (ŁOMNICKI 1870, KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), Volcynec (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930, KUNTZE 1939), Lviv (SCHMIDT-GOEBEL 1876), Sobrance (MOCSARY 1875, 1897), Drahnov (PASZLAVSZKY 1884, MOCSARY 1897) and Malé Ozorovce (CHYZER 1902, CHYZER in ZAVADIL 1934) since more than 100 - 150 years ago as well as in Uzhorod and Mukaceve (GREGOR in ZAVADIL, SUSTERA & BATA 1937; VAVRA in ZAVADIL, SUSTERA & BATA 1937) since more than 75 years ago in contrast to its confirmation in Ustrzyki Dolne, Ustrzyki Górne, Wetlina and Łubne (SOSZYNSKI & SOSZYNSKI 1985) only abt. 40 - 50 years ago as well as in Nasiczne, Zatwarnica, Berehy Górne and Mików only abt. 10 - 20 years ago (WISNIOWSKI 2000; SOSZYNSKI, personal communication 2001) illustrate that the Mud-Dauber *Sceliphron destillatorium* could have immigrated to these places in the Bieszczady Mountains both from Kamjanec-Podilskyj and Lviv along the Podolian-Volhynian route from the east, and from Sobrance, Drahnov and Malé Ozorovce as well as from Uzhorod and Mukaceve along the Transcarpathian route from the south.

The Mud-Dauber *Sceliphron destillatorium* could have reached Ustrzyki Dolne even without crossing of any mountain pass and without overstepping of any watershed by wandering along the Dnestr valley in upstream direction up to the mouth of the Strwiąz into the Dnestr eastnortheast of Sambir, and then by migrating along the Strwiąz valley in upstream direction that leads directly to Ustrzyki Dolne where the Strwiąz pinches out a few km northwest of the town. The narrow interval of the Strwiąz valley between Chyriv and Ustrzyki Dolne which passes in some places through forest should not have inhibited the migration of the Mud-Dauber *Sceliphron destillatorium* in comparison to the proven wandering of the Silk Bee *Colletes daviesanus* (MADER 1999 a) and the Delta Mud Wasp *Delta unguiculatum* (MADER 2000 a) for similar distances of abt. 15 - 20 km along narrow river valleys crossing forest regions in the Palatinate Forest and in the Vosges at the western margin of the Upper Rhine Graben in Germany and France. The arrival of the Mud-Dauber *Sceliphron destillatorium* in Ustrzyki Dolne by migration along the Strwiąz valley in upstream direction is confirmed by the observation of a male and a female on flowers at the margin of the Strwiąz near Ustrzyki Dolne in 2000 by WISNIOWSKI (2000).

The Mud-Dauber *Sceliphron destillatorium* could also have achieved access to the drainage system of

the San and its tributaries in the Bieszczady Mountains by wandering from Sobrance, Drahnov and Malé Ozorovce in the south in upstream direction to the north along the valleys of Uh (Uz), Vydranka, Vyrava, Udava, Pcolinka, Cirocha, Ulicka, Ondava and Olka up to their source regions from where it could have overstepped across the narrow watersheds of abt. 2 - 10 km width between Łupków Pass and Uzok Pass to the source regions of Osława, Osława, Jabłonka, Solinka and Wetlina, and could then have followed the valleys of Osława, Osława, Jabłonka, Solinka and Wetlina in downstream direction to the north up to the arrival in the San valley. In case of the latter route of migration, the Mud-Dauber *Sceliphron destillatorium* would have reached Mików in the Osława valley, Łubne in the Jabłonka valley and Wetlina in the Wetlina valley before its arrival in the San valley and its subsequent access of the other localities in the drainage system of the San in the Bieszczady Mountains.

The expansion of the Mud-Dauber *Sceliphron destillatorium* by wandering from Sobrance, Drahnov and Malé Ozorovce in the south in upstream direction to the north along the valleys of Uh (Uz), Vydranka, Vyrava, Udava, Pcolinka, Cirocha, Ulicka, Ondava and Olka up to their source regions has resulted in its subsequent arrival in Humenné, Snina, Dolina Chotinka, Remetské Hámre, Vihorlat, Ulické Krivé and Nová Sedlica in Slovakia south of the Carpathian Mountains and close to Łupków Pass and Uzok Pass, and the bridging across the narrow watersheds of abt. 2 - 10 km width to the source regions of Osława, Osława, Jabłonka, Solinka and Wetlina via Łupków Pass and Uzok Pass as well as the wandering along the valleys of Osława, Osława, Jabłonka, Solinka and Wetlina in downstream direction to the north has later also brought the Mud-Dauber *Sceliphron destillatorium* to Łupków, Mchawa, Lutowiska and Chrewt in Poland north of the Carpathian Mountains. The further wandering along the Uz valley beyond Drahnov and Uzhorod has also facilitated the appearance of the Mud-Dauber *Sceliphron destillatorium* in Kamjanycja northeast of Uzhorod in Ukraina.

9.3.2 Migration to Ropa and Szymbark

The interpretation of the arrival of the Mud-Dauber *Sceliphron destillatorium* in Ropa and Szymbark in the Ropa valley, Nowy Sącz in the Dunajec valley, Ciężkowice in the Biała valley, Tarnów near the termination of the Biała valley into the Dunajec valley, Krosno in the Wisłok valley, and Muszyna in the Poprad valley has to consider that the nesting site in Ropa (Plate 1/3) is already known since 5 years before 2000 (CELARY 1996) and can be estimated to have already been established at least 10 years before 2000 based on the assemblage of old weathered and new undamaged mason nests, whereas the nesting sites in Nowy Sącz, Ciężkowice (Plate 1/6), Tarnów (Plate 1/5) and Krosno (Plate 1/1 and 1/2) are characterized by the presence of only a single fresh mason nest at each place in 2000 which suggests that the Mud-Dauber *Sceliphron destillatorium* has reached these localities only a few years before 2000. Although mason nests of the Mud-Dauber *Sceliphron destillatorium* have not been found in Szymbark which is situated only abt. 7 km eastnortheast of Ropa, the observation and collection of specimens in 1994 and 1995 (CELARY 1996) indicates that the population of the Mud-Dauber *Sceliphron destillatorium* in Szymbark exists probably also already for abt. 10 years before 2000.

The immigration of the Mud-Dauber *Sceliphron destillatorium* into the Ropa valley near Ropa and Szymbark east of Nowy Sącz in Poland in the region north of the mountain ridges already abt. 10 years before 2000 or even earlier has most probably been accomplished from the region south of the mountain ridges in Slovakia along the Transcarpathian route towards the north via several passes in the Carpathian Mountains, because south of the mountain ridges, the Mud-Dauber *Sceliphron destillatorium* has been recorded in Sobrance (MOCSARY 1875, 1897), Roznava (FRITSCH 1878, MOCSARY 1897) and Drahnov (PASZLAVSZKY 1884, MOCSARY 1897) in Slovakia already more than 130 years ago; in Trencín (MOCSARY 1897) and Malé Ozorovce (CHYZER 1902, CHYZER in ZAVADIL 1934) in Slovakia already more than 110 years ago, in Zlatovce and Kamenany in Slovakia already more than 75 years ago (CHYZER in ZAVADIL 1934; CEPELAK in ZAVADIL, SUSTERA & BATA 1937; CHYZER in ZAVADIL, SUSTERA & BATA 1937; PFEFFER in ZAVADIL, SUSTERA & BATA 1937), in Uzhorod and Mukaceve in Ukraina already more than 75 years ago (GREGOR in ZAVADIL, SUSTERA & BATA 1937; VAVRA in ZAVADIL, SUSTERA & BATA 1937), and in Turna na Bodva in Slovakia already more than 50 years ago (BOUCEK in HOFFER 1954). South of the Carpathian Mountains in Slovakia, the Mud-Dauber *Sceliphron destillatorium* has also been found at various other localities in the surroundings of Kosice already abt. 20 - 70 years ago (LUKAS, BOGUSCH & LISKA 2006).

The Mud-Dauber *Sceliphron destillatorium* has most probably wandered from Roznava, Turna, Kamenany, Malé Ozorovce, Sobrance, Drahnov and other localities in the surroundings of Kosice as well as from Uzhorod and Mukaceve towards northeast and northwest, respectively, has crossed the Carpathian Mountains at the Tylicz Pass, the Dujawa Pass and the Dukla Pass which are gates through the mountain chains in abt. 500 - 700 m elevation, has reached the source region of the Ropa and its tributaries north of these passes, and has followed the Ropa valley in downstream direction to Ropa and Szymbark where it has established limited populations. From the passes in the Carpathian Mountains downstream to Ropa and Szymbark, the upper reach of the Ropa valley contains only typical mountain villages with scattered distribution of mainly wooden houses and rarity or even absence of prominent stone buildings which are thus not too much attractive to masoning wasps and bees for nesting according to my experience in mapping of nesting sites, and therefore the Mud-Dauber *Sceliphron destillatorium* has successively wandered along the Ropa valley in downstream direction until it has arrived in Ropa which is a continuous town that includes also various prominent stone buildings which are particularly concentrated around the existing nesting place of the Mud-Dauber *Sceliphron destillatorium* near the bridge across the Ropa river. Considerable acceleration of the downstream wandering along the Ropa valley by drifting has probably prevented the foundation of other nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the Ropa valley except of Ropa up to 2000.

9.3.3 Migration to Muszyna

The arrival of the Mud-Dauber *Sceliphron destillatorium* in Muszyna southsoutheast of Nowy Sącz in the Poprad valley has been accomplished either by advance from the vicinity of Roznava, Turna, Kamenany, Malé Ozorovce, Drahnov, Sobrance and other localities in the surroundings of Kosice to Poprad and from there by downstream migration along the Poprad valley which provides a narrow gate through the Carpathian Mountains, or via the Tylicz Pass in the Carpathian Mountains into the Muszyńka valley immediately west of the Tylicz Pass and from there up to the termination of the Muszyńka into the Poprad in Muszyna. The further migration would then have led the Mud-Dauber *Sceliphron destillatorium* from Muszyna along the Poprad valley in downstream direction up to the termination of the Poprad into the Dunajec at the southwestern border of Nowy Sącz. The narrow mountaineous interval of the Poprad valley between Rytro south of Nowy Sącz and Muszyna southsouthwest of Krynica should again not have hindered the migration of the Mud-Dauber *Sceliphron destillatorium* in comparison to the proven wandering of the Silk Bee *Colletes daviesanus* (MADER 1999 a) and the Delta Mud Wasp *Delta unguiculatum* (MADER 2000 a) for similar distances of abt. 15 - 20 km along narrow river valleys crossing forest regions in the Palatinate Forest and in the Vosges at the western margin of the Upper Rhine Graben in Germany and France. The successful utlization of the Poprad valley which provides a narrow gate through the Carpathian Mountains as a migration street for the Mud-Dauber *Sceliphron destillatorium* is highlighted by its occurrence in Muszyna (CELARY 1998) just north of the narrow passage through the mountain chain.

The Mud-Dauber *Sceliphron destillatorium* could have arrived in the Poprad valley in the vicinity of Poprad by upstream migration along the Slaná valley via Domica, Plesivec, Silica and Roznava to Dobsiná; by upstream migration along the Hron valley from Stúrovo northwest of Budapest via Levice, Zvolen and Banská Bystrica to Dobsiná; by upstream migration along the Hornád (Hernád) valley from Kosice to the vicinity of Dobsiná; and by upstream migration along the Váh valley from Komárno westnorthwest of Budapest via Trnava, Sedlisko near Soros, Trencín, Zlatovce, Opatová, Horné Srnie and Martin to the vicinity of Dobsiná; and then by bridging from the source regions of Slaná, Hron, Hornád and Váh in the vicinity of Dobsiná to the source region of the Poprad in the vicinity of Poprad. The downstream migration along the Poprad valley would then have brought the Mud-Dauber *Sceliphron destillatorium* through the gate of the Poprad valley in the Carpathian Mountains to Muszyna and further to Nowy Sącz.

The Mud-Dauber *Sceliphron destillatorium* could have arrived at the Tylicz Pass and at the Dujawa Pass by upstream migration along the Topla valley and the Ondava valley from Vinicky and Somotor in the Bodrog valley via Drahnov, Trebisov and Malé Ozorovce in the Ondava valley to Bardejov in the source region of the Topla and Niznỳ Orlík in the source region of the Ondava in the vicinity of Bardejov, and then by bridging of the narrow watershed from the source regions of Topla and Ondava around

Bardejov to the source region of the Muszyńka at the Tylicz Pass. The downstream migration along the Muszyńka valley beyond the Tylicz Pass would then have guided the Mud-Dauber *Sceliphron destillatorium* to the Poprad valley in Muszyna and then further along the Poprad valley in downstream direction to Nowy Sącz. Considerable acceleration of the downstream wandering along the Poprad valley by drifting has probably prevented the foundation of other occurrences of the Mud-Dauber *Sceliphron destillatorium* in the Poprad valley except of Muszyna up to 2000.

9.3.4 Migration to the Vicinities of Jasło and Mielec

The immigration of the Mud-Dauber *Sceliphron destillatorium* into the Ropa valley near Ropa and Szymbark east of Nowy Sącz in Poland north of the mountain ridges already abt. 10 years before 2000 or even earlier along the Transcarpathian route from the south via several passes in the Carpathian Mountains has established a limited region of occurrence of restricted populations of the Mud-Dauber *Sceliphron destillatorium* around Ropa and Szymbark in the Ropa valley from where subsequently further spreading has happened along the Ropa valley in downstream direction as well as from the Ropa valley across the narrow watershed to the adjacent Biała valley west of Ropa after 2000.

The downstream wandering along the Ropa valley has brought the Mud-Dauber *Sceliphron destillatorium* from Ropa and Szymbark via Biecz to Jasło at the termination of the Ropa valley into the Wisłoka valley, and the subsequent downstream advance along the Wisłoka valley has then guided the Mud-Dauber *Sceliphron destillatorium* to Ocieka, Niwiska, Siedlanka and Czajkowa in the surroundings of Mielec, with the further downstream progradation along the Wisłoka valley then having resulted in the arrival of the Mud-Dauber *Sceliphron destillatorium* in the Vistula valley at the termination of the Wisłoka valley north of Mielec. Considerable acceleration of the downstream wandering along the Ropa valley and the Wisłoka valley by drifting has probably prevented the foundation of other occurrences of the Mud-Dauber *Sceliphron destillatorium* in the Ropa valley except of Ropa and Szymbark up to 2000 as well as in the Wisłoka valley except of Ocieka, Niwiska, Siedlanka and Czajkowa in the surroundings of Mielec after 2000.

The Mud-Dauber *Sceliphron destillatorium* could also have arrived in the Wisłoka valley immediately along the Transcarpathian route from the south via several passes in the Carpathian Mountains without migration from Ropa and Szymbark along the Ropa valley in downstream direction via Biecz to Jasło. The Mud-Dauber *Sceliphron destillatorium* could have arrived at the Tylicz Pass and at the Dujawa Pass by upstream migration along the Topla valley and the Ondava valley from Vinicky and Somotor in the Bodrog valley via Drahnov, Trebisov and Malé Ozorovce in the Ondava valley to Bardejov in the source region of the Topla and Nizný Orlík in the source region of the Ondava in the vicinity of Bardejov. In addition to the bridging of the narrow watershed from the source regions of Topla and Ondava around Bardejov to the source region of the Muszyńka at the Tylicz Pass, the Mud-Dauber *Sceliphron destillatorium* could also have used the Dujawa Pass near the spring of the Ondava north of Bardejov for the overstepping from the source region of the Ondava south of the Dujawa Pass to the source regions of the Wisłoka and the Ropa north of the Dujawa Pass. The downstream migration along the Wisłoka valley would then have brought the Mud-Dauber *Sceliphron destillatorium* from Zydowskie and Pielgrzymka in the upper reach of the Wisłoka valley via Jasło to Ocieka, Niwiska, Siedlanka and Czajkowa in the surroundings of Mielec in the lower reach of the Wisłoka valley similarly as the downstream migration along the Ropa valley has guided the Mud-Dauber *Sceliphron destillatorium* to Ropa and Szymbark. Considerable acceleration of the downstream wandering along the Wisłoka valley by drifting has probably again inhibited the foundation of other occurrences of the Mud-Dauber *Sceliphron destillatorium* in the upper reach of the Wisłoka valley except of Zydowskie and Pielgrzymka after 2000.

9.3.5 Migration to Ciężkowice and Tarnów

The Ropa valley near Ropa is only separated by a very narrow watershed of abt. 5 - 7 km width from the Biała valley near Grybów, and thus the Mud-Dauber *Sceliphron destillatorium* could have entered the

Biała valley either also already north of the Tylicz Pass and/or the Dujawa Pass in the Carpathian Mountains or most probably after overstepping from the Ropa valley across the ridge between Ropa and Grybów towards west and northwest into the Biała valley around Grybów. The downstream migration along the Biała valley from Grybów towards the north would then have brought the Mud-Dauber *Sceliphron destillatorium* via Biała Nizna to Ciężkowice, Wozniczna and Tarnów, with again considerable acceleration of the downstream wandering along the Biała valley by drifting probably having prevented the foundation of other occurrences of the Mud-Dauber *Sceliphron destillatorium* in the Biała valley except of Ciężkowice and Tarnów up to 2000 as well as Biała Nizna and Wozniczna after 2000.

The foundation of the occurrences of the Mud-Dauber *Sceliphron destillatorium* in Ropa and Szymbark already abt. 10 years before 2000 as being reflected by the assemblage of several new fresh and old weathered mason nests in Ropa in 2000 as well as by the capture of specimens in Ropa and Szymbark in 1994 - 1996 (CELARY 1996) in contrast to the discovery of only a single new fresh mason nest each in Ciężkowice and Tarnów in 2000 suggests the primary installation of the limited populations of the Mud-Dauber *Sceliphron destillatorium* in Ropa and Szymbark in the Ropa valley, and the secondary spreading from the Ropa valley into the Biała valley and the subsequent downstream migration along the Biała valley from the vicinity of Ropa and Grybów via Biała Nizna to Ciężkowice, Wozniczna and Tarnów.

The migration along the Biała valley in downstream direction from the vicinity of Ropa and Grybów has guided the Mud-Dauber *Sceliphron destillatorium* via Biała Nizna, Ciężkowice and Wozniczna to the termination of the Biała into the Dunajec at the northwestern margin of Tarnów where it could also have arrived by downstream migration along the Dunajec valley from Nowy Sącz following the downstream migration along the Poprad valley from Poprad via Muszyna to Nowy Sącz. The further downstream progradation along the Dunajec valley has then resulted in the arrival of the Mud-Dauber *Sceliphron destillatorium* in the Vistula valley at the termination of the Dunajec valley northnorthwest of Tarnów.

9.3.6 Migration to the Vicinities of Cracow, Pinczów, Koniecpol and Tomaszów Mazowiecki

The presence of the Mud-Dauber *Sceliphron destillatorium* in the Dunajec valley in Nowy Sącz and Tarnów up to 2000 has subsequently enabled its further wandering along the Dunajec valley in downstream direction via Zabno into the Vistula valley northnorthwest of Tarnów after 2000, and from there the Mud-Dauber *Sceliphron destillatorium* has achieved the possibility of entrance of the Nida valley almost opposite to the mouth of the Dunajec valley northnorthwest of Tarnów and upstream migration along the Nida valley to Krzyzanowice, Chotel Czerwony (Przęs'lin reserve), Skowronno and Cisów in the vicinity of Pinczów which has guided the Mud-Dauber *Sceliphron destillatorium* up to the southeastern margin of the Holy Cross Mountains southeast of Kielce.

The arrival at the termination of the Dunajec valley into the Vistula valley northnorthwest of Tarnów has provided the Mud-Dauber *Sceliphron destillatorium* with a turning point for its further spreading into several other directions in addition to the entrance into the Nida valley, such as along the Vistula valley in upstream direction to Cracow as well as in downstream direction towards Sandomierz and beyond. The wandering of the Mud-Dauber *Sceliphron destillatorium* from the termination of the Dunajec valley into the Vistula valley northnorthwest of Tarnów along the Vistula valley in upstream direction to Cracow has included the possibilities of entrance of the Raba valley and wandering along the Raba valley in upstream direction to Buczyna and Kamionka Mała in the vicinity of Bochnia eastsoutheast of Cracow as well as to Lubień south of Myślenice south of Cracow, of entrance of the Prądnik valley and advance along the Prądnik valley in upstream direction to Ojców north of Cracow, of entrance of the Skawinka valley and migration along the Skawinka valley in upstream direction to Kalwaria Zebrzydowska southwest of Cracow, and of entrance of the Soła valley and progradation along the Soła valley in upstream direction to Zywiec westsouthwest of Cracow.

The upstream migration along the Nida valley to Krzyzanowice, Chotel Czerwony (Przęs'lin reserve), Skowronno and Cisów in the vicinity of Pinczów has guided the Mud-Dauber *Sceliphron destillatorium*

not only up to the southeastern margin of the Holy Cross Mountains southeast of Kielce, but also to the source region of the Nida at the southwestern margin of the Holy Cross Mountains southwest of Kielce. The overstepping across the narrow watershed between the source region of the Nida at the southwestern margin of the Holy Cross Mountains southwest of Kielce and the Pilica valley south-southeast of Koniecpol has enabled the Mud-Dauber *Sceliphron destillatorium* to continue its expansion after the upstream migration along the Nida valley by downstream migration along the Pilica valley from its source region via Okołowice in the vicinity of Koniecpol and Orzechówka southeast of Radomsko to Inowłódz east of Tomaszów Mazowiecki where it has reached its northernmost locality of occurrence up to 2013.

Inowłódz east of Tomaszów Mazowiecki where the Mud-Dauber *Sceliphron destillatorium* has been encountered in 2008 by KOWALCZYK & SOSZYNSKI (KOWALCZYK, KURZAC & SOSZYNSKI 2009) in abt. 51.5 degrees northern latitude is located still abt. 20 km farther northwards than Czesławice westnorthwest of Lublin where its occurrence has been proven in Poland for the first time in 1962 by ANASIEWICZ (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) in abt. 51.25 degrees northern latitude, and is located still abt. 30 km farther northwards than Swidnik southeast of Lublin where its occurrence has been confirmed in 2011 by KOCIK (BILANSKI, KOŁODZIEJ & PAJĄK 2012) in abt. 51.25 degrees northern latitude, with these three localities being the northernmost places of definite occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland up to 2013.

An observation of the Palaearctic Mud-Dauber *Sceliphron destillatorium* even in Mokotów in the central part of Warsaw in the Vistula valley in Poland in 2008 (unpublished information reported to CELARY, personal communication 2013) in abt. 52.25 degrees northern latitude requires still confirmation, because a confusion with the Oriental Mud-Dauber *Sceliphron curvatum* could not be completely excluded, similarly as apparent records of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in Wrocław in the Odra valley in Lower Silesia and in Knurów close to the Odra valley south of Gliwice west of Katowice in Upper Silesia in Poland in 2012 (unpublished information reported to KOSIBOWICZ, personal communication 2013) have turned out as having been erroneous and have in fact represented registrations of the Oriental Mud-Dauber *Sceliphron curvatum* (KOSIBOWICZ, personal communication 2013). It is, however, possible that the Palaearctic Mud-Dauber *Sceliphron destillatorium* has already reached Warsaw in Poland in abt. 52.25 degrees northern latitude by successive wandering along the Vistula valley in downstream direction from its recorded occurrences in Tarnów and north of Tarnów in the Dunajec valley as well as around Mielec and north of Mielec in the Wisłoka valley which are all situated close to the terminations of the valleys of both tributaries into the Vistula valley, because in the eastwards adjacent Belarus, the Palaearctic Mud-Dauber *Sceliphron destillatorium* has been encountered in Pinsk east of Brest in the Prypjat valley (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013) in abt. 52.125 degrees northern latitude that is located still abt. 100 km farther northwards than Czesławice westnorthwest of Lublin and Swidnik southeast of Lublin as well as still abt. 70 km farther northwards than Inowłódz east of Tomaszów Mazowiecki. The Palaearctic Mud-Dauber *Sceliphron destillatorium* could also have arrived in Warsaw by wandering from the Black Sea along the Dnepr valley in upstream direction beyond Kijiv and then farther along the Prypjat valley northnorthwest of Kijiv in upstream direction beyond Pinsk and beyond the source region of the Prypjat east of Lublin and south of Brest from where it could have bridged into the San valley west of Lublin and could then have migrated along the Vistula valley in downstream direction to Warsaw.

9.3.7 Migration to Nowy Sącz

The arrival of the Mud-Dauber *Sceliphron destillatorium* in Nowy Sącz could have resulted by downstream migration along the Poprad valley from Muszyna into the Dunajec valley at the southwestern border of Nowy Sącz, by entering of other tributaries of the Dunajec already north of the passes in the Carpathian Mountains and subsequent downstream migration along the valleys of the tributaries of the Dunajec, or by successive overstepping of watersheds from the Ropa valley near Ropa towards west and southwest which could have provided a connection to the Dunajec valley by reaching the valleys of

Kamienica and Kamionka beyond the Biała valley which terminate into the Dunajec.

The Mud-Dauber *Sceliphron destillatorium* could have arrived in Nowy Sącz without utilization of the passes for crossing of the Carpathian Mountains by advance from the vicinity of Roznava, Turna, Kamenany, Malé Ozorovce, Drahnov, Sobrance and other localities in the surroundings of Kosice to Poprad and from there by downstream migration along the Poprad valley which provides a narrow gate through the Carpathian Mountains via Muszyna up to the termination of the Poprad into the Dunajec at the southwestern border of Nowy Sącz. The narrow mountaineous interval of the Poprad valley between Rytro south of Nowy Sącz and Muszyna southsouthwest of Krynica should again not have hindered the migration of the Mud-Dauber *Sceliphron destillatorium* in comparison to the proven wandering of the Silk Bee *Colletes daviesanus* (MADER 1999 a) and the Delta Mud Wasp *Delta unguiculatum* (MADER 2000 a) for similar distances of abt. 15 - 20 km along narrow river valleys crossing forest regions in the Palatinate Forest and in the Vosges at the western margin of the Upper Rhine Graben in Germany and France. The successful utlization of the Poprad valley which provides a narrow gate through the Carpathian Mountains as a migration street for the Mud-Dauber *Sceliphron destillatorium* is highlighted by its occurrence in Muszyna (CELARY 1998) just north of the narrow passage through the mountain chain.

The Mud-Dauber *Sceliphron destillatorium* could have arrived in the Poprad valley in the vicinity of Poprad by upstream migration along the Slaná valley via Domica, Plesivec, Silica and Roznava to Dobsiná; by upstream migration along the Hron valley from Stúrovo northwest of Budapest via Levice, Zvolen and Banská Bystrica to Dobsiná; by upstream migration along the Hornád (Hernád) valley from Kosice to the vicinity of Dobsiná; and by upstream migration along the Váh valley from Komárno westnorthwest of Budapest via Trnava, Sedlisko near Soros, Trencín, Zlatovce, Opatová, Horné Srnie and Martin to the vicinity of Dobsiná; and then by bridging from the source regions of Slaná, Hron, Hornád and Váh in the vicinity of Dobsiná to the source region of the Poprad in the vicinity of Poprad. The downstream migration along the Poprad valley would then have brought the Mud-Dauber *Sceliphron destillatorium* through the gate of the Poprad valley in the Carpathian Mountains to Muszyna and further to Nowy Sącz.

The further downstream wandering along the Dunajec valley from Nowy Sącz up to the termination of the Biała into the Dunajec could also have brought the Mud-Dauber *Sceliphron destillatorium* to Tarnów near the mouth of the Biała into the Dunajec, with again significant speeding of the downstream advance by drifting having probably inhibited the installation of the Mud-Dauber *Sceliphron destillatorium* at other places between Nowy Sącz and Tarnów up to 2000 and subsequently only still at Tymowa after 2000. The bridging from the Dunajec valley across the narrow watershed of abt. 17 - 23 km width to the Biała valley either via the Kamienica valley southeast of Nowy Sącz which emanates from the Dunajec valley or via the Jasienna valley northeast of Nowy Sącz that leads to the Biała valley, and the subsequent downstream migration along the Biała valley would represent another possibility of the arrival of the Mud-Dauber *Sceliphron destillatorium* in Ciężkowice and Tarnów in the Biała valley. The most probable version of the arrival of the Mud-Dauber *Sceliphron destillatorium* in Nowy Sącz and Tarnów, however, is the wandering along the Poprad valley in downstream direction from the vicinity of Poprad through the gate in the Carpathian Mountains via Muszyna to the Dunajec valley in Nowy Sącz and then further along the Dunajec valley in downstream direction to Tarnów.

The arrival of the Mud-Dauber *Sceliphron destillatorium* in the Dunajec valley at the southwestern border of Nowy Sącz by downstream migration along the Poprad valley from Muszyna into the Dunajec valley at the southwestern border of Nowy Sącz, by entering of other tributaries of the Dunajec already north of the passes in the Carpathian Mountains and subsequent downstream migration along the valleys of the tributaries of the Dunajec, or by successive overstepping of watersheds from the Ropa valley near Ropa towards west and southwest which could have provided a connection to the Dunajec valley by reaching the valleys of Kamienica and Kamionka beyond the Biała valley which terminate into the Dunajec valley has also enabled the possibility of migration of the Mud-Dauber *Sceliphron destillatorium* along the Dunajec valley in upstream direction from Nowy Sącz beyond Nowy Targ to Czerwienne northnorthwest of Zakopane in the source region of the Dunajec, because the Tylicz Pass is the westernmost relatively low mountain pass and the elevation of the Carpathian Mountains rises successively west of the Tylicz Pass up to finally abt. 2,500 m southeast of Zakopane, thereby inhibiting the possibility of crossing of the mountain ridges of the Carpathian Mountains by the Mud-Dauber *Sceliphron destillatorium* west of the Tylicz Pass.

9.3.8 Migration to Krosno

The further migration of the Mud-Dauber *Sceliphron destillatorium* in downstream direction along the Ropa valley from Ropa and Szymbark towards northeast and east could have promoted the overstepping into the Jasiołka valley at the opposition of the mouths of the Ropa in the west and the Jasiołka in the east into the Wisłoka in Jasło, and following the Jasiołka valley in upstream direction towards east and southeast beyond Jedlicze, the Mud-Dauber *Sceliphron destillatorium* could have arrived in Krosno by traversing the narrow watershed of abt. 5 - 7 km width between the Jasiołka valley around Jedlicze and the Wisłok valley in Krosno, with again considerable acceleration of the movement along the river valleys by drifting having probably prevented the foundation of nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the Ropa valley and the Jasiołka valley between Ropa/Szymbark and Krosno up to 2000. Alternatively, the Mud-Dauber *Sceliphron destillatorium* could also have reached the source region of the Wisłoka and its tributaries together with the source region of the Ropa and its tributaries after having crossed the Carpathian Mountains at the Dujawa Pass and could have followed the Wisłoka valley in downstream direction up to the mouth of the Jasiołka into the Wisłoka in Jasło, and could then have turned into the Jasiołka valley for its upstream progradation to Krosno including the bridging of the narrow watershed between the valleys of Jasiołka and Wisłok. The third possibility of the arrival of the Mud-Dauber *Sceliphron destillatorium* in Krosno would be the access of the source region of the Wisłok after having crossed the Carpathian Mountains at the Łupków Pass which would have brought it also into the source regions of Osławica and Osława that would have guided it into the San valley, and the subsequent downstream wandering along the Wisłok valley up to Krosno.

Thus the origin of the populations of the Mud-Dauber *Sceliphron destillatorium* in Ropa and Szymbark in the Ropa valley, Nowy Sącz in the Dunajec valley, Ciężkowice in the Biała valley, Tarnów near the termination of the Biała valley into the Dunajec valley, and Krosno in the Wisłok valley up to 2000 could be interpreted as being the consequence of the immigration of the Mud-Dauber *Sceliphron destillatorium* along the Transcarpathian route from the south via several passes in the Carpathian Mountains first to Ropa and Szymbark and most probably then from there to the other places, or also immediately to the other places independently from the installation in Ropa and Szymbark.

In addition to its immigration along the Transcarpathian route from the south, the arrival of the Mud-Dauber *Sceliphron destillatorium* in Krosno could also be interpreted by its immigration along the Podolian-Volhynian route from the east and its continued expansion towards west and northwest after having reached the San valley either near Przemyśl or between Ustrzyki Górne and Ustrzyki Dolne south of Przemyśl. The pioneering nature of the isolated nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the San valley in Przemyśl and in the Wisłok valley in Krosno is highlighted by the lack of other nesting sites in both valleys in 2000. The Wisłok passes from Krosno via Rzeszów to Dębno where it terminates into the San. The occurrence of nesting sites of the Mud-Dauber *Sceliphron destillatorium* in the San valley between Sandomierz and Sanok only in Przemyśl and in the Wisłok valley between Krosno and Dębno only in Krosno in 2000 suggests that the Mud-Dauber *Sceliphron destillatorium* has reached its isolated nesting site in Krosno either by crossing of the watershed between the San valley and the Wisłok valley or by wandering along the valleys of San and Wisłok in drifting manner which has probably inhibited the installation of other nesting sites along the transit route in these regions up to 2000. The Mud-Dauber *Sceliphron destillatorium* could have arrived in Krosno either from Ustrzyki Dolne and Ustrzyki Górne as well as Nasiczne and Zatwarnica by downstream migration along the San valley to Sanok and then overstepping of the watershed between the San valley and the Wisłok valley towards the northwest, or from Przemyśl by upstream wandering along the San valley to Dynów and then overstepping of the watershed between the San valley and the Wisłok valley towards west or southwest.

If the assemblage of several old weathered and new undamaged mason nests of the Mud-Dauber *Sceliphron destillatorium* in Ropa would not contrast with the occurrence of exclusively a single fresh mason nest each in Nowy Sącz, Ciężkowice, Tarnów and Krosno in 2000, with the conclusion of this constellation being the considerably earlier foundation of the nesting site in Ropa than at the other places, then also the inverse succession of the steps of migration as outlined above would be possible which could have brought the Mud-Dauber *Sceliphron destillatorium* from Krosno to Ropa and Szym-

bark and from there to Ciężkowice, Tarnów and Nowy Sącz.

9.3.9 Migration to the Vicinity of Rzeszów

The arrival of the Mud-Dauber *Sceliphron destillatorium* in Krosno by the access of the source region of the Wisłok after having crossed the Carpathian Mountains at the Łupków Pass which would have brought it also into the source regions of Osława and Osława that would have guided it into the San valley, and by the subsequent downstream wandering along the Wisłok valley up to Krosno before 2000 has also provided possibilities of further expansion within the Wisłok valley after 2000. The subsequent downstream migration along the Wisłok valley after 2000 would have led the Mud-Dauber *Sceliphron destillatorium* from Krosno via Lubla and Zyznów to Głogów Małopolski, Markowa, Husów and Przeworsk in the vicinity of Rzeszów, and the further upstream migration along the Wisłok valley after 2000 would have brought the Mud-Dauber *Sceliphron destillatorium* from Krosno to Rymanów and Posada Zarszyńska southeast of Krosno. Alternatively, the Mud-Dauber *Sceliphron destillatorium* could also have migrated from Przemyśl along the San valley in downstream direction to the vicinity of Sieniawa and Lezajsk where it could have entered the Wisłok valley, and the further wandering along the Wisłok valley in upstream direction would then also have guided the Mud-Dauber *Sceliphron destillatorium* to Przeworsk, Markowa, Husów, Głogów Małopolski, Zyznów and Lubla as well as beyond Krosno to Rymanów and Posada Zarszyńska. The entrance of the Mleczka valley from the Wisłok valley near Przeworsk and the subsequent upstream migration along the Mleczka valley beyond Przeworsk would have led the Mud-Dauber *Sceliphron destillatorium* to Dębów and Kańczuga as well as again to Markowa and Husów east of Rzeszów.

The bridging from the source region of the Wisłok valley around Rymanów and Posada Zarszyńska southeast of Krosno across the narrow watershed to the source region of the Jasiołka valley south of Dukla southsouthwest of Krosno, or the arrival in the Jasiołka valley by overstepping of the Carpathian Mountains from the upper reach of the Ondava valley around Svidník eastnortheast of Bardejov via the Dukla Pass would have brought the Mud-Dauber *Sceliphron destillatorium* to Dukla, Głojsce, Teodorówka, Zboiska and Wietrzno by downstream migration along the Jasiołka valley. The further advance of the Mud-Dauber *Sceliphron destillatorium* along the Jasiołka valley in downstream direction would again have guided it to the Wisłoka valley in Jasło and from there along the Wisłoka valley in downstream direction to Ocieka, Niwiska, Siedlanka and Czajkowa in the surroundings of Mielec, with the further downstream progradation along the Wisłoka valley then having again resulted in the arrival of the Mud-Dauber *Sceliphron destillatorium* in the Vistula valley at the termination of the Wisłoka valley north of Mielec.

9.4 Migration along the Moravian-Silesian Route into Poland from the West

In addition to the Podolian-Volhynian route from the east and the Transcarpathian route from the south which have been significant immigration streets for the Mud-Dauber *Sceliphron destillatorium* into southeastern Poland, CELARY (1996) has even postulated the Moravian-Silesian route from the west as a third immigration street which could bring the Mud-Dauber *Sceliphron destillatorium* from the surroundings of Vsetín (ZAVADIL & SNOFLAK 1948, BALTHASAR 1972) in Moravia in eastern Czechia to Silesia in southwestern Poland. The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Moravia in eastern Czechia at a group of localities close to the Moravian-Silesian gate which have up to 2000 included in addition to Vsetín also Mikuluvka, Milotice, Bystrice pod Hostýnem, Kromeríz, Olomouc and Litovel (compilation of records in ZAVADIL, SUSTERA & BATA 1937; ZAVADIL 1939, 1948 and HOFFER 1954) and have after 2000 also been supplemented by additional places (LUKAS, BOGUSCH & LISKA 2006) guides me to the interpretation that the Moravian-Silesian route from the west is a realistical immigration street which will probably direct in future or has even possibly already directed the Mud-Dauber *Sceliphron destillatorium* from Moravia in Czechia to Silesia in southwestern Poland.

9.5 Comparative Evaluation of the Migration Streets into Poland

The comparative evaluation of the migration streets of the Mud-Dauber *Sceliphron destillatorium* into Poland focusses on the relative significance of the Podolian-Volhynian route from the east and the Transcarpathian route from the south based on the evaluation of the scattered distribution of the 17 localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* up to 2000. Comments are also offered on the pioneering nature of the 17 dispersed localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* which have been found in the southeastern part of Poland up to 2000.

9.5.1 Relative Significance of the Podolian-Volhynian Route from the East and the Transcarpathian Route from the South

In summary, the Podolian-Volhynian route from the east is the immigration street for the arrival of the Mud-Dauber *Sceliphron destillatorium* in Przemyśl and Czesławice westnorthwest of Lublin as well as probably also in Ustrzyki Dolne, Ustrzyki Górne, Nasiczne and Zatwarnica up to 2000, whereas the Transcarpathian route from the south is the immigration street for the arrival of the Mud-Dauber *Sceliphron destillatorium* in Ropa, Szymbark, Muszyna and Nowy Sącz as well as probably also in Mików, Łubne, Wetlina, Berehy Górne and Ustrzyki Górne up to 2000. If Mików, Łubne, Wetlina, Berehy Górne and Ustrzyki Górne would have been reached by the Mud-Dauber *Sceliphron destillatorium* along the Transcarpathian route from the south, then its arrival in Ustrzyki Dolne, Nasiczne and Zatwarnica would have been accomplished by subsequent spreading from these places towards north and northeast, whereas if Ustrzyki Dolne as well as Ustrzyki Górne, Nasiczne and Zatwarnica would have been reached by the Mud-Dauber *Sceliphron destillatorium* along the Podolian-Volhynian route from the east, then its arrival in Mików, Łubne, Wetlina and Berehy Górne would have happened by further progradation from Ustrzyki Dolne, Ustrzyki Górne, Nasiczne and Zatwarnica towards southwest and northwest, respectively. Particularly the direct connection of Ustrzyki Dolne to the Dnestr valley by the Strwiąz which originates northwest of Ustrzyki Dolne and terminates into the Dnestr eastnortheast of Sambir southwest of Lviv and southeast of Przemyśl accentuates the probability of the arrival of the Mud-Dauber *Sceliphron destillatorium* in Ustrzyki Dolne by immigration along the Podolian-Volhynian route from the east.

The shortest connection to the San valley and its tributaries via the Podolian-Volhynian route would be the overstepping from the source region of the Dnestr southeast of Ustrzyki Dolne across the narrow watershed of only abt. 5 km width to the source region of the Ruka that terminates into the San, whereas the shortest connection to the San valley and its tributaries via the Transcarpathian route would be the overstepping from the source region of the Uz east of Uzok across the narrow watershed of only abt. 5 - 10 km width to the source region of the San northnortheast of Uzok, with the migration along the San valley in downstream direction as well as the subsequent entering of southwestern side valleys of the San valley and the wandering along southwestern side valleys of the San valley in upstream direction then having guided the Mud-Dauber *Sceliphron destillatorium* to Ustrzyki Górne, Nasiczne and Zatwarnica as well as probably even to Wetlina, Berehy Górne, Łubne and Mików.

The nesting sites of the Mud-Dauber *Sceliphron destillatorium* in Ciężkowice and Tarnów as well as possibly also in Nowy Sącz have most probably been reached by continuing expansion from Ropa, Szymbark and Muszyna after the original immigration to these places along the Transcarpathian route from the south, whereas the nesting site of the Mud-Dauber *Sceliphron destillatorium* in Krosno could have been founded as a result of subsequent spreading after the original immigration to Ropa, Szymbark and Muszyna or to Mików, Łubne, Berehy Górne, Wetlina and Ustrzyki Górne along the Transcarpathian route from the south or to Przemyśl, Ustrzyki Dolne, Ustrzyki Górne, Nasiczne and Zatwarnica along the Podolian-Volhynian route from the east. In contrast to the utilization of passes for crossing the Carpathian Mountains, the Mud-Dauber *Sceliphron destillatorium* could also have arrived in Nowy Sącz by advance from Roznava, Turna, Kamenany, Malé Ozorovce, Drahnov, Sobrance and

other localities in the surroundings of Kosice to Poprad and then by wandering along the Poprad valley which provides a narrow gate through the Carpathian Mountains via Muszyna up to the termination of the Poprad into the Dunajec at the southwestern border of Nowy Sącz.

9.5.2 Pioneering Nature of the Dispersed Localities of Occurrence up to 2000

The low quantity of single fresh mason nests on individual buildings and the lack of traces of old mason nests on the same and other buildings in 5 of the 6 localities where I have confirmed nesting sites of the Mud-Dauber *Sceliphron destillatorium* during my overview mapping in 2000 contradict the assumption of SOSZYNSKI & SOSZYNSKI (1985) that the isolated localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland could be relicts of a formerly wider distribution, but support the interpretation of the scattered localities as newly established pioneering nesting sites in a virginal area from where further expansion of the Mud-Dauber *Sceliphron destillatorium* into up to now uninhabited regions could be expected in the near future after 2000.

The same conclusion also applies for the 12 dispersed places where specimens of the Mud-Dauber *Sceliphron destillatorium* have been captured in the southeastern part of Poland up to 2000 according to the records in the literature (VECHT & BREUGEL 1968, SOSZYNSKI & SOSZYNSKI 1985, CELARY 1996, WISNIOWSKI 2000) and unpublished information (CELARY, personal communication 2000; SOSZYNSKI, personal communication 2001). The 17 localities where the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland has up to 2000 been verified by collection of specimens and observation of nesting sites are dispersed as islands in a large area with so far lack of further records in the regions between the scattered places, with only the 7 localities in the Bieszczady Mountains between Ustrzyki Górne and the Łupków Pass as well as the 5 localities around Nowy Sącz being slightly aggregated in small regions within the large area.

The interpretation of the 17 scattered localities as newly established pioneering nesting sites in a virginal area up to 2000 from where further expansion of the Mud-Dauber *Sceliphron destillatorium* into up to now uninhabited regions could be expected in the near future after 2000 has been confirmed by the discovery of 79 additional localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland after 2000 (WISNIOWSKI 2007; BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; KOSIBOWICZ 2009; KOWALCZYK, KURZAC & SOSZYNSKI 2009; BILANSKI, KOŁODZIEJ & PAJĄK 2012; JAROSIEWICZ 2012; BURY, personal communication 2013; CELARY, personal communication 2013; JAROSIEWICZ, personal communication 2013; KOSIBOWICZ, personal communication 2013; RYBA, personal communication 2013) which are distributed in a considerably more extensive area than the 17 scattered localities of occurrence that have been found up to 2000. Biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* in Poland and surrounding countries are illustrated in various distribution maps in the appendix.

9.6 Potential Migration Streets into Germany

The distribution of published records of the Mud-Dauber *Sceliphron destillatorium* in Europe reflects four potential immigration streets into Germany which extend from Basel in Switzerland into the southern part of the Upper Rhine Graben, from Zürich and Arbon in Switzerland around Lake Constance, from Krems and Linz in Austria along the Danube valley in upstream direction, and from Prague in Czechia along the Vltava valley and subsequently the Elbe valley in downstream direction. The evaluation of these four potential immigration streets into Germany reveals that the most promising regions for the search of potential occurrences of the Mud-Dauber *Sceliphron destillatorium* in Germany are the surroundings of Basel in the southern part of the Upper Rhine Graben, the vicinity of Lindau at the southeastern edge of Lake Constance, the interval of the Danube valley between Passau and Regensburg, and the interval of the Elbe valley around Dresden. Another possible immigration street of the Mud-Dauber *Sceliphron destillatorium* into Germany extends from the Morava valley around Olomouc and the Becva valley between Vsetín and Olomouc across the watershed to the Odra valley bet-

ween Noví Jicín and Ostrava in Moravia in Czechia, and from there along the Odra valley in downstream direction to Wrocław and beyond in Poland and subsequently to Frankfurt an der Oder and beyond in Germany (MADER 2001 b). The significance of the surroundings of Basel in the southern part of the Upper Rhine Graben as one of the most promising regions for the search of potential occurrences of the Mud-Dauber *Sceliphron destillatorium* in Germany has been confirmed by the discovery of two mason nests in Grenzach-Wyhlen abt. 5 km east of Basel in 1997 (STALLING 2002).

The first notification of an occurrence of the Mud-Dauber *Sceliphron destillatorium* in Germany has been published by WISSMANN (1849) who has reported the capture of a specimen around Hannover in Lower Saxony by KRÖSMANN which has later been cited by SCHENCK (1857, 1861, 1866), TASCHENBERG (1858, 1884, 1929), KOHL (1918), FAHRINGER (1922), FRIESE (1926) and BIEGELEBEN (1928). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Germany has also already been quoted by TASCHENBERG (1866), KIRCHNER (1867), GIRARD (1879) and RUDOW (1912) who have probably based their statements on the same source of information. SCHMIEDEKNECHT (1907, 1930) has probably also referred to the find of the Mud-Dauber *Sceliphron destillatorium* by KRÖSMANN (in WISSMANN 1849) around Hannover and its subsequent citations when having assessed the reported occurrences of the Mud-Dauber *Sceliphron destillatorium* in Germany as very doubtful. Similarly, SCHOLZ (1938) has stated that definite finds of the Mud-Dauber *Sceliphron destillatorium* in Germany have not become known, and BISCHOFF (in OLBERG 1959) and BLÜTHGEN (in OLBERG 1959) have commented that the alleged occurrences of the Mud-Dauber *Sceliphron destillatorium* in Germany according to the older literature are imaginary and that the presence of this species in Germany could almost be excluded. BITSCH, BARBIER, GAYUBO, SCHMIDT & OHL (1997) have mentioned that the Mud-Dauber *Sceliphron destillatorium* occurs also in Germany without, however, having cited evidences or references for this statement. JAHN, CALATIN-KRAUSS, HOFFRICHTER, LANGE, MIOTK & NEUB (1976) have remarked that the Mud-Dauber *Sceliphron* does occur in Germany only occasionally and probably also only with one species, but have not provided details or sources for this statement.

In the compilations and reviews of occurrences of digger wasps in parts of Germany of GAUSS (1967), OEHLKE (1970), SCHMIDT (1981), JACOBS & OEHLKE (1990); SCHMID-EGGER, RISCH & NIEHUIS (1995); BURGER, SAURE & OEHLKE (1998) and STOLLE, BURGER & DREWES (2004), the Mud-Dauber *Sceliphron destillatorium* has not been mentioned at all, whereas SCHMIDT & SCHMID-EGGER (1997) have interpreted the find of the Mud-Dauber *Sceliphron destillatorium* by KRÖSMANN (in WISSMANN 1849) around Hannover as the result of confusion or displacement of the locality. The collection of the Museum of Natural History in Görlitz in Germany contains a specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (SEIFERT, personal communication 2013). The isolated find of the Mud-Dauber *Sceliphron destillatorium* in Saxony which has been considered as the result of an artificial import (BURGER, personal communication to OHL 1999; OHL 2001) represents also the specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (BURGER, personal communication 2013; CREUTZBURG, personal communication 2013). BLÖSCH (2000) has stated that the Mud-Dauber *Sceliphron destillatorium* does not occur in Germany, whereas BLÖSCH (2012) has noted that the Mud-Dauber *Sceliphron destillatorium* has occasionally also been found in the Upper Rhine valley in Germany. SCHMID-EGGER (1995) has remarked that single individuals of the Mud-Dauber *Sceliphron destillatorium* have sometimes also been discovered in the southwestern part of Germany which have probably been displaced.

Based on my interpretation of the four potential immigration streets of the Mud-Dauber *Sceliphron destillatorium* into Germany (MADER 2001 b), I could imagine that the Mud-Dauber *Sceliphron destillatorium* does already exist in limited populations in some of the mentioned promising regions in Germany, and I hope to be able to confirm my interpretation of the four potential immigration streets of the Mud-Dauber *Sceliphron destillatorium* into Germany by results of field research in the near future. It could, however, be difficult to discover restricted initial populations of the Mud-Dauber *Sceliphron destillatorium* as a consequence of the hidden way of life, with the insects in many cases only rarely appearing at their nesting sites which are often also attached at places that are not immediately visible and are frequently only encountered accidentally. Biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* in Poland and surrounding countries are illustrated in various distribution maps in the appendix.

9.6.1 Migration into the Upper Rhine Graben

The migration of the Mud-Dauber *Sceliphron destillatorium* into the Upper Rhine Graben has been achieved by wandering along the Rhône valley in upstream direction, beyond the Rhône valley around Lake Léman, along the Aare valley in downstream direction, along the Birs valley in downstream direction, and finally along the Upper Rhine valley in downstream direction.

9.6.1.1 Migration along the Rhône Valley

The Mud-Dauber *Sceliphron destillatorium* has migrated from southern France along the Rhône valley in upstream direction to eastern France and western Switzerland. In Switzerland, the Mud-Dauber *Sceliphron destillatorium* has wandered beyond Lake Léman (Lac de Genève) into the upper reach of the Rhône valley where it has arrived in Martigny (FREY-GESSNER in KOHL 1883, HUBER 1916), Fully northeast of Martigny (VERNIER, BARBALAT & GONSETH 1996), Sion (Sitten) (SCHULTHESS-RECHBERG in KOHL 1918), Sierre (Siders) (FREY-GESSNER in KOHL 1883, HUBER 1916) and Visp (specimen in the collection of the Museum of Zoology in Lausanne; FREITAG, personal communication 2001; KNISPEL, personal communication 2001) as well as in Stalden in the Vispa valley south of Visp (specimen in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in the Rhône valley in Switzerland has also been reported by BEAUMONT (1964), and the presence of the Mud-Dauber *Sceliphron destillatorium* in Switzerland has already been signaled by SULZER (1776) and RÖMER (1789) who have probably referred to its occurrence in the region around Geneva at the margin of Lake Léman and in the Rhône valley.

9.6.1.2 Migration beyond the Rhône Valley around Lake Léman and along the Aare Valley

In Switzerland, the Mud-Dauber *Sceliphron destillatorium* has not remained in the upper reach of the Rhône valley, but has also wandered along the margins of Lake Léman, Lake Neuchâtel and Lake Bienne and then along the Aare valley in downstream direction from where it has dispersed towards the east to Zürich (UNGRICHT 1995; UNGRICHT in VERNIER, BARBALAT & GONSETH 1996) and towards the west to Basel (KOHL 1883, HUBER 1916; TÖPFL in VERNIER, BARBALAT & GONSETH 1996; SCHANOWSKI in SCHMID-EGGER 2005) at the southern margin of the Upper Rhine Graben at the boundary to Germany. A specimen of the Mud-Dauber *Sceliphron destillatorium* has also been captured in Arbon northnortheast of St. Gallen eastnortheast of Zürich at the southern margin of Lake Constance in 1995 (RICKLI in GONSETH, IMBECK & TUSSAC 2001) which is again close to the boundary to Germany. Significant confirmations of individuals of the Mud-Dauber *Sceliphron destillatorium* have also been made in Corcelles west of Neuchâtel southwest of Basel in 1995 (VERNIER, BARBALAT & GONSETH 1996) at the northwestern margin of Lake Neuchâtel, and in Dornach south of Basel in 1995 (TÖPFL in VERNIER, BARBALAT & GONSETH 1996) in the Birs valley south of the Rhine valley.

The collection of the Museum of Natural History in Berne contains also a specimen of the Mud-Dauber *Sceliphron destillatorium* that has been captured in Berne in the Aare valley in 1992 (HUBER, personal communication 2001) which underlines the migration path from Lake Léman via Lake Neuchâtel and Lake Bienne into the Aare valley in downstream direction, and the further wandering along the Aare valley in downstream direction beyond Berne has then guided the Mud-Dauber *Sceliphron destillatorium* to the vicinity of Zürich where it has probably entered the Limmat valley at its mouth into the Aare valley and has followed the Limmat valley in upstream direction to Zürich. Around Solothurn northnortheast of Berne, the Mud-Dauber *Sceliphron destillatorium* has probably overstepped the watershed between the Aare valley around Solothurn and the source region of the Birs valley around Moutier, and has then advanced the Birs valley in downstream direction via Dornach to Basel where the Birs valley terminates into the Rhine valley. Having reached the Rhine valley in Basel along the above outlined migration path, the Mud-Dauber *Sceliphron destillatorium* has achieved the potential of

further spreading along the Rhine valley in downstream direction across the boundary between Switzerland and Germany to Freiburg and beyond as well as in upstream direction to Lake Constance. The Mud-Dauber *Sceliphron destillatorium* has definitely reached Zürich and other localities in Switzerland not by artificial dragging in or passing in (UNGRICHT 1995), but by natural spreading along the above sketched migration paths.

9.6.1.3 Migration along the Upper Rhine Valley

Although an occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southern part of the Upper Rhine Graben and its vicinity in Germany has so far only rarely been reported in the literature (STALLING 2002) and an occurrence of the Mud-Dauber *Sceliphron destillatorium* at the margin of Lake Constance in Germany has even not been signaled at all in the literature, I could imagine that the Mud-Dauber *Sceliphron destillatorium* has now already established limited populations in the southern part of the Upper Rhine Graben close to the boundaries between Germany, Switzerland and France as well as at the margin of Lake Constance close to the boundaries between Germany, Austria and Switzerland. Because the occurrence of the Mud-Dauber *Sceliphron destillatorium* has already been confirmed in and near Basel (KOHL 1883, HUBER 1916; TÖPFL in VERNIER, BARBALAT & GONSETH 1996; SCHANOWSKI in SCHMID-EGGER 2005) at the southern margin of the Upper Rhine Graben near the boundary to Germany, the Mud-Dauber *Sceliphron destillatorium* should also have advanced across the boundaries to Germany and France close to Basel. From Arbon at the southwestern edge of Lake Constance in Switzerland, the Mud-Dauber *Sceliphron destillatorium* could have easily followed the southern margin of Lake Constance via Rorschach in Switzerland to Bregenz in Austria and Lindau in Germany. The surroundings of Basel in the southern part of the Upper Rhine Graben in Baden-Württemberg and the vicinity of Lindau at the southeastern edge of Lake Constance in Bavaria and Baden-Württemberg are thus the most promising regions for the search of potential occurrences of the Mud-Dauber *Sceliphron destillatorium* in Germany.

GAUSS (1997) has reported a capture of the Mud-Dauber *Sceliphron spirifex* in Kirchzarten eastsoutheast of Freiburg in the Dreisam valley abt. 10 km east of the margin of the Upper Rhine Graben in 1990, and has assumed that the completely fresh female has been artificially imported from the Mediterranean region by tourists. In the context of my assumption that the Mud-Dauber *Sceliphron destillatorium* could already have established limited populations in the southern part of the Upper Rhine Graben, it could not be excluded that also the Mud-Dauber *Sceliphron spirifex* has taken the same migration route and has already successfully installed itself at some places in the southern part of the Upper Rhine Graben. The occurrence of the Mud-Daubers *Sceliphron destillatorium* and *Sceliphron spirifex* in southern Germany has already been reported by SCHENCK (1866) without, however, having mentioned particular regions or localities. A redetermination of the specimen having been captured in 1990 by GAUSS (1997) in Kirchzarten, however, has revealed that it is in fact the Mud-Dauber *Sceliphron destillatorium* (OSTEN to OHL, personal communication 2001; OHL in STALLING 2002; OHL, personal communication 2013) which then would have most probably arrived in Kirchzarten along the scheduled migration route along the Upper Rhine Graben in downstream direction and then along the Dreisam valley in upstream direction. The specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured by GAUSS (1997) in Kirchzarten in 1990 is kept in the collection of the Museum of Natural History in Stuttgart (OHL, personal communication 2013). The collection of the Museum of Natural History in Görlitz in Germany contains a specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (SEIFERT, personal communication 2013). The isolated find of the Mud-Dauber *Sceliphron destillatorium* in Saxony which has been considered as the result of an artificial import (BURGER, personal communication to OHL 1999; OHL 2001) represents also the specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (BURGER, personal communication 2013; CREUTZBURG, personal communication 2013).

The first record of mason nests of the Mud-Dauber *Sceliphron destillatorium* in Germany has been made by PREISS & STALLING in 1997 in Grenzach-Wyhlen (STALLING 2002) which is located abt. 5 km east of Basel in Switzerland where the Mud-Dauber *Sceliphron destillatorium* has already been

found before 1883 (KOHL 1883, HUBER 1916). The mason nests of the Mud-Dauber *Sceliphron destillatorium* in Grenzach-Wyhlen have been discovered accidentally when a wooden nesting box for owls which has been fixed in several m height on the inner wall of a wooden barn that is surrounded by orchards and fields south of the village has been checked and two mason nests of the Mud-Dauber *Sceliphron destillatorium* have been found below the ceiling and at the top of the inner wall at the edge to the ceiling of the wooden nesting box that have consisted of eight and nine nest cells, respectively (STALLING 2002). In total 16 individuals of the Mud-Dauber *Sceliphron destillatorium* have emerged from the in total 17 nest cells of the two mason nests some weeks after the discovery of the mason nests, their removal from the nesting box in the barn and their maintenance in the laboratory, with among twelve individuals two males and ten females having been observed (STALLING 2002). The wooden barn south of Grenzach-Wyhlen is located close to the river in the Rhine valley at the southern margin of the Dinkelberg which represents a southern outpost of the Black Forest. The discovery of the Mud-Dauber *Sceliphron destillatorium* in Grenzach-Wyhlen east of Basel by PREISS & STALLING in 1997 (STALLING 2002) has been made only a few years after the last documented records of the Mud-Dauber *Sceliphron destillatorium* in the surroundings of Basel which include confirmations of specimens in Dornach south of Basel in 1995 (TÖPFL in VERNIER, BARBALAT & GONSETH 1996), in Corcelles west of Neuchâtel southwest of Basel in 1995 (VERNIER, BARBALAT & GONSETH 1996) and in Zürich in 1995 (UNGRICHT 1995; UNGRICHT in VERNIER, BARBALAT & GONSETH 1996), thus testifying to the continuous or stepwise expansion of the area of distribution of the Mud-Dauber *Sceliphron destillatorium* north of the mountain range of the Alps along the postulated routes of migration (MADER 2001 b). Another specimen of the Mud-Dauber *Sceliphron destillatorium* has been encountered in Kleinhüningen that is located at the northern margin of Basel immediately south of the boundary between Switzerland and Germany and east of the boundary between Switzerland and France in the three-countries-triangle by SCHANOWSKI in 2001 (SCHMID-EGGER 2005) which again fits into the model of migration as outlined above.

The lack of records of the Mud-Dauber *Sceliphron destillatorium* in the surroundings of Basel north of the mountain range of the Alps for almost a century between the early confirmations in and near Basel since already before 1883 (KOHL 1883, HUBER 1916) and the later observations in Dornach south of Basel in 1995 (TÖPFL in VERNIER, BARBALAT & GONSETH 1996), in Corcelles west of Neuchâtel southwest of Basel in 1995 (VERNIER, BARBALAT & GONSETH 1996), in Zürich in 1995 (UNGRICHT 1995; UNGRICHT in VERNIER, BARBALAT & GONSETH 1996), in Grenzach-Wyhlen east of Basel in 1997 (STALLING 2002) and in Kleinhüningen at the northern margin of Basel in 2001 (SCHANOWSKI in SCHMID-EGGER 2005) is interpreted as the result of the hidden lifestyle of the Mud-Dauber *Sceliphron destillatorium* which similarly as the Delta Mud Wasp *Delta unguiculatum* can in most cases only rarely and accidentally be observed at its nests and at sampling sites of material for its nests (MADER 2000 a) instead of representing a new establishment of the Mud-Dauber *Sceliphron destillatorium* in an uninhabited region and subsequently a permanent colonization after considerable time since an earlier temporary installation and intermittent vanishing (STALLING 2002).

9.6.2 Migration to the Margin of Lake Constance

In addition to the records of the Mud-Dauber *Sceliphron destillatorium* in Basel, Dornach south of Basel, Corcelles west of Neuchâtel southwest of Basel, Berne and Zürich in Switzerland as compiled above, a specimen of the Mud-Dauber *Sceliphron destillatorium* has also been captured in Arbon north-northeast of St. Gallen eastnortheast of Zürich at the southern margin of Lake Constance in 1995 (RICKLI in GONSETH, IMBECK & TUSSAC 2001) which is again close to the boundary to Germany. From Arbon at the southwestern edge of Lake Constance in Switzerland, the Mud-Dauber *Sceliphron destillatorium* could have easily followed the southern margin of Lake Constance via Rorschach in Switzerland to Bregenz in Austria and Lindau in Germany. The surroundings of Basel in the southern part of the Upper Rhine Graben in Baden-Württemberg and the vicinity of Lindau at the southeastern edge of Lake Constance in Bavaria and Baden-Württemberg are thus the most promising regions for the search of potential occurrences of the Mud-Dauber *Sceliphron destillatorium* in Germany.

After its arrival in Zürich by migration along the Aare valley in downstream direction and the Limmat valley in upstream direction, the Mud-Dauber *Sceliphron destillatorium* has probably bridged the

watershed between the Limmat valley and Lake Zürich in the vicinity of Zürich in the west and southwest and the Thur valley between Wattwil eastsoutheast of Zürich and Wil eastnortheast of Zürich in the east and northeast, has subsequently followed the Thur valley in downstream direction up to the mouth of the Sitter valley into the Thur valley southwest of Sittersdorf northeast of St. Gallen, has then advanced the Sitter valley in upstream direction up to the region north of St. Gallen, and has finally drifted across the watershed between the Sitter valley and Lake Constance towards the northeast to Arbon northnortheast of St. Gallen eastnortheast of Zürich at the southern margin of Lake Constance.

9.6.3 Migration along the Danube Valley

The Mud-Dauber *Sceliphron destillatorium* has migrated from the Black Sea along the Danube valley in upstream direction across various countries up to Austria where it has advanced beyond Vienna and has reached Krems (WERNER 1927, MADER 2000 a) and Linz (MARTZY in GUSENLEITNER 1996 a, SCHWARZ 1999). From Linz, the Mud-Dauber *Sceliphron destillatorium* could continue its wandering along the Danube valley in upstream direction via Engelhartszell in Austria to Passau, Deggendorf, Straubing and Regensburg in Germany. The interval of the Danube valley between Passau and Regensburg in Bavaria is therefore another promising region for the search of potential occurrences of the Mud-Dauber *Sceliphron destillatorium* in Germany.

Because SCHÄFFER (1766) has included a picture of the Mud-Dauber *Sceliphron destillatorium* into his compilation of naturally coloured figures of insects of the Regensburg region, with the assignment of the drawing in SCHÄFFER (1766) to the Mud-Dauber *Sceliphron destillatorium* having been later confirmed by PANZER (1804), KOHL (1918) and VECHT & BREUGEL (1968), it is possible that the Mud-Dauber *Sceliphron destillatorium* has already arrived in the interval of the Danube valley between Passau and Regensburg in Germany at the time of SCHÄFFER (1766). Because an occurrence of the Mud-Dauber *Sceliphron destillatorium* in the Danube valley upstream of Linz has later not been reported in the literature, the interpretation of the illustration of the Mud-Dauber *Sceliphron destillatorium* in SCHÄFFER (1766) has to consider certainly also other sources of the figured specimen. According to the limited possibilities of travelling at the time of SCHÄFFER (1766), however, and in view of the significance of the Danube valley as migration street, it cannot be completely excluded that the Mud-Dauber *Sceliphron destillatorium* has already reached the region of Regensburg in the Danube valley in Germany at the time of SCHÄFFER (1766).

The fact that the Mud-Dauber *Sceliphron destillatorium* has not been included into the compilation of the insects living in Regensburg of HERRICH-SCHÄFFER (1840) does not necessarily have to be taken as evidence for its lack at that time, because small populations in large towns could be difficult to discover due to the hidden way of life of the Mud-Dauber *Sceliphron destillatorium*. The Mason Bee *Megachile (Chalicodoma) parietina* which has occurred frequently in and around Regensburg according to the detailed descriptions in SCHÄFFER (1764) has also been assessed as being very rare in Regensburg by HERRICH-SCHÄFFER (1840) which is contradicted by my observations of well-preserved abandoned mason nests at a church in Regensburg in 2000 that confirm an existence of at least a relictical population of the Mason Bee *Megachile (Chalicodoma) parietina* in Regensburg still abt. 50 - 75 years ago (MADER 2000 a, 2001 a). In his critical review of the insect fauna of Germany, PANZER (1806) has also included the Mud-Dauber *Sceliphron destillatorium* which he thus has probably already registered in Germany at that time either in the region of Regensburg in the Danube valley according to the documentation in SCHÄFFER (1766) or in the southern part of the Upper Rhine Graben around Basel. The significance of the Danube valley as immigration street for the wandering of thermophilous insects into Germany has also been emphasized by FROMMER (2012) who has outlined the Danubian route along the Danube valley in upstream direction.

9.6.4 Migration along the Elbe Valley

In the vicinity of Linz in Austria, the Mud-Dauber *Sceliphron destillatorium* has crossed the narrow

watershed between the Danube valley in the south and the Vltava (Moldau) valley in the north, and has then wandered along the Vltava valley in downstream direction via Kaplice (formerly Kaplitz) southeast of Ceský Krumlov (formerly Krumau) north of Linz (KIRCHNER 1854) to Prague (STARY in HOFFER 1954) and Revnícov west of Prague (HOFFER 1954) in Czechia. The further migration along the Vltava valley in downstream direction beyond Prague could bring the Mud-Dauber *Sceliphron destillatorium* to the termination of the Vltava into the Elbe (Labe) near Melník and from there along the Elbe valley in downstream direction via Usti and Decín in Czechia to Dresden and beyond in Germany. The interval of the Elbe valley around Dresden in Saxony and Saxony-Anhalt is therefore another promising region for the search of potential occurrences of the Mud-Dauber *Sceliphron destillatorium* in Germany.

Similarly as the Mud-Dauber *Sceliphron destillatorium*, also the Mason Bee *Megachile (Chalicodoma) parietina* has overstepped the narrow watershed between the Danube valley and the Vltava valley north of Linz in Austria and has advanced along the Vltava valley in downstream direction where it has been recorded in Ceské Budejovice (formerly Budweis) (KIRCHNER 1857, PFLEGER in BATA 1939) and around Prague (BATA 1939, 1942; LUKAS 1979) in Czechia. The Mason Bee *Megachile (Chalicodoma) parietina* has even migrated along the Vltava valley in downstream direction up to its mouth north of Prague where it has entered the Elbe valley which it has followed up to the region of Dresden where it has been recorded in Hoflößnitz in the western part of Radebeul westnorthwest of Dresden (MÜLLER 1944). The Mason Bee *Megachile (Chalicodoma) parietina* has therefore already outlined the potential of farther migration of the Mud-Dauber *Sceliphron destillatorium* beyond Prague in Czechia to Dresden and beyond in Germany.

The individual of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (specimen in the collection of the Museum of Natural History in Görlitz in Germany; SEIFERT, personal communication 2013) could have reached the surroundings of Guttau by downstream migration along the Elbe valley as outlined above, bridging of the watershed between the Elbe valley between Decín and Pirna southeast of Dresden and the source region of the Spree valley southsoutheast of Bautzen, and wandering along the Spree valley in downstream direction up to Guttau northeast of Bautzen. The isolated find of the Mud-Dauber *Sceliphron destillatorium* in Saxony which has been considered as the result of an artificial import (BURGER, personal communication to OHL 1999; OHL 2001) represents also the specimen of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (BURGER, personal communication 2013; CREUTZBURG, personal communication 2013).

WISSMANN (1849) has reported the capture of a specimen of the Mud-Dauber *Sceliphron destillatorium* around Hannover in Lower Saxony in Germany by KRÖSMANN which has later been cited by SCHENCK (1857, 1861, 1866), TASCHENBERG (1858, 1884, 1929), KOHL (1918), FAHRINGER (1922) and FRIESE (1926), and which has been interpreted by SCHMIDT & SCHMID-EGGER (1997) as the result of confusion or displacement of the locality. In view of the potential immigration of the Mud-Dauber *Sceliphron destillatorium* from Kaplice southeast of Ceský Krumlov (KIRCHNER 1854), Prague (STARY in HOFFER 1954) and Revnícov west of Prague (HOFFER 1954) along the valleys of Vltava and Elbe in downstream direction via Usti and Decín in Czechia to Dresden and beyond in Germany, the Mud-Dauber *Sceliphron destillatorium* could have reached the surroundings of Hannover by further wandering along the Elbe valley in downstream direction from Dresden to Magdeburg and then by drifting from the Elbe valley around Magdeburg in westnorthwestwards direction via Braunschweig to Hannover. The confirmation of the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Brjansk (KOLESNIKOV 1977) and Penza (KERENSKIJ 1919) in Russia in abt. 53.25 degrees northern latitude that are situated still abt. 100 km farther northwards than Hannover in Germany which is located in abt. 52.375 degrees northern latitude underlines that the Mud-Dauber *Sceliphron destillatorium* could certainly have reached the region around Hannover (KRÖSMANN in WISSMANN 1849) by natural wandering from the Vltava valley in Prague and its vicinity in Czechia along the above outlined migration route.

At a locality similarly far in the north of Germany as Hannover, a specimen of the Mud-Dauber *Sceliphron spirifex* has been captured in Eberswalde northeast of Berlin in 1999, with its provenance having been considered as enigmatic (BLANK in BLÖSCH 2000). Because the Mud-Dauber *Sceliphron spirifex* has already been recorded in Mödling southsouthwest of Vienna before 1851 (SCHEFFER 1851), in

Vienna since 1853 (FRITSCH 1858, 1878), in Kaplice southeast of Cesky Krumlov south of Prague before 1854 (KIRCHNER 1854) and in Brno before 1878 (FRITSCH 1878), it could have reached Eberswalde northeast of Berlin by migrating along the Danube valley in upstream direction up to Linz, bridging of the narrow watershed between the Danube valley and the Vltava valley north of Linz, wandering along the Vltava valley and subsequently the Elbe valley in downstream direction, and then leaving the Elbe valley between Dresden and Magdeburg in northnortheastwards to northeastwards direction and crossing the city of Berlin. Because Brjansk (KOLESNIKOV 1977) and Penza (KERENSKIJ 1919) in Russia where the Mud-Dauber *Sceliphron destillatorium* has been encountered in abt. 53.25 degrees northern latitude are still situated abt. 50 km farther northwards than Eberswalde northeast of Berlin which is located in abt. 52.75 degrees northern latitude, it is certainly possible that the Mud-Dauber *Sceliphron spirifex* has reached Eberswalde in Germany by natural wandering from the Vltava valley around Kaplice in Czechia along the above outlined migration route. The significance of Elbe valley and Vltava valley as immigration streets for the wandering of thermophilous insects into Germany has also been emphasized by FROMMER (2012) who has outlined the Moldavian-Saxonian route along the valleys of Vltava and Elbe in downstream direction.

The individual of the Mud-Dauber *Sceliphron destillatorium* which has probably been captured in the country of Brandenburg (specimen in the collection of the Zoologisches Forschungsinstitut of the University of Bonn in Germany; PETERS, personal communication 2013) most probably between 1920 and 1940 has possibly also reached its destination by wandering along the Elbe valley in downstream direction and then leaving the Elbe valley between Dresden and Magdeburg in northnortheastwards to northeastwards direction towards the locality of its discovery similarly as the individual of the Mud-Dauber *Sceliphron spirifex* which has been captured in Eberswalde northeast of Berlin in 1999 (BLANK in BLÖSCH 2000).

9.6.5 Migration along the Odra Valley

From the Danube valley at the boundary between Slovakia and Austria west of Bratislava (formerly Preßburg), the Mud-Dauber *Sceliphron destillatorium* has migrated along the Morava (March) valley in upstream direction from Devín west of Bratislava (LUKAS, BOGUSCH & LISKA 2006) via Moravský Jan northnorthwest of Bratislava (LUKAS in LUKAS, BOGUSCH & LISKA 2006), Hodonín (formerly Göding) southeast of Brno (formerly Brünn) (ZBORIL in HEYMONS 1915, ZWOSCHIL in KOHL 1918; ZBORIL in ZAVADIL, SUSTERA & BATA 1937; HACHLER in ZAVADIL, SUSTERA & BATA 1937; STARY in HOFFER 1954), Chropov southeast of Skalica eastsoutheast of Hodonín southeast of Brno (DEVAN 1999), Bzenec northeast of Hodonín southeast of Brno (ZAVADIL in LUKAS, BOGUSCH & LISKA 2006), Moravský Písek southwest of Uherské Hradiste southsoutheast of Olomouc (ZAVADIL in ZAVADIL, SUSTERA & BATA 1937; HACHLER & STARY in LUKAS, BOGUSCH & LISKA 2006), Uherské Hradiste southsoutheast of Olomouc (SRBA in LUKAS, BOGUSCH & LISKA 2006), Velehrad northwest of Uherské Hradiste southsoutheast of Olomouc (ZAVADIL 1939; ZAVADIL in LUKAS, BOGUSCH & LISKA 2006), Salas northnorthwest of Velehrad northwest of Uherské Hradiste eastsoutheast of Brno (SRBA in LUKAS, BOGUSCH & LISKA 2006) and Kromeríz southsoutheast of Olomouc (FIALA in ZAVADIL, SUSTERA & BATA 1937; FIALA in LUKAS, BOGUSCH & LISKA 2006) to Olomouc (formerly Olmütz) (HOFFER 1954), Hodolany east of Olomouc (TOMSIK in LUKAS, BOGUSCH & LISKA 2006) and Kozlov near Litovel northwest of Olomouc (SLAVICEK in ZAVADIL, SUSTERA & BATA 1937) as well as along the Becva valley which terminates into the Morava valley northnorthwest of Kromeríz in upstream direction to Prerov southeast of Olomouc (VEPREK in LUKAS, BOGUSCH & LISKA 2006), Milotice na Becva eastsoutheast of Hranice east of Olomouc (GREGOR in ZAVADIL, SUSTERA & BATA 1937; GREGOR in ZAVADIL 1948), Mikuluvka northnorthwest of Vsetín (VODICKA in ZAVADIL 1939, VODICKA in ZAVADIL 1948; VODICKA in LUKAS, BOGUSCH & LISKA 2006) and Vsetín eastsoutheast of Olomouc (ZAVADIL & SNOFLAK 1948, BALTHASAR 1972) in Czechia.

The continuation of the upstream migration of the Mud-Dauber *Sceliphron destillatorium* along the Morava valley beyond Olomouc, Hodolany and Litovel, and subsequently the overstepping across the narrow watershed between the Morava valley and the Odra valley east of Olomouc on the one hand; as well as the further downstream wandering along the Becva valley beyond Vsetín, Mikuluvka, Milotice

and Prerov, and subsequently the crossing of the narrow watershed between the Becva valley and the Odra valley around Noví Jicín and Odry on the other hand, could bring the Mud-Dauber *Sceliphron destillatorium* to the Moravian-Silesian gate southsouthwest of Ostrava in Moravia in Czechia where it could then immigrate into Silesia in the southwestern part of Poland along the Odra valley in downstream direction.

After having passed the Moravian-Silesian Gate southsouthwest of Ostrava, the subsequent downstream wandering along the Odra (Oder) valley could thus lead the Mud-Dauber *Sceliphron destillatorium* from Noví Jicín and Ostrava in Czechia via Racibórz, Opole, Wrocław, Głogów and Zielona Góra in Poland to Eisenhüttenstadt and Frankfurt an der Oder in Germany. In comparison to the records in Brjansk (KOLESNIKOV 1977) and Penza (KERENSKIJ 1919) in Russia in abt. 53.25 degrees northern latitude, the Mud-Dauber *Sceliphron destillatorium* would have the potential of migration along the Odra valley in downstream direction up to Szczecin in abt. 53.5 degrees northern latitude. The Mud-Dauber *Sceliphron spirifex* which has been captured in Eberswalde northeast of Berlin in 1999 (BLANK in BLÖSCH 2000) could also have utilized the migration street of the Odra valley from where it could have reached Eberswalde by leaving the Odra valley near Freienwalde northnorthwest of Frankfurt an der Oder and drifting over a distance of abt. 15 - 25 km towards westnorthwest.

9.7 Potential of Farther Northwards Migration in Poland and Germany

The potential of farther northwards migration of the Mud-Dauber *Sceliphron destillatorium* in Poland and Germany beyond its northernmost localities of occurrence in Poland up to 2013 is discussed along the lines of the distribution of the Mud-Dauber *Sceliphron destillatorium* up to abt. 51 degrees northern latitude in Poland and up to abt. 55 degrees northern latitude in Russia.

9.7.1 Distribution up to abt. 51 Degrees Northern Latitude in Poland

The northernmost occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland has been reported up to 2000 from Czesławice westnorthwest of Lublin where it has been captured in 1962 by ANASIEWICZ (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985), with Lublin being located in abt. 51.25 degrees northern latitude. Except of Czesławice westnorthwest of Lublin, all the other up to 2000 known occurrences of the Mud-Dauber *Sceliphron destillatorium* in Poland are located between 49 and 50 degrees northern latitude, with the northernmost place of this group of occurrences being Tarnów which is located in 50 degrees northern latitude. After 2000, various occurrences of the Mud-Dauber *Sceliphron destillatorium* have also been discovered between Tarnów and Czesławice between 50 and 51 degrees northern latitude, with most of them, however, being located still abt. 60 - 80 km south of Czesławice and abt. 60 - 80 km north of Tarnów, with only Inowłódz east of Tomaszów Mazowiecki where it has been encountered in 2008 by KOWALCZYK & SOSZYNSKI (KOWALCZYK, KURZAC & SOSZYNSKI 2009) in abt. 51.5 degrees northern latitude and Swidnik southeast of Lublin where it has been confirmed in 2011 by KOCIK (BILANSKI, KOŁODZIEJ & PAJĄK 2012) in abt. 51.25 degrees northern latitude having reached or even slightly exceeded Czesławice concerning northwards progradation. The individual of the Mud-Dauber *Sceliphron destillatorium* which has been captured in the vicinity of Guttau in the Spree valley northeast of Bautzen eastnortheast of Dresden in 1985 by WEIGEL (specimen in the collection of the Museum of Natural History in Görlitz in Germany; SEIFERT, personal communication 2013) has been found in abt. 51.25 degrees northern latitude that represents a similar geographical level as the above mentioned northernmost localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland.

The Mud-Dauber *Sceliphron destillatorium*, however, has the potential of considerably farther northwards migration in Poland, and could reach places which are located in abt. 53 degrees northern lati-

tude where it has already been found repeatedly in Russia. A similar potential of considerably farther northwards migration as applying for the Mud-Dauber *Sceliphron destillatorium* in Poland is also valid for the Delta Mud Wasp *Delta unguiculatum* in Germany. The northernmost occurrences of the Delta Mud Wasp *Delta unguiculatum* in Germany are up to 2000 Mainz and Bingen (REDER, personal communication 2000) in 50 degrees northern latitude as well as Frankfurt am Main (DOROW 1988, FLECHTNER & KLINGER 1990, KLINGER 1992), Hanau (MADER 2000 a) and Taunusstein north-northwest of Wiesbaden (EMMERICH in KLINGER & REDER 1995) in abt. 50.125 degrees northern latitude, whereas it has already been confirmed in abt. 51.75 degrees northern latitude in Russia. If the occurrence of the Mud-Dauber *Sceliphron destillatorium* in Czesławice westnorthwest of Lublin (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) would be omitted, then all the other up to 2000 known occurrences of the Mud-Dauber *Sceliphron destillatorium* in Poland as well as all the up to 2000 confirmed occurrences of the Delta Mud Wasp *Delta unguiculatum* in Germany would not exceed abt. 50.125 degrees northern latitude in northwards extension. MAZEK-FIALLA (1935 a, 1936 b) has also concluded that the northern boundary of the extension of the Mud-Dauber *Sceliphron destillatorium* is located in abt. 49 degrees northern latitude in Europe and shifts up to abt. 53 degrees northern latitude in Russia according to the evaluation of its known distribution at that time which has been mainly based on the compilation in KOHL (1918). North of Frankfurt am Main, mason nests of the Delta Mud Wasp *Delta unguiculatum* have also been discovered in the southern part of the Wetterau (REDER 2010) in Bad Homburg, Ober-Erlenbach east of Bad Homburg and Großkarben east of Bad Homburg in 2000 (REDER, personal communication 2013) in abt. 50.25 degrees northern latitude, whereas I have searched without success for mason nests of the Delta Mud Wasp *Delta unguiculatum* in the northern part of the Wetterau in Friedberg and Bad Nauheim in 2000 (MADER 2000 a) in abt. 50.375 degrees northern latitude, with the northern boundary of distribution of the Delta Mud Wasp *Delta unguiculatum* in 2000 thus probably having been located between Bad Homburg and Friedberg north of Frankfurt am Main in Germany.

Inowłódz east of Tomaszów Mazowiecki where the Mud-Dauber *Sceliphron destillatorium* has been encountered in 2008 by KOWALCZYK & SOSZYNSKI (KOWALCZYK, KURZAC & SOSZYNSKI 2009) in abt. 51.5 degrees northern latitude is located still abt. 20 km farther northwards than Czesławice westnorthwest of Lublin where its occurrence has been proven in Poland for the first time in 1962 by ANASIEWICZ (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) in abt. 51.25 degrees northern latitude, and is located still abt. 30 km farther northwards than Swidnik southeast of Lublin where its occurrence has been confirmed in 2011 by KOCIK (BILANSKI, KOŁODZIEJ & PAJĄK 2012) in abt. 51.25 degrees northern latitude, with these three localities being the northernmost places of definite occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland up to 2013.

An observation of the Palaearctic Mud-Dauber *Sceliphron destillatorium* even in Mokotów in the central part of Warsaw in the Vistula valley in Poland in 2008 (unpublished information reported to CELARY, personal communication 2013) in abt. 52.25 degrees northern latitude requires still confirmation, because a confusion with the Oriental Mud-Dauber *Sceliphron curvatum* could not be completely excluded, similarly as apparent records of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in Wrocław in the Odra valley in Lower Silesia and in Knurów close to the Odra valley south of Gliwice west of Katowice in Upper Silesia in Poland in 2012 (unpublished information reported to KOSIBOWICZ, personal communication 2013) have turned out as having been erroneous and have in fact represented registrations of the Oriental Mud-Dauber *Sceliphron curvatum* (KOSIBOWICZ, personal communication 2013). It is, however, possible that the Palaearctic Mud-Dauber *Sceliphron destillatorium* has already reached Warsaw in Poland in abt. 52.25 degrees northern latitude by successive wandering along the Vistula valley in downstream direction from its recorded occurrences in Tarnów and north of Tarnów in the Dunajec valley as well as around Mielec and north of Mielec in the Wisłoka valley which are all situated close to the terminations of the valleys of both tributaries into the Vistula valley, because in the eastwards adjacent Belarus, the Palaearctic Mud-Dauber *Sceliphron destillatorium* has been encountered in Pinsk east of Brest in the Prypjat valley (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013) in abt. 52.125 degrees northern latitude that is located still abt. 100 km farther northwards than Czesławice westnorthwest of Lublin and Swidnik southeast of Lublin as well as still abt. 70 km farther northwards than Inowłódz east of Tomaszów Mazowiecki. The Palaearctic Mud-Dauber *Sceliphron destillatorium* could also have arrived in Warsaw by wandering

from the Black Sea along the Dnepr valley in upstream direction beyond Kijiv and then farther along the Prypjat valley northnorthwest of Kijiv in upstream direction beyond Pinsk and beyond the source region of the Prypjat east of Lublin and south of Brest from where it could have bridged into the San valley west of Lublin and could then have migrated along the Vistula valley in downstream direction to Warsaw.

9.7.2 Distribution up to abt. 55 Degrees Northern Latitude in Russia

In Russia, the Mud-Dauber *Sceliphron destillatorium* has been encountered in Orynbor (formerly Orenburg) in the Ural valley already before 1848 (EVERSMANN 1848, 1849) in abt. 51.75 degrees northern latitude, in Poim west of Penza northnorthwest of Saratov in 1915 (KERENSKIJ 1919) in abt. 53.25 degrees northern latitude, and in Brjansk in the Desna valley between Kijiv and Moscow between 1964 and 1973 (KOLESNIKOV 1977) in abt. 53.25 degrees northern latitude. In Orynbor (formerly Orenburg), also the Delta Mud Wasp *Delta unguiculatum* has been noticed already before 1865 (RADOSZKOVSKY 1865) in abt. 51.75 degrees northern latitude. In comparison to the records in Brjansk and Penza in Russia, the Mud-Dauber *Sceliphron destillatorium* would have the potential of farther wandering in Poland for example up to Toruń in the Vistula valley in abt. 53 degrees northern latitude, up to Białystok in the Narew valley which tributes via the Bug valley to the Vistula valley in abt. 53.125 degrees northern latitude, and up to Szczecin in the Odra valley in abt. 53.5 degrees northern latitude.

Similarly, the Mud-Dauber *Sceliphron destillatorium* would have the potential of immigration into Germany for example along the Rhine valley in downstream direction up to Xanten northnorthwest of Duisburg beyond Cologne in abt. 51.75 degrees northern latitude, along the Elbe valley in downstream direction up to Hamburg in abt. 53.5 degrees northern latitude, and along the Weser valley in downstream direction up to Bremen in abt. 53 degrees northern latitude. If the Mud-Dauber *Sceliphron destillatorium* would reach Toruń and Białystok in Poland as well as Bremen in Germany in the future, it would have advanced abt. 200 km farther northwards than Lublin in Poland and abt. 350 km farther northwards than Tarnów in Poland as well as Mainz and Frankfurt am Main in Germany. If the Mud-Dauber *Sceliphron destillatorium* would even arrive in Szczecin in Poland and Hamburg in Germany in the future, it would have prograded abt. 250 km farther northwards than Lublin in Poland and abt. 400 km farther northwards than Tarnów in Poland as well as Mainz and Frankfurt am Main in Germany. In comparison to the record in Orynbor (formerly Orenburg) in Russia, the Delta Mud Wasp *Delta unguiculatum* would have the potential of farther wandering in Germany for example along the Rhine valley in downstream direction up to Xanten northnorthwest of Duisburg beyond Cologne which would correspond to a potential advance in the future over a distance of abt. 180 km farther northwards than Frankfurt am Main, Hanau and Taunusstein as well as abt. 200 km farther northwards than Mainz and Bingen.

Based on the comparison with the northwards advance of the Mud-Dauber *Sceliphron destillatorium* from Black Sea and Caspian Sea up to Brjansk and Penza in Russia in abt. 53.25 degrees northern latitude, it could thus be postulated that the Mud-Dauber *Sceliphron destillatorium* has the potential of continuation of its migration in Poland in downstream direction along the San valley beyond Przemyśl via Sandomierz near the termination of the San into the Vistula, and then along the Vistula valley via Puławy and Warsaw to Toruń or even beyond. From Lublin, the Mud-Dauber *Sceliphron destillatorium* could arrive in the Vistula valley either directly by drifting beyond Czesławice in westnorthwestwards direction to Puławy or indirectly by entering the Wieprz valley southeast or northeast of Lublin which reaches the Vistula valley near Dęblin northnorthwest of Puławy, and could then follow the Vistula valley in downstream direction. From the surroundings of Olomouc, the Mud-Dauber *Sceliphron destillatorium* could arrive in the Odra valley around Noví Jicín and Odry, could then pass through the Moravian-Silesian gate southsouthwest of Ostrava in Moravia in Czechia; could then immigrate into Silesia in Poland along the Odra valley in downstream direction via Racibórz, Opole, Wrocław, Głogów and Zielona Góra; and could even follow the Odra valley up to its termination into the Szczecin Lagoon north of Szczecin.

The comparison with the northwards advance of the Mud-Dauber *Sceliphron destillatorium* from Black Sea and Caspian Sea up to Brjansk and Penza in Russia in abt. 53.25 degrees northern latitude confirms also the possibility of the interpretation of the arrival of the Mud-Dauber *Sceliphron destillatorium* in the region around Hannover in Germany (KRÖSMANN in WISSMANN 1849) in abt. 52.375 degrees northern latitude which is located abt. 100 km more southwards than Brjansk and Penza in Russia as well as the arrival of the Mud-Dauber *Sceliphron spirifex* in Eberswalde northeast of Berlin in Germany (BLANK in BLÖSCH 2000) in abt. 52.875 degrees northern latitude that is situated abt. 50 km more southwards than Brjansk and Penza in Russia by natural migration.

The Mud-Dauber *Sceliphron destillatorium* has even already prograded still significantly farther northwards beyond Brjansk and Penza in Russia. The collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg includes specimens of the Mud-Dauber *Sceliphron destillatorium* which have been captured in the Samara (formerly Kujbysev) province in the Volga valley in abt. 53.25 degrees northern latitude, in the Dankov district in the Rjazan province southeast of Moscow in the Oka valley that tributes to the Volga valley in abt. 54.5 degrees northern latitude, and in Ufa eastnortheast of Samara in the Belaja valley which tributes to the Kama valley that terminates into the Volga valley in abt. 54.75 degrees northern latitude (PESENKO to CELARY, personal communication 2001). MINORANSKIJ, CHARCENKO & FOMICEV (1970); FOMICEV & MINORANSKIJ (1971) and MINORANSKIJ (1971) have even signaled the record of the Mud-Dauber *Sceliphron destillatorium* in Kazan northnorthwest of Samara in the Volga valley in abt. 55.75 degrees northern latitude, and the collection of the University of Niznij Novgorod in Russia contains specimens of the Mud-Dauber *Sceliphron destillatorium* which have been captured in Niznij Novgorod (MOKROUSOV, personal communication 2013) eastnortheast of Moscow in the Volga valley in abt. 56.25 degrees northern latitude. Samara is located on the same geographical latitude as Brjansk and Penza, whereas Rjazan, Ufa, Kazan and Niznij Novgorod are located on a geographical latitude considerably farther north of Brjansk, Penza and Samara. The Mud-Dauber *Sceliphron destillatorium* has migrated still abt. 150 km farther northwards beyond Brjansk, Penza and Samara to reach Rjazan and Ufa, has again wandered still abt. 150 km farther northwards beyond Rjazan and Ufa to arrive in Kazan, and has again still advanced abt. 75 km farther northwards beyond Kazan to reach Niznij Novgorod. On the other hand, the Mud-Dauber *Sceliphron destillatorium* is missing in the assemblage of digger wasps that have been recorded by ASSMUSS (1859) in Serpuchov, Podolsk, Mozhajsk and Klin in the surroundings of Moscow which are again located in abt. 55 - 56 degrees northern latitude and are thus also placed still abt. 200 - 300 km more northwards than Brjansk, Penza and Samara.

This relationship suggests that the northern boundary of the distribution of the Mud-Dauber *Sceliphron destillatorium* is at least in the surroundings of Moscow situated between the Dankov district in the Rjazan province (specimen in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) in abt. 54.5 degrees northern latitude in the south and Serpuchov, Podolsk, Mozhajsk and Klin (ASSMUSS 1859) in abt. 55 - 56 degrees northern latitude in the north, whereas east of the region around Moscow, the northern boundary of the distribution of the Mud-Dauber *Sceliphron destillatorium* is probably located close to Kazan (MINORANSKIJ, CHARCENKO & FOMICEV 1970; FOMICEV & MINORANSKIJ 1971, MINORANSKIJ 1971) in abt. 55.75 degrees northern latitude that is placed still abt. 150 km more northwards than Rjazan or even near Niznij Novgorod (specimens in the collection of the University of Niznij Novgorod in Russia; MOKROUSOV, personal communication 2013) in abt. 56.25 degrees northern latitude which is situated still abt. 75 km more northwards than Kazan. Concerning relative northwards progradation, the Mud-Dauber *Sceliphron destillatorium* is in Czesławice westnorthwest of Lublin in Poland still abt. 220 km behind the Mud-Dauber *Sceliphron destillatorium* in Brjansk, Penza and Samara in Russia; still abt. 370 km behind the Mud-Dauber *Sceliphron destillatorium* in Rjazan and Ufa in Russia, still abt. 520 km behind the Mud-Dauber *Sceliphron destillatorium* in Kazan in Russia, and still abt. 600 km behind the Mud-Dauber *Sceliphron destillatorium* in Niznij Novgorod in Russia.

9.8 Winter Stability

The winter stability of the Mud-Dauber *Sceliphron destillatorium* is illustrated along the lines of nor-

thernmost occurrences of *Sceliphron destillatorium* in Europe and *Sceliphron caementarium* in North America, and extreme temperatures in winter as follows.

9.8.1 Northernmost Occurrences of *Sceliphron destillatorium* in Europe

The northernmost places where the Palaearctic Mud-Dauber *Sceliphron destillatorium* has been encountered in Europe and its surroundings are Orynbor (formerly Orenburg) in the Ural valley (EVERSMANN 1848, 1849) in abt. 51.75 degrees northern latitude, Poim west of Penza in the Sura valley northnorthwest of Saratov (KERENSKIJ 1919) in abt. 53.25 degrees northern latitude, Brjansk in the Desna valley between Kijiv and Moscow (KOLESNIKOV 1977) in abt. 53.25 degrees northern latitude, the Samara (formerly Kujbysev) province in the Volga valley (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) in abt. 53.25 degrees northern latitude, the Dankov district in the Rjazan province southeast of Moscow in the Oka valley that tributes to the Volga valley (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) in abt. 54.5 degrees northern latitude, Ufa eastnortheast of Samara in the Belaja valley which tributes to the Kama valley that terminates into the Volga valley (specimens in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg; PESENKO to CELARY, personal communication 2001) in abt. 54.75 degrees northern latitude, Kazan northnorthwest of Samara in the Volga valley (MINORANSKIJ, CHARCENKO & FOMICEV 1970; FOMICEV & MINORANSKIJ 1971, MINORANSKIJ 1971) in abt. 55.75 degrees northern latitude, and Niznij Novgorod eastnortheast of Moscow in the Volga valley (specimens in the collection of the University of Niznij Novgorod in Russia; MOKROUSOV, personal communication 2013) in abt. 56.25 degrees northern latitude in Russia.

Volgograd (formerly Sarepta) in the Volga valley where the mud-dauber *Sceliphron destillatorium* has also been found (BECKER 1880, STRAND 1915, EVERSMANN in KOHL 1918) is situated considerably farther south in abt. 48.75 degrees northern latitude, but is particularly well-known for its very cold winters, because the severe winter of Volgograd has had a decisive impact on the further course of the Second World War. The areas between Kijiv and Moscow as well as between Moscow and the Ural Mountains are also famous for their very cold winters.

9.8.2 Northernmost Occurrences of *Sceliphron caementarium* in North America

The Nearctic Mud-Dauber *Sceliphron caementarium* is widely distributed in Canada and in the United States of America where it occurs also commonly in areas with harsh climate and particularly very cold winters (BOHART & MENKE 1963). The distribution map which is contained in BOHART & MENKE (1963) reflects the northernmost occurrences of the Mud-Dauber *Sceliphron caementarium* in North America in Seattle in abt. 47.5 degrees northern latitude and in Calgary in abt. 51 degrees northern latitude as well as southwest of Winnipeg in abt. 49.75 degrees northern latitude and southeast of Montréal in abt. 45.5 degrees northern latitude, and PORTER (1926) has mentioned Vancouver in abt. 49.25 degrees northern latitude and Québec in abt. 46.75 degrees northern latitude as the northernmost occurrences of the Mud-Dauber *Sceliphron caementarium* in North America which are all located still farther northwards than Toronto in abt. 43.75 degrees northern latitude where rich populations have established nesting sites on many buildings (MADER 2000 a). PILON & STEINER (1966) have also reported various occurrences of the Mud-Dauber *Sceliphron caementarium* in the surroundings of Montréal.

9.8.3 Extreme Temperatures in Winter

In many of the above mentioned towns in Russia and North America, the winter is characterized by long periods of severe coldness, with the temperature falling regularly below -10 °C or even below -20 °C for in total abt. 30 - 50 days or even more per winter. In several of the above mentioned towns in Russia and North America, the temperature could fall below -30 °C or even below -40 °C for in total abt. 10 - 20 days or even more per winter at least in exceptional winters. The numerous occurrences in localities with harsh winters where very cold temperatures are developed regularly at least for several weeks highlight the pronounced winter stability of the Mud-Daubers *Sceliphron destillatorium* and *Sceliphron caementarium* which are even not affected by such severe winters.

Because the winter in the southeastern part of Poland is usually also very cold, but is even in the Bieszczady Mountains around Ustrzyki Górne still considerably less severe than in many of the above mentioned towns in Russia and North America, the significant winter stability of the Mud-Dauber *Sceliphron destillatorium* allows its spreading in an extensive area in the southeastern part of Poland and adjacent countries.

10 History of Biogeography and Migration of *Sceliphron destillatorium*

The history of biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* in Middle Europe and surrounding areas is illustrated along the lines of its distribution and expansion between 1850 and 1900 as well as before 1800.

10.1 History of Biogeography and Migration between 1850 and 1900

The Mud-Dauber *Sceliphron destillatorium* has already wandered from Black Sea, Caspian Sea and Mediterranean Sea along various migration streets for considerable distances between 1850 and 1900. The significant increase of the amount of publications of aspects of natural history of insects after 1850 permits a detailed reconstruction of the distribution of the Mud-Dauber *Sceliphron destillatorium* between 1850 and 1900, whereas the only very limited appearance of publications of aspects of natural history of insects before 1850 does not allow a detailed reconstruction of the distribution of the Mud-Dauber *Sceliphron destillatorium* between 1800 and 1850. The considerable increase of the quantity of contributions of natural history of insects in the literature after 1850 has also been the consequence of the improvement of the possibilities of travelling by the invention as well as subsequently spreading construction and operation of railway lines which have provided the potential of faster and broader locomotion beyond the limited courses of the rivers where before 1850 travelling has been restricted to ships along the streams and horse carriages along the few streets preferentially along the river valleys.

10.1.1 Migration Streets from the Black Sea

The distribution of the published records of the Mud-Dauber *Sceliphron destillatorium* in Europe and its eastern surroundings reveals three main migration streets from the Black Sea which comprise the Danube valley, the Dnestr valley and the Dnepr valley that have been followed in upstream direction. Subordinate migration streets from the Black Sea (including the appendix of the Azov Sea) incorporate the Don valley and the Kuban valley which also have been advanced in upstream direction. The abundance of localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* already between 1850

and 1900 within and around the Danube valley as well as within the network of valleys of tributaries of the Danube valley underlines the significance of the Danube valley as the most important migration street from the Black Sea.

10.1.1.1 Migration along the Danube Valley

The migration from the Black Sea along the Danube valley in upstream direction has guided the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 up to the region between Budapest and Vienna from where it has advanced along various side valleys of the Danube valley in upstream direction up to the southern foreland of the Carpathian Mountains in the regions around Kosice northeast of Budapest and around Trencín northeast of Vienna. Within the network of valleys of tributaries of the Danube valley between Budapest and Vienna, the occurrence of the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 has been registered in eastern Slovakia south of Poland on the other side of the Carpathian Mountains in Roznava (formerly Rosenau or Rozsnyó) westsouthwest of Kosice (formerly Kaschau or Kassa) before 1878 (FRITSCH 1878, MOCSARY 1897), in Sobrance (formerly Szobráncz) east of Michalovce east of Kosice before 1875 (MOCSARY 1875, 1897), in Drahnov (formerly Deregnyö) southsoutheast of Michalovce east of Kosice before 1884 (PASZLAVSZKY 1884, MOCSARY 1897), and in Malé Ozorovce (formerly Kisazar) westsouthwest of Michalovce east of Kosice before 1902 (CHYZER 1902, CHYZER in ZAVADIL 1934; CHYZER in ZAVADIL, SUSTERA & BATA 1937); in western Slovakia in Trencín (formerly Trencsén) northnortheast of Bratislava before 1897 (MOCSARY 1897); and in Bohemia in western Czechia in Kaplice (formerly Kaplitz) southeast of Cesky Krumlov south of Prague before 1854 (KIRCHNER 1854).

Within and around the Danube valley as well as within the network of valleys of tributaries of the Danube valley in the area of Vienna and its surroundings, the occurrence of the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 has been documented in Vienna since 1871 (KOHL 1893, 1918); in Dornbach, Floridsdorf, Josefstadt, Prater, Sievering and Türkenschanze which are parts of the town of Vienna since 1871 (KOHL 1893, 1918); in Brühl southsouthwest of Vienna in 1881 (KOHL 1893, 1918), in Piesting southsouthwest of Vienna between 1866 and 1870 (TSCHEK in KOHL 1893), in Gars am Kamp south of Horn northwest of Vienna in 1891 (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Josefsthal westnorthwest of Traiskirchen southsouthwest of Vienna in 1866 (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Kronstein southsouthwest of Rappoltskirchen west of Vienna in 1883 (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), and in Gries at the Brenner south of Innsbruck before 1880 (KOHL 1880). SCHEFFER (1851) and FRITSCH (1858, 1878) have already recorded the Mud-Dauber *Sceliphron spirifex* in and around Vienna before 1851 and since 1853, respectively, and it is possible that either the determinations of SCHEFFER (1851) and FRITSCH (1858, 1878) have been incorrect and they have in fact referred to the Mud-Dauber *Sceliphron destillatorium*, or that in addition to *Sceliphron spirifex* also *Sceliphron destillatorium* has already been present in and around Vienna before 1851 and since 1853, respectively, with both species not having been discriminated by SCHEFFER (1851) and FRITSCH (1858, 1878). The occurrence of the Mud-Dauber *Sceliphron destillatorium* in Austria has also already been reported by SCHENCK (1861).

Within and around the Danube valley as well as within the network of valleys of tributaries of the Danube valley in the area between and around Budapest, Szeged and Debrecen, the occurrence of the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 has been confirmed in Budapest since before 1897 (MOCSARY 1897, VANGEL 1905, KOHL 1918), in Debrecen (formerly Debreczén) east of Budapest before 1877 (MOCSARY 1877, 1897), in Forró northnortheast of Miskolc northeast of Budapest before 1897 (MOCSARY 1897), in Kalocsa (formerly Kalasa) south of Budapest before 1897 (MOCSARY 1897, KOHL 1918), in Kecskemét southsoutheast of Budapest before 1897 (MOCSARY 1897), in Kisszentmiklós (formerly Kis-Szent-Miklós) near Gödöllö eastnortheast of Budapest before 1882 (SAJO 1882, 1896), in Peszér northnortheast of Dunaújváros south of Budapest (according to index and map in MOCZAR 1972) before 1897 (MOCSARY 1897), in Sárospatak eastnortheast of Miskolc northeast of Budapest before 1902 (CHYZER 1902), and in Szeged southsoutheast of Budapest before 1897 (MOCSARY 1897, VELLAY 1899).

Within and around the Danube valley as well as within the network of valleys of tributaries of the Danube valley in the area between and around Bukarest, Craiova and Constanța, the occurrence of the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 has been noticed in the Apuseni Mountains (formerly Bihar Mountains or Cséhtelek) northeast of Deva northwest of Bucharest before 1872 (MOCSARY 1872), in Hațeg (formerly Hátszeg) south of Deva westnorthwest of Bucharest before 1897 (MOCSARY 1897), in Oradea (formerly Nagyvárad) northwest of Bucharest before 1872 (MOCSARY 1872, 1877, 1897), in Nușfalau (formerly Nagyfalu) eastnortheast of Oradea northwest of Bucharest before 1897 (MOCSARY 1897), in Orșova westnorthwest of Craiova west of Bucharest before 1897 (MOCSARY 1897), in Sibiu (formerly Hermannstadt) northwest of Bucharest before 1874 (RIESS in MOCSARY 1874), in Târnaveni (formerly Dicsöszentmartón) southwest of Târgu Mureș northnorthwest of Bucharest before 1897 (MOCSARY 1897), in Tulcea (formerly Tultscha) east of Braila northeast of Bucharest in 1863 (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), and in Zau de Câmpie (formerly Mezözáh) westnorthwest of Târgu Mureș (representing the former region Mezöség southeast of Cluj-Napoca; formerly Klausenburg) northnorthwest of Bucharest before 1873 (HERMAN 1873, MOCSARY 1897).

Within and around the Danube valley as well as within the network of valleys of tributaries of the Danube valley in the area between and around Belgrade and Novi Sad, the occurrence of the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 has been signaled in Apatin northwest of Novi Sad northwest of Belgrade before 1897 (MOCSARY 1897), in Deliblato (formerly Deliblat) northnortheast of Kovin east of Belgrade before 1897 (MOCSARY 1897), in Grebenac (formerly Grebenácz) west of Bela Crkva eastnortheast of Belgrade before 1879 (MOCSARY 1879, 1897), in Kovin (formerly Kubin) east of Belgrade before 1897 (MOCSARY 1897), and in Novi Sad northwest of Belgrade in 1899 (specimen in the collection of the Museum of Natural History in Budapest; VAS, personal communication 2013).

10.1.1.2 Migration along the Dnestr Valley

The migration from the Black Sea along the Dnestr valley in upstream direction has guided the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 to the region between Ivano-Frankivsk and Kamjanec-Podilskyj southeast of Lviv in the western part of Ukraina where its occurrence has been confirmed in Volcynec (formerly Wołczyniec) northeast of Ivano-Frankivsk (formerly Stanisławów) in the Bystrycja valley close to its mouth into the Dnestr valley before 1868 (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930, KUNTZE 1939), in Dzvenihorod (formerly Dźwinogród) westsouthwest of Kamjanec-Podilskyj (formerly Kamieniec Podolski) in the Dnestr valley in 1869 (ŁOMNICKI 1870, KINEL & NOSKIEWICZ 1930, KUNTZE & NOSKIEWICZ 1938), in Skala-Podilska (formerly Skała) in the Zbruc valley tributing to the Dnestr valley northwest of Kamjanec-Podilskyj before 1874 (WIERZEJSKI 1874, KINEL & NOSKIEWICZ 1930), and in Kamjanec-Podilskyj in the Smotryc valley close to its termination into the Dnestr valley before 1853 (BELKE 1853, 1858 a, 1859).

In the vicinity of the Dnestr valley, the occurrence of the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 has also been verified in Lviv (formerly Lwów or Lemberg) in 1862 (SCHMIDT-GOEBEL 1876) as well as in the Bukovina in Kalinovci (formerly Kalinowce) in the Ceremos valley close to its termination into the Prut valley westnorthwest of Cernivci southeast of Ivano-Frankivsk and southwest of Kamjanec-Podilskyj before 1868 (WIERZEJSKI 1868, 1874; KINEL & NOSKIEWICZ 1930).

The individual of the Mud-Dauber *Sceliphron destillatorium* which has been captured in Odessa near the mouth of the Dnestr into the Black Sea in the western part of Ukraina before 1900 (specimen in the collection of the Museum of Natural History in Stuttgart in Germany; OSTEN, personal communication 2001) underlines that the Mud-Dauber *Sceliphron destillatorium* is resident at the northwestern margin of the Black Sea since more than 100 years. The occurrence of the Mud-Dauber *Sceliphron destillatorium* at the northern margin of the Black Sea (including the Azov Sea which is an appendix of the Black Sea) in the area between the mouth of the Dnestr southwest of Odessa in the west and the mouth of the Don southwest of Rostov-on-Don in the east already before 1900 is also illustrated by records of individuals of the Mud-Dauber *Sceliphron destillatorium* on the Crimea peninsula in Ali-Pasa in 1898 (BULGAKOV in PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), at the Catyrdah

northwest of Alusta southeast of Simferopol in 1900 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Jevpatorija westnorthwest of Simferopol in 1898 (BIRULA in SHORENKO 2005 a), in Kiparisnoe westsouthwest of Alusta southeast of Simferopol in 1899 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Krasnogorskoe westsouthwest of Bilohirsk (formerly Belogorsk) eastnortheast of Simferopol in 1899 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Sajtana near Kipcak on the Tarchankut peninsula northwest of Simferopol in 1897 (PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012), in Samokhvalovo near Bachcysaraj southwest of Simferopol in 1901 (SHORENKO 2005 a), in Simeiz near Alupka south of Simferopol in 1849 (RYBAKOV in SHORENKO 2005 a) and in 1899 (KUZNETSOVA in SHORENKO 2005 a); and in Simferopol in 1895, 1898 and 1899 (SHORENKO 2005 a; PROTSENKO, FATERYGA, IVANOV & PUZANOV 2012).

10.1.1.3 Migration along the Dnepr Valley

The migration from the Black Sea along the Dnepr valley in upstream direction has guided the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 to the region of Dnipropetrovsk where its occurrence has been confirmed in Dnipropetrovsk (formerly Jekaterinoslav) in 1861 (specimens in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013).

10.1.1.4 Migration along the Don Valley

The first migration street from the Azov Sea which is an appendix of the Black Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Don valley in upstream direction, and from the Don valley, the Mud-Dauber *Sceliphron destillatorium* has also diverted into the Donec valley and has succeeded it in turn in upstream direction where it has already between 1850 and 1900 arrived in Slovjansk southeast of Charkiv before 1881 (JAROSEVSKIJ 1881), and in Charkiv eastsoutheast of Kijiv before 1873 (BELECKIJ 1873, JAROSEVSKIJ 1881), and has also advanced from the Donec valley into the Oskil valley where it has reached Kupjansk eastsoutheast of Charkiv before 1867 (IVANOV 1872).

10.1.1.5 Migration along the Kuban Valley

The second migration street from the Azov Sea which is an appendix of the Black Sea has guided the Mud-Dauber *Sceliphron destillatorium* along the Kuban valley in upstream direction where it has already between 1850 and 1900 arrived probably between Karacajevsk south of Stavropol and Ekaterinodar eastnortheast of Novorossijsk before 1899 (RADDE 1899).

10.1.2 Migration Streets from the Caspian Sea

The distribution of the published records of the Mud-Dauber *Sceliphron destillatorium* in Europe and its eastern surroundings reveals three main migration streets from the Caspian Sea east of the Black Sea which comprise the Volga valley, the Ural valley and the Kura valley that have been followed in upstream direction. Some localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* east of the Caspian Sea are also contributed. The abundance of localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 within and around the Volga valley as well as within the network of valleys of tributaries of the Volga valley underlines the significance of the Volga valley as the most important migration street from the Caspian Sea.

10.1.2.1 Migration along the Volga Valley

The migration from the Caspian Sea along the Volga valley in upstream direction has guided the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 or even already before 1850 to the

region of Astrachan and Volgograd where it has been registered in Astrachan before 1848 (EVERSMANN 1848, 1849; BECKER 1866, MORAWITZ 1890, KOHL 1918), on the island Biruci (formerly Birutschi) in the Volga delta southeast of Astrachan in 1865 (BECKER 1866), in Volgograd (formerly Sarepta) before 1880 (BECKER 1880, STRAND 1915, EVERSMANN in KOHL 1918), and in Saratov before 1848 (EVERSMANN 1848, 1849). The report of EVERSMANN (1848, 1849) of the presence of the Mud-Dauber *Sceliphron destillatorium* in the western foreland of the Ural Mountains has also been cited by SCHENCK (1857) and TASCHENBERG (1869, 1884, 1929). The Mud-Dauber *Sceliphron destillatorium* does not only occur in the western foreland of the Ural Mountains or in the cis-Uralian regions, but also in the eastern foreland of the Ural Mountains or in the trans-Uralian regions (EVERSMANN 1849).

10.1.2.2 Migration along the Ural Valley

The migration from the Caspian Sea along the Ural valley in upstream direction has guided the Mud-Dauber *Sceliphron destillatorium* already before 1850 via Atyrau (formerly Gurjev) and Oral (formerly Uralsk) to Orynbor (formerly Orenburg) and farther to the eastern foreland of the Ural Mountains (EVERSMANN 1848, 1849).

The Mud-Dauber *Sceliphron dimidiativentris* which has been collected around Nikolajevsk close to the mouth of the Amur valley into the Ochotsk Sea in Russia before 1859 (MOTSCHULSKY 1859) represents probably in fact also the Mud-Dauber *Sceliphron destillatorium*.

10.1.2.3 Migration along the Kura Valley

The migration from the Caspian Sea along the Kura valley in upstream direction has guided the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 to the area west and southwest of Baku where it has been captured in Chanlar (formerly Helenendorf) in Azerbajdzhan northeast of Jerevan (formerly Eriwan) in 1886 by LEDER (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013).

From the Kura valley southwest of Baku, the Mud-Dauber *Sceliphron destillatorium* has also diverted into the Araks (formerly Araxes) valley and has succeeded it in turn in upstream direction, because it has been captured in the Araks (formerly Araxes) valley near Nachicevan (formerly Nachtschewan) southeast of Jerevan in Azerbajdzhan in 1898 by REITTER (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013) and in Jerevan in 1898 by KORB (specimen in the collection of the Zoologische Staatssammlung in Munich in Germany; GEISELBRECHT, personal communication 2013) beyond the source region of the Araks.

10.1.2.4 Migration along the Syrdarija Valley

East of the Caspian Sea, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has also been verified already between 1850 and 1900 in Kazakhstan where it has been registered near the Syrdarija river east of Lake Aral in 1901 (specimen in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013), and in Kyzylorda (formerly Ksyl-Orda) in the Syrdarija Valley east of Lake Aral westnorthwest of Almaty in 1905 (specimen in the collection of the Museum of Natural History in Berlin in Germany; RING, personal communication 2013).

East of the Caspian Sea, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has also been confirmed already between 1850 and 1900 in Turkmenistan where it has been recorded in Asgabat (formerly Askhabad or Astrabad) before 1871 (RADOSZKOVSKY 1871, RADOSZKOWSKI 1886), and in Dusak eastsoutheast of Asgabat in 1898 (KOKUJEV 1902).

10.1.3 Migration Streets from the Mediterranean Sea

The migration of the Mud-Dauber *Sceliphron destillatorium* from the Mediterranean Sea along the Rhône valley in upstream direction has enabled its wandering around the mountain range of the Alps into Middle Europe between the Alps in the east and the Central Massiv in the west, and similarly, the migration of the Mud-Dauber *Sceliphron destillatorium* from the Black Sea along the Danube valley in upstream direction has enabled its wandering around the mountain range of the Alps into Middle Europe between the Alps in the west and the Carpathian Mountains in the east. The abundance of localities of occurrence of the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 within and around the Rhône valley as well as within the network of valleys of tributaries of the Rhône valley underlines the significance of the Rhône valley as the most important migration street from the Mediterranean Sea.

10.1.3.1 Migration along the Rhône Valley

The main migration streets of the Mud-Dauber *Sceliphron destillatorium* from the Mediterranean Sea extend along the eastern coasts of Ionian Sea and Adriatic Sea which have guided it from Greece via Albania, Serbia (formerly Yugoslavia), Bosna-Hercegovina, Croatia and Slovenia to northern Italy; along the eastern coasts of Tyrrhenian Sea and Ligurian Sea that have led it from southern Italy to northern Italy and southern France, along the western coast of the Mediterranean Sea which has brought it from eastern Spain to southern France, and then along the Rhône valley in upstream direction that has guided the Mud-Dauber *Sceliphron destillatorium* from southern France via eastern France to western Switzerland.

In western Switzerland, the Mud-Dauber *Sceliphron destillatorium* has already between 1850 and 1900 prograded along the Rhône valley in upstream direction beyond Lake Léman (Lac de Genève) and has arrived in Martigny eastsoutheast of Geneva before 1883 (FREY-GESSNER in KOHL 1883, HUBER 1916), in Fully northeast of Martigny before 1900 (VERNIER, BARBALAT & GONSETH 1996), in Sion (Sitten) east of Geneva before 1900 (specimen in the collection of the Museum of Natural History in Geneva; MERZ, personal communication 2001), in Sierre (Siders) east of Geneva before 1883 (FREY-GESSNER in KOHL 1883, HUBER 1916), and in Visp east of Sierre east of Geneva before 1906 (specimen in the collection of the Museum of Zoology in Lausanne; FREITAG, personal communication 2001; KNISPEL, personal communication 2001) in the upper reach of the Rhône valley as well as in Stalden in the Vispa valley south of Visp before 1886 (specimen in the collection of the Museum of Natural History in Berne; HUBER, personal communication 2001).

The Mud-Dauber *Sceliphron destillatorium* has already been recorded in Geneva at the western margin of Lake Léman between 1850 and 1860 (specimen in the collection of SAUSSURE in the Museum of Natural History in Geneva; VERNIER, BARBALAT & GONSETH 1996; MERZ, personal communication 2001; Centre Suisse de Cartographie de la Faune in Neuchâtel, personal communication 2013). North of the Alps in Switzerland, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has also been confirmed in Basel before 1883 (KOHL 1883, HUBER 1916). The presence of the Mud-Dauber *Sceliphron destillatorium* in Switzerland has already been signaled by SULZER (1776) and RÖMER (1789).

10.1.3.2 Migration along the Eastern Coasts of Ionian Sea and Adriatic Sea

The migration along the eastern coasts of Ionian Sea and Adriatic Sea has guided the Mud-Dauber *Sceliphron destillatorium* already between 1850 and 1900 to Croatia where it has been verified in Bakar (formerly Buccari) southeast of Rijeka (formerly Fiume) westsouthwest of Zagreb (formerly Agram) since before 1897 (MOCSARY 1897, VOGRIN 1955, SELESI & RAFAJLOVIC 1963), in Brusje (formerly Brusije) on the island Hvar southwest of Split southsouthwest of Zagreb before 1887 (GASPERINI 1887), in Dubrovnik (formerly Ragusa) southsoutheast of Zagreb in 1868 (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Orehovica northeast of Rijeka westsouthwest of Zagreb before 1890 (KORLEVIC 1890), on the

peninsula Peljesac (formerly Sabioncello or Sabionella) northwest of Dubrovnik southsoutheast of Zagreb in 1900 (specimen in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013), in Rijeka westsouthwest of Zagreb before 1890 (KORLEVIC 1890, MOCSARY 1897, VOGRIN 1955), in Senj (formerly Zengg) southsoutheast of Rijeka southwest of Zagreb before 1890 (KORLEVIC 1890, MOCSARY 1897, VOGRIN 1955), in Split (formerly Spalato) southsoutheast of Zagreb in 1862 and 1868 (specimens in the collection of the Museum of Natural History in Vienna in Austria; BRUCKNER, personal communication 2013) and before 1889 (GASPERINI 1889), in Susak eastsoutheast of Rijeka westsouthwest of Zagreb before 1890 (KORLEVIC 1890, MOCSARY 1897), on the island Vis (formerly Lissa) southwest of Split southsouthwest of Zagreb before 1887 (GASPERINI 1887), in Vrana on the island Cres south of Rijeka southwest of Zagreb in 1894 (LANGHOFFER 1896), and in Zadar (formerly Zara) southsouthwest of Zagreb since before 1817 (GERMAR 1817, FRAUENFELD 1861, KOHL 1918, ERLANDSSON 1974).

10.2 History of Biogeography and Migration before 1800

The history of biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* before 1800 can be delineated by the interpretation of the observations and descriptions of SCHÄFFER (1766), SULZER (1776), RÖMER (1789) and CHRIST (1791). The limited possibilities of travelling and the probable destinations of excursions for the observations of wasps and bees by CHRIST (1791) which are considerably significant for the interpretation of the history of biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* before 1800 are also illustrated by the example of the Delta Mud Wasp *Delta unguiculatum* which has already been much more common than the Mud-Dauber *Sceliphron destillatorium* in the central part of Middle Europe more than 200 years ago.

10.2.1 The Delta Mud Wasp *Delta unguiculatum*

In the monograph of CHRIST (1791), the Delta Mud Wasp *Delta unguiculatum* is described under the names *Sphex lapicida* and *Sphex cursor* and is illustrated in qualitatively excellent coloured copper plates which permit definite identification, assignment and synonymization (DOURS 1873, BALDINI 1894, BLÜTHGEN 1961, VECHT & FISCHER 1972). In the section on the so-called Mason *Sphex lapicida*, CHRIST (1791) gives such a detailed and matching description of the mason nests that there is also concerning nesting ecology no doubt that it is the Delta Mud Wasp *Delta unguiculatum*. A confusion with the Mason Bee *Megachile (Chalicodoma) parietina* and the Mud-Dauber *Sceliphron destillatorium* which concerning nesting ecology are quite similar to the Delta Mud Wasp *Delta unguiculatum* is excluded not only by the excellent coloured illustrations of the individuals, but also by the description of the provisioning, because CHRIST (1791) assigns the Delta Mud Wasp *Delta unguiculatum* to the group of the caterpillar killers according to the supply of the nest cells of the Delta Mud Wasp *Delta unguiculatum* with mainly green caterpillars of noctuid and geometrid butterflies in contrast to the completion of the nest cells of the Mason Bee *Megachile (Chalicodoma) parietina* with yellow pollen of fabaceous (formerly papilionaceous) plants and the filling of the nest cells of the Mud-Dauber *Sceliphron destillatorium* with mainly black spiders.

The detailed description of the mason nests of the Delta Mud Wasp *Delta unguiculatum* by CHRIST (1791) allows the conclusion that he has observed mason nests in low height on walls of buildings at least in several localities, and that he has repeatedly quite rapidly found mason nests upon searching for them in various towns and villages. CHRIST (1791) has considered the Delta Mud Wasp *Delta unguiculatum* as indigenous in Germany, but has not given any details concerning localities of occurrence. The limited possibilities of travelling and the probable destinations of excursions for the observations of wasps and bees by CHRIST (1791) have considerable significance for the interpretation of the history of biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* and the Delta Mud Wasp *Delta unguiculatum* before 1800.

10.2.1.1 Limited Possibilities of Travelling

CHRIST (1791) was parson in Kronenberg an der Höh in the vicinity of Nassau in the Lahn valley (HORN & SCHENKLING 1928). Before 1800, there have been neither railways nor cars, but only horse carriages and ships could be used for locomotion. CHRIST (1791) has thus made his excursions from Nassau in the Lahn valley either by horse carriages, or has travelled by ships along the Lahn valley in downstream direction and along the Rhine valley in upstream direction and has then changed to horse carriages or has continued by walking. Because CHRIST (1791) has described not only the Delta Mud Wasp *Delta unguiculatum*, but also the Mason Bee *Megachile (Chalicodoma) parietina* and the Mud-Dauber *Sceliphron destillatorium* which all three have not reached the area of the Lahn valley, he has extended his excursions at least up to the southwestern part of Germany and has most probably investigated the middle and southern parts of the Upper Rhine Graben where he could easily arrive by ship along the Rhine valley in upstream direction.

10.2.1.2 Probable Destinations of Excursions

According to the travel connections at that time, CHRIST (1791) has thus most probably reached the southwestern part of Germany by ship and has most probably observed and collected within the Upper Rhine Graben and its vicinity. With the exception of the northernmost part, almost in all towns and villages of the Upper Rhine Graben mason nests of the Delta Mud Wasp *Delta unguiculatum* can easily and quickly be found today which occur repeatedly also in low height on walls of buildings. The classification of the Delta Mud Wasp *Delta unguiculatum* as indigenous by CHRIST (1791) allows the conclusion that he has discovered mason nests of the Delta Mud Wasp *Delta unguiculatum* relatively rapidly at least in several towns and villages during his excursions in the middle and southern parts of the Upper Rhine Graben, and that he has compiled his detailed description from the observations which he has made there. As parson, CHRIST (1791) has certainly also repeatedly visited churches during his excursions, and because of the preference of the Delta Mud Wasp *Delta unguiculatum* for churches, he has probably found mason nests particularly on walls, portals and windows of churches.

Because the coloured illustrations in CHRIST (1791) are drafted in position of life and not in position of preparation, he has not only utilized material from collections, but has observed the Delta Mud Wasp *Delta unguiculatum* and the other illustrated wasps, bees and ants also by himself in nature. According to the distribution and abundance of mason nests of the Delta Mud Wasp *Delta unguiculatum* on walls of buildings in towns and villages within the Upper Rhine Graben today, CHRIST (1791) has most probably made his observations in the middle and southern parts of the Upper Rhine Graben in the interval between Mannheim/Heidelberg and Basel. The wealth of treated species of wasps, bees and ants in CHRIST (1791) allows the conclusion that it has taken him at least abt. 10 years for the collection, revision and evaluation of his material up to the passing of the manuscript to press for publication.

10.2.1.3 Interpretation of the History of Biogeography and Migration

The above reconstruction of research and documentation of CHRIST (1791) results in the interpretation that the Delta Mud Wasp *Delta unguiculatum* has been distributed at least several decades before 1800 at least in the middle and southern parts of the Upper Rhine Graben already in such an extension that CHRIST (1791) had no difficulties during his excursions most probably in the interval between Mannheim/Heidelberg and Basel to find relatively quickly mason nests of the Delta Mud Wasp *Delta unguiculatum* in low height on walls of buildings in various towns and villages. The classification of the Delta Mud Wasp *Delta unguiculatum* as indigenous by CHRIST (1791) reveals thus that the Delta Mud Wasp *Delta unguiculatum* has been resident in stable populations in the middle and southern parts of the Upper Rhine Graben already since quite some time before 1800.

The immigration of the Delta Mud Wasp *Delta unguiculatum* via the Burgundian Gate into the Upper Rhine Graben has thus probably already happened before 1750, and permanent populations have been established in the Upper Rhine Graben probably already before abt. 1750 - 1780 in such a distribution

that the Delta Mud Wasp *Delta unguiculatum* has been present all the time at least in the middle and southern parts of the Upper Rhine Graben most probably in the interval between Mannheim/Heidelberg and Basel already during the first excursions of CHRIST (1791) at least since abt. 1780. Immigration and expansion of the Delta Mud Wasp *Delta unguiculatum* in the southwestern part of Germany have thus started already more than 200 years ago, and the Delta Mud Wasp *Delta unguiculatum* is indigenous at least in some areas in the southwestern part of Germany at least since more than 200 years.

HERRICH-SCHÄFFER (1841) has also reported the occurrence of the Delta Mud Wasp *Delta unguiculatum* in the southwestern part of Germany which probably also means the southern part of the Upper Rhine Graben. In the revision of the fauna of insects in Germany of PANZER (1806), the Delta Mud Wasp *Delta unguiculatum* is also contained. PANZER (1806) has considered the Delta Mud Wasp *Delta unguiculatum* as a real but up to now still poorly known species in Germany, and has mentioned SULZER (1776) as the only reference in the literature where the Delta Mud Wasp *Delta unguiculatum* has been noted to occur in Germany and surrounding areas that has been available to him at that time. Because he has not given further references from the literature, the information for the statement of PANZER (1806) that the Delta Mud Wasp *Delta unguiculatum* has already been present at that time in Germany but has still been poorly known derives most probably from his own observations during his excursions in the southwestern part of Germany when he had probably also no difficulties to find mason nests of the Delta Mud Wasp *Delta unguiculatum* in low height on walls of buildings in various localities in the middle and southern parts of the Upper Rhine Graben most probably in the interval between Mannheim/Heidelberg and Basel.

10.2.2 The Mud-Dauber *Sceliphron destillatorium*

In the monograph of CHRIST (1791), in addition to the Delta Mud Wasp *Delta unguiculatum* which is described under the names *Sphex lapicida* and *Sphex cursor*, also the Mud-Dauber *Sceliphron destillatorium* that is described under the names *Sphex spirifex* und *Sphex flavipes* is contained and is illustrated in qualitatively excellent coloured copper plates which permit definite identification, assignment and synonymization (KOHL 1918). The limited possibilities of travelling and the probable destinations of excursions for the observations of wasps and bees by CHRIST (1791) have considerable significance for the interpretation of the history of biogeography and migration of the Mud-Dauber *Sceliphron destillatorium* and the Delta Mud Wasp *Delta unguiculatum* before 1800.

10.2.2.1 Limited Possibilities of Travelling

In analogy to the interpretation of the observation of the Delta Mud Wasp *Delta unguiculatum*, it is possible to conclude that CHRIST (1791) has probably also seen the Mud-Dauber *Sceliphron destillatorium* at the southern margin of the Upper Rhine Graben or not very much farther south and southwest from there. According to the limited possibilities of travelling at the time of CHRIST (1791) which have been restricted to horse carriages and ships because of the absence of railways and cars as outlined above for the example of the possibilities of discovery of mason nests of the Delta Mud Wasp *Delta unguiculatum*, CHRIST (1791) has most probably made his excursions particularly in the central part of Middle Europe, and therefore CHRIST (1791) has most probably encountered in addition to the Delta Mud Wasp *Delta unguiculatum* also the Mud-Dauber *Sceliphron destillatorium* in the central part of Middle Europe which thus is also resident in the central part of Middle Europe at least in some regions since already more than 200 years.

10.2.2.2 Interpretation of the History of Biogeography and Migration

Because CHRIST (1791) has described the mason nests of the Delta Mud Wasp *Delta unguiculatum* in detail, whereas he has only briefly mentioned the mason nests of the Mud-Dauber *Sceliphron destillatorium*, he has probably observed numerous mason nests of the Delta Mud Wasp *Delta unguiculatum* during his excursions in various localities, whereas he has seen mason nests of the Mud-Dauber *Sceli-*

phron destillatorium probably only occasionally at some places. Therefore the Delta Mud Wasp *Delta unguiculatum* has probably already existed in considerable distribution in the southwestern part of Germany already at the time of the excursions of CHRIST (1791), whereas the Mud-Dauber *Sceliphron destillatorium* has occurred in the southwestern part of Germany and surrounding areas probably similarly as today also at the time of the excursions of CHRIST (1791) only occasionally and locally. The above reconstruction of research and documentation of CHRIST (1791) is confirmed by the registration of the Mud-Dauber *Sceliphron destillatorium* in Switzerland already by SULZER (1776) and RÖMER (1789) who have probably referred to its occurrence in the region around Geneva at the margin of Lake Léman and in the Rhône valley. The Mud-Dauber *Sceliphron destillatorium* has thus probably already arrived in Switzerland north of the Alps at the time of SULZER (1776) and RÖMER (1789).

Because SCHÄFFER (1766) has included a picture of the Mud-Dauber *Sceliphron destillatorium* into his compilation of naturally coloured figures of insects of the Regensburg region, with the assignment of the drawing in SCHÄFFER (1766) to the Mud-Dauber *Sceliphron destillatorium* having been later confirmed by PANZER (1804), KOHL (1918) and VECHT & BREUGEL (1968), it is possible that the Mud-Dauber *Sceliphron destillatorium* has already arrived in the interval of the Danube valley between Passau and Regensburg in Germany at the time of SCHÄFFER (1766). Because an occurrence of the Mud-Dauber *Sceliphron destillatorium* in the Danube valley upstream of Linz has later not been reported in the literature, the interpretation of the illustration of the Mud-Dauber *Sceliphron destillatorium* in SCHÄFFER (1766) has to consider certainly also other sources of the figured specimen. According to the limited possibilities of travelling at the time of SCHÄFFER (1766) which have been restricted to horse carriages and ships because of the absence of railways and cars as outlined above for the example of the possibilities of excursions of CHRIST (1791), however, and in view of the significance of the Danube valley as migration street, it cannot be completely excluded that the Mud-Dauber *Sceliphron destillatorium* has already reached the region of Regensburg in the Danube valley in Germany at the time of SCHÄFFER (1766).

The fact that the Mud-Dauber *Sceliphron destillatorium* has not been included into the compilation of the insects living in Regensburg of HERRICH-SCHÄFFER (1840) does not necessarily have to be taken as evidence for its lack at that time, because small populations in large towns could be difficult to discover due to the hidden way of life of the Mud-Dauber *Sceliphron destillatorium*. The Mason Bee *Megachile (Chalicodoma) parietina* which has occurred frequently in and around Regensburg according to the detailed descriptions in SCHÄFFER (1764) has also been assessed as being very rare in Regensburg by HERRICH-SCHÄFFER (1840) which is contradicted by my observations of well-preserved abandoned mason nests at a church in Regensburg in 2000 that confirm an existence of at least a relictical population of the Mason Bee *Megachile (Chalicodoma) parietina* in Regensburg still abt. 50 - 75 years ago (MADER 2000 a, 2001 a). In his critical review of the insect fauna of Germany, PANZER (1806) has also included the Mud-Dauber *Sceliphron destillatorium* which he thus has probably already registered in Germany at that time either in the region of Regensburg in the Danube valley according to the documentation in SCHÄFFER (1766) or in the southern part of the Upper Rhine Graben around Basel.

At the coast of the Adriatic Sea, the occurrence of the Mud-Dauber *Sceliphron destillatorium* has already been reported from Zadar (formerly Zara) southsouthwest of Zagreb by GERMAR (1817), thus suggesting that the Mud-Dauber *Sceliphron destillatorium* has also been present at the coast of the Adriatic Sea already before 1800. The Mud-Dauber *Sceliphron destillatorium* is resident at the coasts of Mediterranean Sea, Black Sea and Caspian Sea in Southern Europe and surrounding regions even since more than a millennium (according to remarks in works of ARISTOTELES in Athens in Greece and PLINIUS in Rome in Italy; literature review in LENZ 1856, KÖNIG 1896, SAJO 1896, KOHL 1918).

10.2.2.3 Probable Destinations of Excursions

Similarly as CHRIST (1791) has most probably made his excursions by ship along the Rhine valley in upstream direction and has observed and collected most probably in the middle and southern parts of the Upper Rhine Graben most probably in the interval between Mannheim/Heidelberg and Basel, SCHÄFFER (1766) has most probably made his excursions by ship along the Danube valley in downstream direction and has observed and collected most probably within and around the Danube valley

where he has possibly travelled from Regensburg via Linz and Krems up to Vienna, Bratislava or even Budapest. In comparison with the observation and documentation of mason nests of the Delta Mud Wasp *Delta unguiculatum* most probably in the middle and southern parts of the Upper Rhine Graben most probably in the interval between Mannheim/Heidelberg and Basel in the southwestern part of Germany by CHRIST (1791), it could be concluded that SCHÄFFER (1766) has observed and documented individuals and/or mason nests of the Mud-Dauber *Sceliphron destillatorium* most probably in the Danube valley between Regensburg and Vienna, Bratislava or even Budapest.

The above reconstruction of research and documentation of SCHÄFFER (1766) results in the conclusion that the Mud-Dauber *Sceliphron destillatorium* has already migrated along the Danube valley in upstream direction up to Budapest, Bratislava and Vienna before 1750, and has already been present at various localities in the Danube valley between Budapest, Bratislava and Vienna or even beyond Vienna in upstream direction before 1750 in such a regular occurrence that SCHÄFFER (1766) had no difficulties in finding some specimens for his descriptions during his obviously restricted excursions according to the limited possibilities of travelling at that time.

11 Comparison of Biogeography and Migration of the Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina*

The comparative evaluation of biogeography and migration of the Palaearctic Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* reveals significant potential of further migration in the future. The Palaearctic Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* are original and indigenous elements of the European entomofauna with natural biogeography and migration which have been controlled by natural patterns of spreading and distribution, whereas the Oriental Mud-Dauber *Sceliphron curvatum* does not belong to the original and indigenous elements of the European entomofauna with natural biogeography and migration, but is an exotical and external element of the European entomofauna with artificial biogeography and migration that have started at the random localities of anthropogenical introduction of the strange representative of the Asiatical entomofauna into Europe and have been guided by radiation from the selected places of human contamination of the European entomofauna into various directions irrespective of natural patterns of spreading and distribution.

The Oriental Mud-Dauber *Sceliphron curvatum* is an original resident of Asia from India, Pakistan, Kashmir and Nepal to Kazakhstan, Uzbekistan and Tadzikistan which has been artificially imported to Austria in Western Europe after abt. 1975 and has expanded its distribution in Europe rapidly and significantly since then (literature review in MADER 2000 a; CETKOVIC, RADOVIC & DOROVIC 2004; HELLRIGL 2004; BOGUSCH, LISKA, LUKAS & DUDICH 2005; RAHOLA 2005, SCHMID-EGGER 2005, BITSCH & BARBIER 2006; BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BITSCH 2010, PROKOFIEV & SKOMOROKHOV 2010; CETKOVIC, MOKROUSOV, PLECAS, BOGUSCH, ANTIC, DOROVIC-JOVANOVIC, KRPO-CETKOVIC & KARAMAN 2011; SCHARDT, RENKER, STAUDT & REDER 2012; FATERYGA & KOVBLYUK 2013 b; PULAWSKI 2013 a, 2013 b).

11.1 Comparison of the Mud-Dauber *Sceliphron destillatorium* and the Delta Mud Wasp *Delta unguiculatum*

The Mud-Dauber *Sceliphron destillatorium* and the Delta Mud Wasp *Delta unguiculatum* have followed different strategies of wandering and spreading in Middle Europe which are reflected by the relative significance of migration streets, and are also highlighted by different distances of northwards migration.

11.1.1 Relative Significance of Migration Streets

The relative significance of migration streets of the Mud-Dauber *Sceliphron destillatorium* and the Delta Mud Wasp *Delta unguiculatum* is illustrated along the lines of the different importance of the utilization of Danube valley, Dnestr valley and Rhône valley for their expansion.

11.1.1.1 Rhône Valley and its Tributaries

The Delta Mud Wasp *Delta unguiculatum* has immigrated from the Mediterranean region into Middle Europe mainly along the Rhône valley in upstream direction, only subordinately along the Danube valley in upstream direction and up to now not at all along the Dnestr valley in upstream direction, whereas the Mud-Dauber *Sceliphron destillatorium* has immigrated from the Mediterranean region into Middle Europe mainly along the Danube valley in upstream direction and along the Rhône valley in upstream direction, and subordinately also along the Dnestr valley in upstream direction. At the mouth of the Saône into the Rhône in Lyon, the Mud-Dauber *Sceliphron destillatorium* has mainly followed the Rhône valley in upstream direction and has advanced into its upper reach beyond Lake Léman, and has only subordinately entered the Saône valley in upstream direction, whereas the Delta Mud Wasp *Delta unguiculatum* has also followed the Rhône valley in upstream direction and has advanced into its upper reach beyond Lake Léman, but has much more significantly than the Mud-Dauber *Sceliphron destillatorium* utilized the Saône valley in upstream direction which has become the main migration street into Middle Europe for the Delta Mud Wasp *Delta unguiculatum*. In the upper reach of the Rhône valley beyond Lake Léman, the Mud-Dauber *Sceliphron destillatorium* has advanced in upstream direction beyond Martigny and has already reached Sion, Sierre and Visp, whereas the Delta Mud Wasp *Delta unguiculatum* has not yet prograded in upstream direction beyond Martigny and is still absent in Sion, Sierre and Visp (MADER 2002 b).

The Delta Mud Wasp *Delta unguiculatum* has wandered along the Saône valley in upstream direction from its mouth in Lyon to its source east of Darney westsouthwest of Epinal (MADER 2000 a), whereas the Mud-Dauber *Sceliphron destillatorium* has followed the Saône valley in upstream direction from its mouth in Lyon only up to the region of Chalon-sur-Saône southsouthwest of Dijon according to the distribution map in BITSCH, BARBIER, GAYUBO, SCHMIDT & OHL (1997). The Mud-Dauber *Sceliphron destillatorium* has not yet entered the Doubs valley in upstream direction at the termination of the Doubs into the Saône northeast of Chalon-sur-Saône, has therefore not yet reached the area around Besançon and Montbéliard in the Doubs valley east of Dijon according to the distribution map in BITSCH, BARBIER, GAYUBO, SCHMIDT & OHL (1997), has thus probably not yet passed the Burgundian Gate into the Upper Rhine Graben, and has arrived at the southern margin of the Upper Rhine Graben possibly by further extension from Lake Léman via Lake Neuchâtel and Lake Bienne as well as along the Aare valley in downstream direction and the Birs valley in downstream direction. The same extension applies probably also for the Mud-Dauber *Sceliphron spirifex* according to the distribution map in BITSCH, BARBIER, GAYUBO, SCHMIDT & OHL (1997) which has been recorded up to Dijon (DULAC 1956).

On the other hand, the Delta Mud Wasp *Delta unguiculatum* has migrated persistently along the Saône valley in upstream direction beyond its source region east of Darney, has entered the Doubs val-

ley in upstream direction at the termination of the Doubs into the Saône northeast of Chalon-sur-Saône, has wandered along the Doubs valley in upstream direction via Besançon and Montbéliard up to St. Ursanne, and has passed the Burgundian Gate between Montbéliard, Belfort and Mulhouse which has brought it into the Upper Rhine Graben where it has spread extensively not only within the elongated plain of the tectonical depression zone along the Rhine valley in downstream direction, but has also entered the valleys of the western and eastern tributaries of the Rhine in the regions of Vosges, Black Forest and Kraichgau and has advanced along them in upstream direction, and has also followed the Rhine valley from Basel to Lake Constance in upstream direction (MADER 2000 a). The significance of Rhône valley and Saône valley as a wandering street and the Burgundian Gate as a passage for immigration of thermophilous insects into the Upper Rhine Graben has also been emphasized by FROMMER (2012) who has outlined the Rhodanian-Rhenanian route from the Rhône valley via the Burgundian Gate into the Upper Rhine Graben.

11.1.1.2 Dnestr Valley and its Tributaries

The absence of the Delta Mud Wasp *Delta unguiculatum* in contrast to the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland underlines that the Delta Mud Wasp *Delta unguiculatum* has so far not repeated the migration of the Mud-Dauber *Sceliphron destillatorium* from the Black Sea along the Dnestr valley in upstream direction across Ukraina into Poland, but it is possible that the Delta Mud Wasp *Delta unguiculatum* will follow the Mud-Dauber *Sceliphron destillatorium* along the Podolian-Volhynian route into Poland from the east in the future.

11.1.1.3 Danube Valley and its Tributaries

The only subordinate presence of the Delta Mud Wasp *Delta unguiculatum* in the Danube valley from the Black Sea up to Bratislava and Hainburg east of Vienna where it occurs significantly less frequently than in the Upper Rhine Graben, in contrast to the common occurrence and widespread distribution of the Delta Mud Wasp *Delta unguiculatum* in the valleys of the western and eastern tributaries of the Rhine in the regions of Vosges, Black Forest and Kraichgau as well as in the Rhine valley between Basel and Lake Constance reveals that the Danube valley has so far not been a major migration street for the Delta Mud Wasp *Delta unguiculatum.*

The Danube valley has been considerably more important as a wandering route for the Mud-Dauber *Sceliphron destillatorium* which occurs abundantly in the Danube valley and its tributaries between Budapest and Vienna and has advanced along the Danube valley in upstream direction already beyond Vienna at least to Linz where it has also overstepped the watershed between the Danube valley and the Vltava valley and has reached Prague by downstream migration along the Vltava valley, whereas the Delta Mud Wasp *Delta unguiculatum* has not yet prograded along the Danube valley in upstream direction beyond Vienna and is absent in both Linz and Prague. The isolated populations of the Delta Mud Wasp *Delta unguiculatum* in and around Donaueschingen/Bräunlingen, Tuttlingen and Sigmaringen in Germany have reached the western part of the Danube valley by overstepping across the watershed between the northern tributaries of Lake Constance and the Danube valley (MADER 2002 a) instead of continuous migration along the Danube valley in upstream or downstream direction, whereas the Mud-Dauber *Sceliphron destillatorium* does not occur in this area so far.

The entering of the valleys of several tributaries of the Danube valley in Serbia (formerly Yugoslavia), Hungary, Slovakia and Austria and the migration along the valleys of the tributaries of the Danube valley in upstream direction up to the southern foreland of the Carpathian Mountains in Slovakia has also enabled the Mud-Dauber *Sceliphron destillatorium* to reach the northern foreland of the Carpathian Mountains in Poland via the Transcarpathian route from the south across several passes in the mountain chain and through a gate in the mountain chain, whereas the absence of the Delta Mud Wasp *Delta unguiculatum* in the southeastern part of Poland again confirms that also this significant migration street of the Mud-Dauber *Sceliphron destillatorium* has so far not been utilized by the Delta Mud Wasp *Delta unguiculatum.* It is, however, again possible that the Delta Mud Wasp *Delta unguiculatum* will also follow the Mud-Dauber *Sceliphron destillatorium* along the Transcarpathian route from the south into Poland in the future if the Delta Mud Wasp *Delta unguiculatum* repeats the history of ex-

pansion of the Mud-Dauber *Sceliphron destillatorium* by the entering of the valleys of several tributaries of the Danube valley in Serbia (formerly Yugoslavia), Hungary, Slovakia and Austria and the migration along the valleys of the tributaries of the Danube valley in upstream direction up to the southern foreland of the Carpathian Mountains in Slovakia .

11.1.2 Different Distances of Northwards Migration

The migration of the Mud-Dauber *Sceliphron destillatorium* from Black Sea and Caspian Sea northwards up to Brjansk (KOLESNIKOV 1977) and Penza (KERENSKIJ 1919) in abt. 53.25 degrees northern latitude as well as Orynbor (formerly Orenburg) (EVERSMANN 1848, 1849) in abt. 51.75 degrees northern latitude in contrast to the wandering of the Delta Mud Wasp *Delta unguiculatum* only up to Orynbor (formerly Orenburg) (RADOSZKOVSKY 1865) in abt. 51.75 degrees northern latitude in Russia reflects a considerably higher potential of northwards advance of the Mud-Dauber *Sceliphron destillatorium* than the Delta Mud Wasp *Delta unguiculatum*. The Mud-Dauber *Sceliphron destillatorium* which has already prograded northwards beyond Orynbor to Brjansk and Penza in Russia has thus migrated abt. 150 km farther northwards than the Delta Mud Wasp *Delta unguiculatum* that has up to now not exceeded Orynbor in northwards direction. Comments are offered on the distribution of the Mud-Dauber *Sceliphron destillatorium* up to abt. 51 degrees northern latitude in Poland and up to abt. 55 degrees northern latitude in Russia as follows.

11.1.2.1 Distribution up to abt. 51 Degrees Northern Latitude in Poland

Despite of this significant difference in northwards advance in Russia, the distribution of most of the up to 2000 known occurrences of the Mud-Dauber *Sceliphron destillatorium* in Poland as well as the distribution of all the up to 2000 confirmed occurrences of the Delta Mud Wasp *Delta unguiculatum* in Germany do not exceed abt. 50.125 degrees northern latitude in northwards extension if the exceptional record of the Mud-Dauber *Sceliphron destillatorium* in Czesławice westnorthwest of Lublin (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) in Poland which is located in abt. 51.25 degrees northern latitude would be omitted. In the latter case, the northwards extension of both the Mud-Dauber *Sceliphron destillatorium* in Poland and the Delta Mud Wasp *Delta unguiculatum* in Germany up to 2000 would thus be limited by the same boundary of abt. 50.125 degrees northern latitude. MAZEK-FIALLA (1935 a, 1936 b) has also concluded that the northern boundary of the extension of the Mud-Dauber *Sceliphron destillatorium* is located in abt. 49 degrees northern latitude in Europe and shifts up to abt. 53 degrees northern latitude in Russia according to the evaluation of its known distribution at that time which has been mainly based on the compilation in KOHL (1918). North of Frankfurt am Main, mason nests of the Delta Mud Wasp *Delta unguiculatum* have also been discovered in the southern part of the Wetterau (REDER 2010) in Bad Homburg, Ober-Erlenbach east of Bad Homburg and Großkarben east of Bad Homburg in 2000 (REDER, personal communication 2013) in abt. 50.25 degrees northern latitude, whereas I have searched without success for mason nests of the Delta Mud Wasp *Delta unguiculatum* in the northern part of the Wetterau in Friedberg and Bad Nauheim in 2000 (MADER 2000 a) in abt. 50.375 degrees northern latitude, with the northern boundary of distribution of the Delta Mud Wasp *Delta unguiculatum* in 2000 thus probably having been located between Bad Homburg and Friedberg north of Frankfurt am Main in Germany.

The line of 50 degrees northern latitude runs through Mainz in Germany, Prague in Czechia, Cracow and Tarnów in Poland, Lviv and Charkiv in Ukraina, and Karagandy in Kazakhstan. If the find of the Mud-Dauber *Sceliphron destillatorium* in Czesławice westnorthwest of Lublin is also considered for the evaluation, the difference of abt. 140 km in northwards advance between Czesławice westnorthwest of Lublin in the north and Tarnów in the south which is the northernmost place of the group of all the other up to 2000 known occurrences of the Mud-Dauber *Sceliphron destillatorium* in Poland is less than half the distance of northwards advance between Tarnów in Poland in the south and Brjansk and Penza in Russia in the north. Concerning relative northwards progradation, the Mud-Dauber *Sceliphron destillatorium* is in Czesławice westnorthwest of Lublin in Poland still abt. 60 km behind the Delta Mud Wasp *Delta unguiculatum* in Orynbor (formerly Orenburg) in Russia and still abt. 220 km

behind the Mud-Dauber *Sceliphron destillatorium* in Brjansk and Penza in Russia. This comparison illustrates the still considerable potential of northwards progradation of the Mud-Dauber *Sceliphron destillatorium* in Poland and the Delta Mud Wasp *Delta unguiculatum* in Germany in the future.

After 2000, various occurrences of the Mud-Dauber *Sceliphron destillatorium* have also been discovered between Tarnów and Czesławice between 50 and 51 degrees northern latitude, with most of them, however, being located still abt. 60 - 80 km south of Czesławice and abt. 60 - 80 km north of Tarnów, with only Inowłódz east of Tomaszów Mazowiecki where it has been encountered in 2008 by KOWALCZYK & SOSZYNSKI (KOWALCZYK, KURZAC & SOSZYNSKI 2009) in abt. 51.5 degrees northern latitude and Swidnik southeast of Lublin where it has been confirmed in 2011 by KOCIK (BILANSKI, KOŁODZIEJ & PAJĄK 2012) in abt. 51.25 degrees northern latitude having reached or even slightly exceeded Czesławice concerning northwards progradation.

Inowłódz east of Tomaszów Mazowiecki where the Mud-Dauber *Sceliphron destillatorium* has been encountered in 2008 by KOWALCZYK & SOSZYNSKI (KOWALCZYK, KURZAC & SOSZYNSKI 2009) in abt. 51.5 degrees northern latitude is located still abt. 20 km farther northwards than Czesławice westnorthwest of Lublin where its occurrence has been proven in Poland for the first time in 1962 by ANASIEWICZ (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) in abt. 51.25 degrees northern latitude, and is located still abt. 30 km farther northwards than Swidnik southeast of Lublin where its occurrence has been confirmed in 2011 by KOCIK (BILANSKI, KOŁODZIEJ & PAJĄK 2012) in abt. 51.25 degrees northern latitude, with these three localities being the northernmost places of definite occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland up to 2013.

An observation of the Palaearctic Mud-Dauber *Sceliphron destillatorium* even in Mokotów in the central part of Warsaw in the Vistula valley in Poland in 2008 (unpublished information reported to CELARY, personal communication 2013) in abt. 52.25 degrees northern latitude requires still confirmation, because a confusion with the Oriental Mud-Dauber *Sceliphron curvatum* could not be completely excluded, similarly as apparent records of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in Wrocław in the Odra valley in Lower Silesia and in Knurów close to the Odra valley south of Gliwice west of Katowice in Upper Silesia in Poland in 2012 (unpublished information reported to KOSIBOWICZ, personal communication 2013) have turned out as having been erroneous and have in fact represented registrations of the Oriental Mud-Dauber *Sceliphron curvatum* (KOSIBOWICZ, personal communication 2013). It is, however, possible that the Palaearctic Mud-Dauber *Sceliphron destillatorium* has already reached Warsaw in Poland in abt. 52.25 degrees northern latitude by successive wandering along the Vistula valley in downstream direction from its recorded occurrences in Tarnów and north of Tarnów in the Dunajec valley as well as around Mielec and north of Mielec in the Wisłoka valley which are all situated close to the terminations of the valleys of both tributaries into the Vistula valley, because in the eastwards adjacent Belarus, the Palaearctic Mud-Dauber *Sceliphron destillatorium* has been encountered in Pinsk east of Brest in the Prypjat valley (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013) in abt. 52.125 degrees northern latitude that is located still abt. 100 km farther northwards than Czesławice westnorthwest of Lublin and Swidnik southeast of Lublin as well as still abt. 70 km farther northwards than Inowłódz east of Tomaszów Mazowiecki. The Palaearctic Mud-Dauber *Sceliphron destillatorium* could also have arrived in Warsaw by wandering from the Black Sea along the Dnepr valley in upstream direction beyond Kijiv and then farther along the Prypjat valley northnorthwest of Kijiv in upstream direction beyond Pinsk and beyond the source region of the Prypjat east of Lublin and south of Brest from where it could have bridged into the San valley west of Lublin and could then have migrated along the Vistula valley in downstream direction to Warsaw.

11.1.2.2 Distribution up to abt. 55 Degrees Northern Latitude in Russia

The Mud-Dauber *Sceliphron destillatorium* has even already prograded still significantly farther northwards beyond Brjansk and Penza in Russia. The collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg includes specimens of the Mud-Dauber *Sceliphron destillatorium* which have been captured in the Samara (formerly Kujbysev) province in the Volga valley in abt.

53.25 degrees northern latitude, in the Dankov district in the Rjazan province southeast of Moscow in the Oka valley that tributes to the Volga valley in abt. 54.5 degrees northern latitude, and in Ufa east-northeast of Samara in the Belaja valley which tributes to the Kama valley that terminates into the Volga valley in abt. 54.75 degrees northern latitude (PESENKO to CELARY, personal communication 2001).

MINORANSKIJ, CHARCENKO & FOMICEV (1970); FOMICEV & MINORANSKIJ (1971) and MINORANSKIJ (1971) have even signaled the record of the Mud-Dauber *Sceliphron destillatorium* in Kazan northnorthwest of Samara in the Volga valley in abt. 55.75 degrees northern latitude, and the collection of the University of Niznij Novgorod in Russia contains specimens of the Mud-Dauber *Sceliphron destillatorium* which have been captured in Niznij Novgorod (MOKROUSOV, personal communication 2013) eastnortheast of Moscow in the Volga valley in abt. 56.25 degrees northern latitude. Samara is located on the same geographical latitude as Brjansk and Penza, whereas Rjazan, Ufa, Kazan and Niznij Novgorod are located on a geographical latitude considerably farther north of Brjansk, Penza and Samara.

The Mud-Dauber *Sceliphron destillatorium* has migrated still abt. 150 km farther northwards beyond Brjansk, Penza and Samara to reach Rjazan and Ufa, has again wandered still abt. 150 km farther northwards beyond Rjazan and Ufa to arrive in Kazan, and has again still advanced abt. 75 km farther northwards beyond Kazan to reach Niznij Novgorod. Concerning relative northwards progradation, the Mud-Dauber *Sceliphron destillatorium* is in Czesławice westnorthwest of Lublin in Poland still abt. 220 km behind the Mud-Dauber *Sceliphron destillatorium* in Brjansk, Penza and Samara in Russia; still abt. 370 km behind the Mud-Dauber *Sceliphron destillatorium* in Rjazan and Ufa in Russia, still abt. 520 km behind the Mud-Dauber *Sceliphron destillatorium* in Kazan in Russia, and still abt. 600 km behind the Mud-Dauber *Sceliphron destillatorium* in Niznij Novgorod in Russia.

11.2 Comparison of the Mud-Dauber *Sceliphron destillatorium* and the Mason Bee *Megachile (Chalicodoma) parietina*

The Mud-Dauber *Sceliphron destillatorium* and the Mason Bee *Megachile (Chalicodoma) parietina* have followed different strategies of wandering and spreading in Middle Europe which are reflected by the relative significance of migration streets, and are also highlighted by different distances of northwards migration.

11.2.1 Relative Significance of Migration Streets

The relative significance of migration streets of the Mud-Dauber *Sceliphron destillatorium* and the Mason Bee *Megachile (Chalicodoma) parietina* is illustrated along the lines of the different importance of the utilization of Danube valley, Dnestr valley and Rhône valley for their expansion.

11.2.1.1 Rhône Valley and Danube Valley

The Mason Bee *Megachile (Chalicodoma) parietina* has immigrated from the Mediterranean region into Middle Europe mainly along the Rhône valley in upstream direction and along the Danube valley in upstream direction, but up to now not at all along the Dnestr valley in upstream direction, whereas the Mud-Dauber *Sceliphron destillatorium* has immigrated from the Mediterranean region into Middle Europe mainly along the Danube valley in upstream direction and along the Rhône valley in upstream direction, and subordinately also along the Dnestr valley in upstream direction.

The preservation of old mason nests confirms that prior to its almost total extinction in Germany and surrounding areas until abt. 1950 - 1965 (literature overview in MADER 2000 a, 2002 c), the Mason Bee

Megachile (Chalicodoma) parietina has wandered along the Rhône valley in upstream direction and along the Danube valley in upstream direction, along the successive side valleys of the Rhône valley and the Danube valley in upstream direction, and across the northwards following watersheds beyond the source regions of the successive side valleys of the Rhône valley and the Danube valley still considerably farther northwards than the Delta Mud Wasp *Delta unguiculatum* and the Mud-Dauber *Sceliphron destillatorium* in Middle Europe.

The documents of the preserved old mason nests of the Mason Bee *Megachile (Chalicodoma) parietina* in various localities in the valleys of the Rhône and its tributaries, the Danube and its tributaries, and other rivers and their tributaries (literature overview in MADER 2000 a, 2002 c) in regions beyond the northern boundaries of the distribution of the Mud-Dauber *Sceliphron destillatorium* and the Delta Mud Wasp *Delta unguiculatum* in Middle Europe delineate therefore the potential of further advance of the Mud-Dauber *Sceliphron destillatorium* and the Delta Mud Wasp *Delta unguiculatum* in Middle Europe along established and experienced migration streets in the future.

11.2.1.2 Dnestr Valley

The absence of the Mason Bee *Megachile (Chalicodoma) parietina* similarly as the Delta Mud Wasp *Delta unguiculatum* in contrast to the occurrence of the Mud-Dauber *Sceliphron destillatorium* in the southeastern part of Poland underlines that also the Mason Bee *Megachile (Chalicodoma) parietina* has so far not repeated the migration of the Mud-Dauber *Sceliphron destillatorium* from the Black Sea along the Dnestr valley in upstream direction across Ukraina into Poland from the east as well as along the Danube valley and its northern side valleys in upstream direction across Hungary and Slovakia and then via several passes in the Carpathian Mountains into Poland from the south, but it is possible that also the Mason Bee *Megachile (Chalicodoma) parietina* will follow the Mud-Dauber *Sceliphron destillatorium* along the Podolian-Volhynian route from the east and the Transcarpathian route from the south into Poland in the future.

11.2.2 Different Distances of Northwards Migration

Prior to its almost total extinction in Germany and surrounding areas until abt. 1950 - 1965 (literature overview in MADER 2000 a, 2002 c), the Mason Bee *Megachile (Chalicodoma) parietina* in Germany has already migrated significantly farther northwards than the Mud-Dauber *Sceliphron destillatorium* in Poland and the Delta Mud Wasp *Delta unguiculatum* in Germany. Comments are offered on the distribution of the Mason Bee *Megachile (Chalicodoma) parietina* up to abt. 52 degrees northern latitude in Germany, the Mud-Dauber *Sceliphron destillatorium* up to abt. 51 degrees northern latitude in Poland, and the Delta Mud Wasp *Delta unguiculatum* up to abt. 52 degrees northern latitude in Russia as follows.

11.2.2.1 Distribution up to abt. 52 Degrees Northern Latitude in Germany

Prior to its almost total extinction in Germany and surrounding areas until abt. 1950 - 1965 (literature overview in MADER 2000 a, 2002 c), the Mason Bee *Megachile (Chalicodoma) parietina* has occurred in Thuringia, Saxony-Anhalt and Saxony in Germany (literature overview in MADER 2000 a, 2002 c) in and around Halle and Jena in the Saale valley in abt. 51.5 and abt. 51 degrees northern latitude, respectively; in Weimar in the Ilm valley which tributes to the Saale valley in abt. 51 degrees northern latitude, and in Hoflößnitz in the western part of Radebeul westnorthwest of Dresden (MÜLLER 1944) in the Elbe valley in abt. 51 degrees northern latitude. The northernmost former record of the Mason Bee *Megachile (Chalicodoma) parietina* in Germany has been obtained in Staßfurt (PARRE 1964) in the Bode valley close to its termination into the Saale valley between Halle and Magdeburg in abt. 51.875 degrees northern latitude.

Similarly as the Mud-Dauber *Sceliphron destillatorium*, the Mason Bee *Megachile (Chalicodoma) parietina* has formerly also crossed the watershed between the Danube valley and the Vltava (Moldau)

valley north of Linz in Austria, and has wandered along the Vltava valley in downstream direction via Ceské Budejovice (formerly Budweis; KIRCHNER 1857) to Prague (BATA 1939). In contrast to the Mud-Dauber *Sceliphron destillatorium* which has not advanced beyond Prague, the Mason Bee *Megachile (Chalicodoma) parietina* has then migrated farther along the Vltava valley in downstream direction up to its termination into the Elbe (Labe) valley near Melník, and has then prograded along the Elbe valley in downstream direction via Usti and Decín in Czechia to Dresden and beyond in Germany where it has either drifted westwards into the Saale valley across the separating watersheds or has entered the Saale valley at its termination into the Elbe valley south of Magdeburg and has then followed the Saale valley in upstream direction to Halle and Jena as well as subsequently the Ilm valley in upstream direction to Weimar.

Concerning relative northwards progradation, the Mud-Dauber *Sceliphron destillatorium* is in Czesławice westnorthwest of Lublin (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) in Poland in abt. 51.25 degrees northern latitude still abt. 30 km behind the former occurrences of the Mason Bee *Megachile (Chalicodoma) parietina* in and around Halle, Jena and Dresden in Germany in abt. 51 - 51.5 degrees northern latitude, and similarly, the Delta Mud Wasp *Delta unguiculatum* is in Frankfurt am Main (DOROW 1988, FLECHTNER & KLINGER 1990, KLINGER 1992), Hanau (MADER 2000 a) and Taunusstein northnorthwest of Wiesbaden (EMMERICH in KLINGER & REDER 1995) in Germany in abt. 50.125 degrees northern latitude still abt. 150 km behind the former occurrences of the Mason Bee *Megachile (Chalicodoma) parietina* in and around Halle, Jena and Dresden in Germany in abt. 51 - 51.5 degrees northern latitude. If the northernmost former record of the Mason Bee *Megachile (Chalicodoma) parietina* in Germany is also considered, the Mud-Dauber *Sceliphron destillatorium* is in Czesławice westnorthwest of Lublin (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) in Poland in abt. 51.25 degrees northern latitude still abt. 70 km behind the former occurrence of the Mason Bee *Megachile (Chalicodoma) parietina* in Staßfurt (PARRE 1964) in the Bode valley close to its termination into the Saale valley between Halle and Magdeburg in abt. 51.875 degrees northern latitude.

The unexpected recent new occurrences of the Mason Bee *Megachile (Chalicodoma) parietina* in the southwestern part of Germany which have been found in the Neckar valley south to southwest of Stuttgart (WESTRICH 2008) and in the southern Saar area (WEIGAND 2012) probably in the Saar valley west to northwest of Saarbrücken are both located south of 50 degrees northern latitude, and the occurrences of the Mason Bee *Megachile (Chalicodoma) parietina* which have been investigated north of the Alps by HERRMANN (2007) probably in the region of the boundary between the southwestern part of Germany and the northern part of Switzerland are even located south of 48 degrees northern latitude. North of Frankfurt am Main, mason nests of the Delta Mud Wasp *Delta unguiculatum* have also been discovered in the southern part of the Wetterau (REDER 2010) in Bad Homburg, Ober-Erlenbach east of Bad Homburg and Großkarben east of Bad Homburg in 2000 (REDER, personal communication 2013) in abt. 50.25 degrees northern latitude, whereas I have searched without success for mason nests of the Delta Mud Wasp *Delta unguiculatum* in the northern part of the Wetterau in Friedberg and Bad Nauheim in 2000 (MADER 2000 a) in abt. 50.375 degrees northern latitude, with the northern boundary of distribution of the Delta Mud Wasp *Delta unguiculatum* in 2000 thus probably having been located between Bad Homburg and Friedberg north of Frankfurt am Main.

11.2.2.2 Distribution up to abt. 51 Degrees Northern Latitude in Poland

The Mason Bee *Megachile (Chalicodoma) parietina* has formerly occurred in Poland only in Stolec east of Ząbkowice Slaskie south of Wrocław in Lower Silesia (DITTRICH 1924, SCHOLZ 1938, NOSKIEWICZ 1948, MACKO & NOSKIEWICZ 1954; STROJNY 1959, 1961 a, 1961 b, 1963, 1966, 1968, 1971 a, 1971 b, 1975, 1979, 1981 a, 1981 b, 1984, 1987, 1989; JANKOWSKI & POMORSKI 1996; ORGANISCIAK, DUDZIAK & DZIEDZIC 1997; MADER 2000 a) which is located in abt. 50.625 degrees northern latitude. Similarly as the Mud-Dauber *Sceliphron destillatorium*, the Mason Bee *Megachile (Chalicodoma) parietina* has formerly also migrated from the Danube valley along the Morava valley in upstream direction beyond Olomouc. In contrast to the Mud-Dauber *Sceliphron destillatorium* which has not advanced beyond Litovel northwest of Olomouc, the Mason Bee *Megachile (Chalicodoma) parietina* has then migrated farther along the Morava valley in upstream direction up to its source area north-

northwest of Sumperk, has then bridged across the watershed between the source regions of Morava and Nysa Kłodzka southsoutheast of Kłodzko, and has then wandered along the Nysa Kłodzka valley in downstream direction to the vicinity of Ząbkowice Śląskie northnortheast of Kłodzko.

If the exceptional record of the Mud-Dauber *Sceliphron destillatorium* in Czesławice westnorthwest of Lublin (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) in Poland which is located in abt. 51.25 degrees northern latitude would be omitted, then all the other occurrences of the Mud-Dauber *Sceliphron destillatorium* in Poland up to 2000 which do not exceed 50 degrees northern latitude in northwards extension would be situated still abt. 70 km south of the former occurrence of the Mason Bee *Megachile (Chalicodoma) parietina* in Stolec east of Ząbkowice Śląskie. On the other hand, if the northernmost occurrences of the Mud-Dauber *Sceliphron destillatorium* in Poland up to 2013 in Czesławice westnorthwest of Lublin (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985), in Inowłódz east of Tomaszów Mazowiecki (KOWALCZYK & SOSZYNSKI in KOWALCZYK, KURZAC & SOSZYNSKI 2009), and in Swidnik southeast of Lublin (KOCIK in BILANSKI, KOŁODZIEJ & PAJĄK 2012) are also included into the evaluation, then the Mud-Dauber *Sceliphron destillatorium* has advanced in Czesławice, Inowłódz and Swidnik already abt. 80 - 100 km farther northwards than the Mason Bee *Megachile (Chalicodoma) parietina* at its former occurrence in Stolec.

After 2000, various occurrences of the Mud-Dauber *Sceliphron destillatorium* have also been discovered between Tarnów and Czesławice between 50 and 51 degrees northern latitude, with most of them, however, being located still abt. 60 - 80 km south of Czesławice and abt. 60 - 80 km north of Tarnów, with only Inowłódz east of Tomaszów Mazowiecki where it has been encountered in 2008 by KOWALCZYK & SOSZYNSKI (KOWALCZYK, KURZAC & SOSZYNSKI 2009) in abt. 51.5 degrees northern latitude and Swidnik southeast of Lublin where it has been confirmed in 2011 by KOCIK (BILANSKI, KOŁODZIEJ & PAJĄK 2012) in abt. 51.25 degrees northern latitude having reached or even slightly exceeded Czesławice concerning northwards progradation.

Inowłódz east of Tomaszów Mazowiecki where the Mud-Dauber *Sceliphron destillatorium* has been encountered in 2008 by KOWALCZYK & SOSZYNSKI (KOWALCZYK, KURZAC & SOSZYNSKI 2009) in abt. 51.5 degrees northern latitude is located still abt. 20 km farther northwards than Czesławice westnorthwest of Lublin where its occurrence has been proven in Poland for the first time in 1962 by ANASIEWICZ (PUŁAWSKI, personal communication in VECHT & BREUGEL 1968; PUŁAWSKI, personal communication in SOSZYNSKI & SOSZYNSKI 1985) in abt. 51.25 degrees northern latitude, and is located still abt. 30 km farther northwards than Swidnik southeast of Lublin where its occurrence has been confirmed in 2011 by KOCIK (BILANSKI, KOŁODZIEJ & PAJĄK 2012) in abt. 51.25 degrees northern latitude, with these three localities being the northernmost places of definite occurrence of the Mud-Dauber *Sceliphron destillatorium* in Poland up to 2013.

An observation of the Palaearctic Mud-Dauber *Sceliphron destillatorium* even in Mokotów in the central part of Warsaw in the Vistula valley in Poland in 2008 (unpublished information reported to CELARY, personal communication 2013) in abt. 52.25 degrees northern latitude requires still confirmation, because a confusion with the Oriental Mud-Dauber *Sceliphron curvatum* could not be completely excluded, similarly as apparent records of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in Wrocław in the Odra valley in Lower Silesia and in Knurów close to the Odra valley south of Gliwice west of Katowice in Upper Silesia in Poland in 2012 (unpublished information reported to KOSIBOWICZ, personal communication 2013) have turned out as having been erroneous and have in fact represented registrations of the Oriental Mud-Dauber *Sceliphron curvatum* (KOSIBOWICZ, personal communication 2013). It is, however, possible that the Palaearctic Mud-Dauber *Sceliphron destillatorium* has already reached Warsaw in Poland in abt. 52.25 degrees northern latitude by successive wandering along the Vistula valley in downstream direction from its recorded occurrences in Tarnów and north of Tarnów in the Dunajec valley as well as around Mielec and north of Mielec in the Wisłoka valley which are all situated close to the terminations of the valleys of both tributaries into the Vistula valley, because in the eastwards adjacent Belarus, the Palaearctic Mud-Dauber *Sceliphron destillatorium* has been encountered in Pinsk east of Brest in the Prypjat valley (specimen in the collection of the Department of Entomology of the California Academy of Sciences in San Francisco in the United States of America; PULAWSKI, personal communication 2013) in abt. 52.125 degrees northern latitude that is located still abt. 100 km farther northwards than Czesławice westnorthwest of Lublin and Swidnik southeast of

Lublin as well as still abt. 70 km farther northwards than Inowłódz east of Tomaszów Mazowiecki. The Palaearctic Mud-Dauber *Sceliphron destillatorium* could also have arrived in Warsaw by wandering from the Black Sea along the Dnepr valley in upstream direction beyond Kijiv and then farther along the Prypjat valley northnorthwest of Kijiv in upstream direction beyond Pinsk and beyond the source region of the Prypjat east of Lublin and south of Brest from where it could have bridged into the San valley west of Lublin and could then have migrated along the Vistula valley in downstream direction to Warsaw.

Because the Mason Bee *Megachile (Chalicodoma) parietina* has formerly reached also Halle in the Saale valley northwest of Leipzig westnorthwest of Dresden as well as Stolec east of Ząbkowice Śląskie in the Nysa Kłodzka valley south of Wrocław, it could also be expected that the Mud-Dauber *Sceliphron destillatorium* will continue its migration along the Vltava valley in downstream direction beyond Prague and along the Morava valley in upstream direction beyond Litovel northwest of Olomouc in Czechia, and could arrive in the Elbe valley around Dresden in Germany and in the Nysa Kłodzka valley around Kłodzko in Poland from where it could advance in downstream direction to Magdeburg in the Elbe valley and Wrocław in the Odra valley as well as subsequently in upstream direction to Halle in the Saale valley.

11.2.2.3 Distribution up to abt. 52 Degrees Northern Latitude in Russia

In Russia, the Delta Mud Wasp *Delta unguiculatum* has been encountered in Orynbor (formerly Orenburg) in the Ural valley already before 1865 (RADOSZKOVSKY 1865) in abt. 51.75 degrees northern latitude. In comparison to the northernmost former record of the Mason Bee *Megachile (Chalicodoma) parietina* in Germany which has been obtained in Staßfurt (PARRE 1964) in the Bode valley close to its termination into the Saale valley between Halle and Magdeburg in abt. 51.875 degrees northern latitude, the Delta Mud Wasp *Delta unguiculatum* has in Orynbor in Russia (RADOSZKOVSKY 1865) in abt. 51.75 degrees northern latitude still been abt. 20 km behind the Mason Bee *Megachile (Chalicodoma) parietina* in Staßfurt in Germany (PARRE 1964) in abt. 51.875 degrees northern latitude, whereas in all the other former localities of occurrence of the Mason Bee *Megachile (Chalicodoma) parietina* in Thuringia, Saxony-Anhalt and Saxony in Germany (literature overview in MADER 2000 a, 2002 c) in and around Halle and Jena in the Saale valley in abt. 51.5 and abt. 51 degrees northern latitude, respectively; in Weimar in the Ilm valley which tributes to the Saale valley in abt. 51 degrees northern latitude, and in Hoflößnitz in the western part of Radebeul westnorthwest of Dresden (MÜLLER 1944) in the Elbe valley in abt. 51 degrees northern latitude, the Mason Bee *Megachile (Chalicodoma) parietina* has still been abt. 50 - 100 km behind the Delta Mud Wasp *Delta unguiculatum* in Orynbor in Russia (RADOSZKOVSKY 1865) in abt. 51.75 degrees northern latitude.

12 Comparison of Biogeography and Migration of the Palaearctic Mud-Dauber *Sceliphron destillatorium* and the Oriental Mud-Dauber *Sceliphron curvatum* in Europe

The Palaearctic Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* are original and indigenous elements of the European entomofauna with natural biogeography and migration which have been controlled by natural patterns of spreading and distribution, whereas the Oriental Mud-Dauber *Sceliphron curvatum* does not belong to the original and indigenous elements of the European entomofauna with natural biogeography and migration, but is an exotical and external element of the European entomofauna with artificial biogeography and migration that have started at the random localities of anthropogenical introduction of the strange representative of the Asiatical entomofauna into Europe and have been guided by radiation from the selected places of human contamination of the European entomofauna into

various directions irrespective of natural patterns of spreading and distribution.

The Oriental Mud-Dauber *Sceliphron curvatum* is an original resident of Asia from India, Pakistan, Kashmir and Nepal to Kazakhstan, Uzbekistan and Tadzikistan which has been artificially imported to Austria in Western Europe after abt. 1975 and has expanded its distribution in Europe rapidly and significantly since then (literature review in MADER 2000 a; CETKOVIC, RADOVIC & DOROVIC 2004; HELLRIGL 2004; BOGUSCH, LISKA, LUKAS & DUDICH 2005; RAHOLA 2005, SCHMID-EGGER 2005, BITSCH & BARBIER 2006; BURY, SUDOŁ, ZIĘBA & ZYŁA 2009; BITSCH 2010, PROKOFIEV & SKOMOROKHOV 2010; CETKOVIC, MOKROUSOV, PLECAS, BOGUSCH, ANTIC, DOROVIC-JOVANOVIC, KRPO-CETKOVIC & KARAMAN 2011; SCHARDT, RENKER, STAUDT & REDER 2012; FATERYGA & KOVBLYUK 2013 b; PULAWSKI 2013 a, 2013 b). The comparison of biogeography and migration of the Palaearctic Mud-Dauber *Sceliphron destillatorium* and the Oriental Mud-Dauber *Sceliphron curvatum* in Europe is illustrated along the lines of time framework, pattern, strategy, directions, organization and prediction of migration; nesting strategy, winter stability and rain resistivity; stage of synanthropical adaptation, differences in northwards progradation, coexistence instead of competition and replacement, and different constellations of distribution.

12.1 Time Framework of Migration

As a consequence of the artificial introduction of the Oriental Mud-Dauber *Sceliphron curvatum* as an exotical and external element into the European entomofauna in contrast to the original and indigenous provenance of the Palaearctic Mud-Dauber *Sceliphron destillatorium* which represents a primary resident in the European entomofauna, the succession of biogeographical distribution and history of migration of the Oriental Mud-Dauber *Sceliphron curvatum* and the Palaearctic Mud-Dauber *Sceliphron destillatorium* in Europe have taken place in considerably different time frameworks and have been guided by significantly different radiation patterns. The Palaearctic Mud-Dauber *Sceliphron destillatorium* has achieved its present biogeography in Europe by systematical and continuous migration from its primary distribution areas throughout centuries, whereas the Oriental Mud-Dauber *Sceliphron curvatum* has established its present biogeography in Europe by random and discontinuous migration from the points of its anthropogenical insertion by contamination during the last few decades.

The Palaearctic Mud-Dauber *Sceliphron destillatorium* has migrated from its primary distribution areas at the coasts of Mediterranean Sea, Black Sea and Caspian Sea in Southern Europe and surrounding regions where it is resident since more than a millennium (according to remarks in works of ARISTOTELES in Athens in Greece and PLINIUS in Rome in Italy; literature review in LENZ 1856, KÖNIG 1896, SAJO 1896, KOHL 1918) along several main migration streets to Western Europe and Eastern Europe throughout centuries, whereas the Oriental Mud-Dauber *Sceliphron curvatum* has radiated from the localities of its human installation by contamination in Western Europe along various routes in different directions to other areas in Western Europe as well as to Eastern Europe and even to Southern Europe during the last few decades. The Oriental Mud-Dauber *Sceliphron curvatum* has covered significant distances of expansion between the different parts of Europe within only a few decades, whereas the Palaearctic Mud-Dauber *Sceliphron destillatorium* has needed more than a century or even several centuries for its migration over comparable distances.

Similarly as the Palaearctic Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* have also migrated from their primary distribution areas in Southern Europe and surrounding regions along several main migration streets to Western Europe throughout centuries (MADER 2000 a).

12.2 Pattern and Strategy of Migration

Both the Palaearctic Mud-Dauber *Sceliphron destillatorium* and the Oriental Mud-Dauber *Sceliphron curvatum* have mainly followed river valleys in upstream and downstream direction during their

spreading. The Palaearctic Mud-Dauber *Sceliphron destillatorium* has migrated from its primary distribution areas at the coasts of Mediterranean Sea, Black Sea and Caspian Sea in Southern Europe and surrounding regions where it is resident since more than a millennium (according to remarks in works of ARISTOTELES in Athens in Greece and PLINIUS in Rome in Italy; literature review in LENZ 1856, KÖNIG 1896, SAJO 1896, KOHL 1918) along a suite of river valleys in upstream direction in an organized unidirectional pattern and in strategical manner of progradation towards north and west to Western Europe and Eastern Europe throughout centuries, whereas the Oriental Mud-Dauber *Sceliphron curvatum* has radiated from the places of its artificial introduction in Western Europe along various river valleys in both upstream and downstream direction as well as across the watersheds separating adjacent river valleys in an unorganized multidirectional pattern and in random manner of progradation towards north, west, east and even south to other areas in Western Europe as well as to Eastern Europe and even to Southern Europe during the last few decades.

Similarly as the Palaearctic Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* have also migrated from their primary distribution areas in Southern Europe and surrounding regions along a suite of river valleys in upstream direction in an organized unidirectional pattern and in strategical manner of progradation towards north and west to Western Europe throughout centuries (MADER 2000 a). Comments on the utilization of river valleys for the progradation of the Oriental Mud-Dauber *Sceliphron curvatum* are also included in SCHMID-EGGER (2005).

12.3 Directions and Organization of Migration

The Palaearctic Mud-Dauber *Sceliphron destillatorium* has migrated from its primary distribution areas at the coasts of Mediterranean Sea, Black Sea and Caspian Sea in Southern Europe and surrounding regions where it is resident since more than a millennium (according to remarks in works of ARISTOTELES in Athens in Greece and PLINIUS in Rome in Italy; literature review in LENZ 1856, KÖNIG 1896, SAJO 1896, KOHL 1918) exclusively in normal direction from south and east towards north and west to Western Europe and Eastern Europe throughout centuries, whereas the Oriental Mud-Dauber *Sceliphron curvatum* has radiated from the places of its anthropogenical insertion by contamination in Western Europe both in normal direction from south and east towards north and west and in inverse direction from north and west towards south and east to other areas in Western Europe as well as to Eastern Europe and even to Southern Europe during the last few decades.

The combination of migration of the Oriental Mud-Dauber *Sceliphron curvatum* in normal direction from south and east towards north and west as well as in inverse direction from north and west towards south and east is a consequence of its unorganized multidirectional and random spreading from the localities of its human installation by contamination in Western Europe into different directions regardless of structure and orientation of migration streets to other areas in Western Europe as well as to Eastern Europe and even to Southern Europe during the last few decades, whereas the Palaearctic Mud-Dauber *Sceliphron destillatorium* has expanded exclusively in normal direction from south and east towards north and west as a result of its organized unidirectional and strategical spreading from its primary distribution areas at the coasts of Mediterranean Sea, Black Sea and Caspian Sea in Southern Europe and surrounding regions where it is resident since more than a millennium (according to remarks in works of ARISTOTELES in Athens in Greece and PLINIUS in Rome in Italy; literature review in LENZ 1856, KÖNIG 1896, SAJO 1896, KOHL 1918) along a suite of migration streets towards north and west to Western Europe and Eastern Europe throughout centuries.

Similarly as the Palaearctic Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* have also migrated from their primary distribution areas in Southern Europe and surrounding regions exclusively in normal direction from south and east towards north and west to Western Europe throughout centuries as a result of their organized unidirectional and strategical spreading (MADER 2000 a).

12.4 Prediction of Migration

According to its organized unidirectional and strategical spreading exclusively in normal direction from south and east towards north and west from its primary distribution areas at the coasts of Mediterranean Sea, Black Sea and Caspian Sea in Southern Europe and surrounding regions where it is resident since more than a millennium (according to remarks in works of ARISTOTELES in Athens in Greece and PLINIUS in Rome in Italy; literature review in LENZ 1856, KÖNIG 1896, SAJO 1896, KOHL 1918) along a suite of migration streets towards north and west to Western Europe and Eastern Europe throughout centuries, the directions and distances of the further migration of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in the future are predictable, whereas due to its unorganized multidirectional and random spreading in normal direction from south and east towards north and west as well as in inverse direction from north and west towards south and east from the localities of its human installation by contamination in Western Europe into different directions regardless of structure and orientation of migration streets to other areas in Western Europe as well as to Eastern Europe and even to Southern Europe during the last few decades, the directions and distances of the further migration of the Oriental Mud-Dauber *Sceliphron curvatum* in the future are unpredictable.

Similarly as applying for the Palaearctic Mud-Dauber *Sceliphron destillatorium*, the directions and distances of the further migration of the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* in the future are also predictable according to their organized unidirectional and strategical spreading exclusively in normal direction from south and east towards north and west from their primary distribution areas in Southern Europe and surrounding regions along a suite of migration streets towards north and west to Western Europe throughout centuries (MADER 2000 a).

12.5 Nesting Strategy, Winter Stability and Rain Resistivity

The differences in rapidity of progradation of the Palaearctic Mud-Dauber *Sceliphron destillatorium* which has achieved its present biogeography in Europe by systematical and continuous migration from its primary distribution areas throughout centuries and the Oriental Mud-Dauber *Sceliphron curvatum* that has established its present biogeography in Europe by random and discontinuous migration from the points of its anthropogenical insertion by contamination during the last few decades are predominantly the result of different nesting strategies which are the consequence of different winter stability and rain resistivity. The original and indigenous provenance of the Palaearctic Mud-Dauber *Sceliphron destillatorium* which represents a primary resident in the European entomofauna is the reason for its pronounced winter stability that permits the Palaearctic Mud-Dauber *Sceliphron destillatorium* to construct its mason nests on outer and inner walls of buildings without the necessity of artificial temperature control by heating during the winter and protection of the mason nests from contact by the rain, and thus the mason nests of the Palaearctic Mud-Dauber *Sceliphron destillatorium* on outer and inner walls of buildings are always covered by a continuous layer of roughcast for protection of the cells within the mason nests against extreme temperatures, predators and rain. Because the mason nests of the Palaearctic Mud-Dauber *Sceliphron destillatorium* as well as also the mason nests of the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a) are resistant to rain, they can therefore also be installed on only partially protected or even unprotected outer walls of buildings.

On the other hand, the artificial introduction of the Oriental Mud-Dauber *Sceliphron curvatum* as an exotical and external element into the European entomofauna has required a quick adaptation of the original resident of the Asiatical entomofauna to the comparatively less favourable climate in Europe with cooler summers and colder winters, and therefore the Oriental Mud-Dauber *Sceliphron curvatum* constructs its mason nests predominantly within the insides of rooms in buildings with artificial temperature control by heating during the winter and protection of the mason nests from contact by the rain which allows in most cases even to resign from coverage of the cells of the mason nests by roughcast and to place the suites of cells without coverage by roughcast on various substrates including not necessarily only walls, but also strange substrates such as books, boxes, curtains, carpets, furniture, de-

vices, clothing, lamps and window panes where the Palaearctic Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a) have never installed and would never install their mason nests. The mason nests of the Oriental Mud-Dauber *Sceliphron curvatum* are not resistant to rain and can therefore not be constructed on only partially protected or even unprotected outer walls of buildings.

Within the insides of rooms in buildings with artificial temperature control by heating during the winter, the mason nests of the Oriental Mud-Dauber *Sceliphron curvatum* are also not so easily accessible by predators as the mason nests of the Palaearctic Mud-Dauber *Sceliphron destillatorium* on outer and inner walls of buildings without artificial temperature control by heating during the winter and are also completely out of the reach of the rain, and the protection of the mason nests of the Oriental Mud-Dauber *Sceliphron curvatum* within the insides of rooms in buildings with artificial temperature control by heating during the winter against abundant attacks by predators and against the rain has permitted the abandonment of the coverage of the mason nests of the Oriental Mud-Dauber *Sceliphron curvatum* by roughcast, because the armour of the nest cells against extreme temperatures, predators and rain is no longer required in the comfortable environment of rooms in buildings with artificial temperature control by heating during the winter, considerable isolation against the access of numerous predators and perfect shade against the rain.

The almost exclusive utilization of the insides of rooms in buildings with artificial temperature control by heating during the winter as well as protection of the mason nests from contact by the rain and abundant attacks by predators provides the Oriental Mud-Dauber *Sceliphron curvatum* with an artificial environment which is comparable to its original habitat in tropical regions in Asia and makes it independent of the cooler summers and colder winters in its exotical habitat in Europe, and permits also the acceleration of nesting by renouncement from coverage of the cells of the mason nests by roughcast. The time which the Oriental Mud-Dauber *Sceliphron curvatum* saves during accelerated nesting by resigning from coverage of the cells of the mason nests by roughcast can be invested into reproduction and dispersal into adjacent areas that speeds up the expansion of the distribution of the Oriental Mud-Dauber *Sceliphron curvatum* from the existing nesting sites into neighbouring virginal regions. The saving of time during accelerated nesting by resigning from coverage of the cells of the mason nests by roughcast, the considerable isolation against the access of numerous predators, the perfect shade against the rain and the comfortable environment of rooms in buildings with artificial temperature control by heating during the winter as a consequence of a much more advanced stage of synanthropical adaptation are the main factors having enabled the significantly faster spreading of the Oriental Mud-Dauber *Sceliphron curvatum* which has achieved remarkable distances of progradation during only a few decades that have required more than a century or even several centuries for their coverage by the Palaearctic Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a).

12.6 Stage of Synanthropical Adaptation

The almost exclusive utilization of the insides of rooms in buildings with artificial temperature control by heating during the winter as well as protection of the mason nests from contact by the rain and abundant attacks by predators by the Oriental Mud-Dauber *Sceliphron curvatum* represents a much more advanced stage of synanthropical adaptation than the construction of the mason nests of the Palaearctic Mud-Dauber *Sceliphron destillatorium* as well as also the mason nests of the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a) on outer and inner walls of buildings without the necessity of artificial temperature control by heating during the winter and protection of the mason nests from contact by the rain which represents a relatively retarded stage of synanthropical adaptation in comparison with the relatively accelerated stage of synanthropical adaptation of the Oriental Mud-Dauber *Sceliphron curvatum*. Similar relatively accelerated and relatively retarded stages of synanthropical adaptation as applying for the Palaearctic Mud-Dauber *Sceliphron destillatorium*, the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* on the one hand and the Oriental Mud-Dauber *Sceliphron curvatum* on the other hand are also documented in the nesting behaviour of different genera and species of swallows (Aves : Hirundinidae; MADER 2000 a).

The competitive advantage of the nesting strategy of the Oriental Mud-Dauber *Sceliphron curvatum* almost exclusively within the insides of rooms in buildings with artificial temperature control by heating during the winter as well as protection from contact of the mason nests by the rain and abundant attacks by predators which represents a much more advanced stage of synanthropical adaptation than the nesting strategy of the Palaearctic Mud-Dauber *Sceliphron destillatorium* as well as also the nesting strategy of the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a) on outer and inner walls of buildings without the necessity of artificial temperature control by heating during the winter and protection of the mason nests from contact by the rain is the main reason for the explosionary spreading of the Oriental Mud-Dauber *Sceliphron curvatum* within only a few decades from the places of its artificial introduction in Western Europe along various river valleys in both upstream and downstream direction as well as across the watersheds separating adjacent river valleys in an unorganized multidirectional pattern and in random manner of progradation towards north, west, east and even south to other areas in Western Europe as well as to Eastern Europe and even to Southern Europe. As a result of its above outlined explosionary spreading as a consequence of its much more advanced stage of synanthropical adaptation, the Oriental Mud-Dauber *Sceliphron curvatum* has achieved remarkable distances of progradation during only a few decades that have required more than a century or even several centuries for their coverage by the Palaearctic Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a).

12.7 Differences in Northwards Progradation

During its explosionary radiation within only a few decades from the localities of its human installation by contamination in Western Europe along various routes in different directions to other areas in Western Europe as well as to Eastern Europe and even to Southern Europe, the Oriental Mud-Dauber *Sceliphron curvatum* has even already achieved a significantly farther northwards progradation than has been reached by the Palaearctic Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a) troughout centuries. The extremely quick spreading of the Oriental Mud-Dauber *Sceliphron curvatum* within only a few decades from the places of its artificial introduction in Western Europe along various river valleys in both upstream and downstream direction as well as across the watersheds separating adjacent river valleys in an unorganized multidirectional pattern and in random manner of progradation towards north, west, east and even south to other areas in Western Europe as well as to Eastern Europe and even to Southern Europe has not only included already a considerably farther northwards advance than has been established by the Palaearctic Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a) troughout centuries, but has also confirmed the postulated potential of farther northwards progradation of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in the future.

The unconventional rapidity of expansion of the Oriental Mud-Dauber *Sceliphron curvatum* within only a few decades from the localities of its human installation by contamination in Western Europe along various routes in different directions to other areas in Western Europe as well as to Eastern Europe and even to Southern Europe has already fulfilled the prognosis of the potential of farther northwards progradation of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in the future and has illustrated that the predicted distances of farther northwards advance of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in the future are realistical and could be reached without difficulties in a reasonable time framework. The postulated potential of farther northwards progradation of the Palaearctic Mud-Dauber *Sceliphron destillatorium* in the future which has been admirably confirmed by the explosionary radiation of the Oriental Mud-Dauber *Sceliphron curvatum* within the framework of forecast of farther northwards progradation having been established for the Palaearctic Mud-Dauber *Sceliphron destillatorium* during only a few decades could therefore easily be realized by the Palaearctic Mud-Dauber *Sceliphron destillatorium*, with the achievement of the prediction of the future northwards spreading of the Palaearctic Mud-Dauber *Sceliphron destillatorium* thus having become doubtless and requiring only time as a conclusion of the experience of the already performed radiation of the Oriental Mud-Dauber *Sceliphron curvatum.*

12.8 Coexistence Instead of Competition and Replacement

As a consequence of the differences in nesting strategy of the Palaearctic Mud-Dauber *Sceliphron destillatorium* which constructs its mason nests on outer and inner walls of buildings without the necessity of artificial temperature control by heating during the winter and protection from contact of the mason nests by the rain, with the mason nests of the Palaearctic Mud-Dauber *Sceliphron destillatorium* on outer and inner walls of buildings being always covered by a continuous layer of roughcast for protection of the cells within the nests against extreme temperatures and rain on the one hand, and the Oriental Mud-Dauber *Sceliphron curvatum* that constructs its mason nests predominantly within the insides of rooms in buildings with artificial temperature control by heating during the winter as well as protection from contact of the mason nests by the rain and abundant attacks by predators which allows in most cases even to resign from coverage of the cells of the mason nests by roughcast and to place the suites of cells without coverage by roughcast on various substrates including not necessarily only walls, but also strange substrates such as books, boxes, curtains, carpets, furniture, devices, clothing, lamps and window panes where the Palaearctic Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a) have never installed and would never install their mason nests on the other hand, there is no competition between the Palaearctic Mud-Dauber *Sceliphron destillatorium* and the Oriental Mud-Dauber *Sceliphron curvatum* for nesting sites, material supply and prey capturing. The Palaearctic Mud-Dauber *Sceliphron destillatorium* and the Oriental Mud-Dauber *Sceliphron curvatum* predominantly coexist within the same localities at different places on and in different buildings, utilize different regions for material supply and prey capturing, and in many cases do not even meet each other during the coexistence in limited distances within the same localities.

The artificial introduction of the Oriental Mud-Dauber *Sceliphron curvatum* as an exotical and external element into the European entomofauna in contrast to the original and indigenous provenance of the Palaearctic Mud-Dauber *Sceliphron destillatorium* which represents a primary resident in the European entomofauna has therefore not resulted in replacement of the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* by the secondary Oriental Mud-Dauber *Sceliphron curvatum* in the regions of its spreading in Europe, but has permitted predominantly a joint occurrence in coexistence within the same localities at different places on and in different buildings including utilization of different regions for material supply and prey capturing. The anthropogenical insertion of the Oriental Mud-Dauber *Sceliphron curvatum* by contamination of the European entomofauna with an exotical and external element that is an original resident of the Asiatical entomofauna and its subsequent radiation from the selected places of human introduction into the European entomofauna into various directions irrespective of natural patterns of spreading and distribution has thus resulted in the installation of an additional member into the European entomofauna during the last decades which does not disturb the biogeography and migration as well as the nesting strategy and reproduction biology of the Palaearctic Mud-Dauber *Sceliphron destillatorium* that is the original representative of this group of digger wasps in Europe since centuries or even more than a millennium.

In contrast to my above interpretation, GEPP (2003) and FATERYGA & KOVBLYUK (2013 a, 2013 b) have concluded that the Oriental Mud-Dauber *Sceliphron curvatum* probably disturbs and replaces the Palaearctic Mud-Dauber *Sceliphron destillatorium* in the regions of their joint occurrence. On the other hand, FATERYGA & KOVBLYUK (2013 a, 2013 b) have discovered differences in the taxonomical spectrum of the spiders which have been stored as provisions in the cells of the nests of the Palaearctic Mud-Dauber *Sceliphron destillatorium* and the Oriental Mud-Dauber *Sceliphron curvatum* as well as differences in the distribution of nests of the Palaearctic Mud-Dauber *Sceliphron destillatorium* and the Oriental Mud-Dauber *Sceliphron curvatum* on outer and inner walls of buildings in localities of their joint occurrence on the Crimea peninsula in the southern part of Ukraina which indicate that both species of the Mud-Dauber *Sceliphron* capture different taxonomical suites of spiders as prey, construct their mason nests with different priority of selection of nesting sites, and can thus live together independently from each other without competition. Cells of the nests of the Palaearctic Mud-Dauber *Sceliphron destillatorium* which have been investigated by ONCUROV (2000) and FATERYGA & KOVBLYUK (2013 a) have contained only spiders of the families Araneidae, Oxyopidae, Tetragnathidae and Thomisidae, whereas cells of the nests of the Oriental Mud-Dauber *Sceliphron curvatum* which have been analyzed by FATERYGA & KOVBLYUK (2013 b) have included in addition to spiders of the

families Araneidae, Oxyopidae, Tetragnathidae and Thomisidae also spiders of the families Anyphaenidae, Clubionidae, Gnaphosidae, Philodromidae, Salticidae and Theridiidae, but have not contained spiders of the family Tetragnathidae. Moreover, FATERYGA & KOVBLYUK (2013 a, 2013 b) have confirmed that the Oriental Mud-Dauber *Sceliphron curvatum* has stored predominantly juvenile individuals of spiders in the cells of its nests, whereas the Palaearctic Mud-Dauber *Sceliphron destillatorium* has filled the cells of its nests mainly with adult individuals of spiders, with this relationship again underlining the possibility of coexistence instead of competition of both species of the Mud-Dauber *Sceliphron*. The rate of successful development of eggs, larvae and pupae to wasps differs between abt. 49 % in the Palaearctic Mud-Dauber *Sceliphron destillatorium* and abt. 64 % in the Oriental Mud-Dauber *Sceliphron curvatum*, and in contrast to the occurrence of only one generation per year in the Palaearctic Mud-Dauber *Sceliphron destillatorium*, two generations per year are developed in in the Oriental Mud-Dauber *Sceliphron curvatum* (FATERYGA & KOVBLYUK 2013 a, 2013 b).

12.9 Different Constellations of Distribution

Because the Oriental Mud-Dauber *Sceliphron curvatum* has even already achieved a significantly farther northwards progradation than has been reached by the Palaearctic Mud-Dauber *Sceliphron destillatorium* as well as also the Delta Mud Wasp *Delta unguiculatum* and the Mason Bee *Megachile (Chalicodoma) parietina* (MADER 2000 a) troughout centuries as a consequence of the explosionary radiation of the Oriental Mud-Dauber *Sceliphron curvatum* within only a few decades from the localities of its human installation by contamination in Western Europe along various routes in different directions to other areas in Western Europe as well as to Eastern Europe and even to Southern Europe, the artificial introduction of the Oriental Mud-Dauber *Sceliphron curvatum* as an exotical and external element into the European entomofauna in contrast to the original and indigenous provenance of the Palaearctic Mud-Dauber *Sceliphron destillatorium* which represents a primary resident in the European entomofauna has therefore not only resulted in a joint occurrence of the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* and the secondary Oriental Mud-Dauber *Sceliphron curvatum* in coexistence within the same localities at different places on and in different buildings including utilization of different regions for material supply and prey capturing, but has also caused different successions of progradation and different constellations of distribution.

According to the differences in structure, pattern, network, directions and rapidity of expansion between the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* and the secondary Oriental Mud-Dauber *Sceliphron curvatum*, three constellations of distribution can be distinguished. The secondary Oriental Mud-Dauber *Sceliphron curvatum* has not only already arrived at many localities of occurrence of the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* within a time framework of only a few decades instead of a century or more, but the secondary Oriental Mud-Dauber *Sceliphron curvatum* has already conquered various localities within a time framework of only a few decades where the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* has so far not appeared even within a time framework of a century or more. On the other hand, the secondary Oriental Mud-Dauber *Sceliphron curvatum* has up to now not reached all the localities where the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* is already resident since quite some time.

Distinction can thus be made between localities where the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* is already established since quite some time but the secondary Oriental Mud-Dauber *Sceliphron curvatum* has not yet arrived, localities where the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* is already established since quite some time and the secondary Oriental Mud-Dauber *Sceliphron curvatum* has also already arrived and thus both species are present in coexistence, and localities which the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* has not yet reached whereas the secondary Oriental Mud-Dauber *Sceliphron curvatum* has already conquered these places prior to a possible future arrival of the primary Palaearctic Mud-Dauber *Sceliphron destillatorium*. Distinction can thus be made between localities where only the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* is already present and the secondary Oriental Mud-Dauber *Sceliphron curvatum* is still absent, localities where both the primary Palaearctic Mud-Dauber *Sceliphron destillatorium* and the secondary Oriental Mud-Dauber *Sceliphron curvatum* occur in coexistence, and localities where only the secondary Oriental Mud-Dauber *Sceliphron curvatum* is already present and the primary

Palaearctic Mud-Dauber *Sceliphron destillatorium* is still absent.

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14 References

ALLEN, H.W. (1926) : North American species of two-winged flies belonging to the tribe Miltogrammini. Proceedings of the United States National Museum, **68**/9 (2610) : 1 - 106; Washington.

ANANEVA, S.I., BABKINA, N.G., BLINUSOV, A.V., LOBOV, I.V., MAROCKINA, E.A., RYBCAK, R.V., TRUSICYNA, O.S. & CELTSOV, N.V. (2008) : Cadaster of invertebrate animals of Meserskij national park : 80 pp. (in Russian); Rjazanskij Oblastnoy Institut Razvitija Obrazovanija, Rjazan.

ANANEVA, S.I. & KOCETKOV, D.N. (1999) : Fauna of aculeate hymenoptera of Rjazan region. In : ANANEVA, S.I. (Editor), Fauna and ecology of animals. Sbornik Naucnych Dokladov Zoologiceskogo Obscestva RGPU, **1999** : 4 - 12 (in Russian); Rjazanskij Oblastnoy Institut Razvitija Obrazovanija, Rjazan.

ANANEVA, S.I. & KOCETKOV, D.N. (2001) : Rare species of aculeate hymenoptera of Rjazan region. In : ANANEVA, S.I. (Editor), Fauna and ecology of animals. Sbornik Naucnych Dokladov Zoologiceskogo Obscestva RGPU, **2001** : 3 - 6 (in Russian); Rjazanskij Oblastnoy Institut Razvitija Obrazovanija, Rjazan.

ANTROPOV, A.V. (1993) : Notes on three little known Palaearctic species of digger wasps (Hymenoptera, Sphecidae). Zoologiceskij Zhurnal, **72**/10 : 156 - 158 (in Russian); Moscow.

ARNOLD, N. (1902) : Catalogus Insectorum provinciae Mohilevensis. 150 pp.; Frolovoy, St. Petersburg.

ASSMUSS, E.P. (1859) : Symbola ad faunam Hymenopterologicam Mosquensem. Enumeratio Hymeno-

pterorum Spheciformium gubernii Mosquensis. Bulletin de la Société Impériale des Naturalistes de Moscou, **32**/1 : 604 - 620; Moscow.
ATANASSOV, N. (1955) : New and rare species of the fam. Sphecidae (Hymenoptera) for the fauna of Bulgaria. Bulletin de l'Institut Zoologique de l'Académie Bulgare des Sciences, **4/5** : 191 - 214 (in Bulgarian); Sofija.
ATANASSOV, N. (1962) : Investigations on systematics and ecology of the Hymenoptera species from the region of Petric (southwestern Bulgaria). Izvestiya na Zoologicheskiya Institut s Muzey, Bulgarska Akademiya na Naukite, Biologia, **12** : 109 - 172 (in Bulgarian); Sofija.
BAJARI, E. (1957) : Sphecoidea I. Fauna Hungariae, **20** (Hymenoptera III). Magyarország Allatvilága, **13**/7 : 1 - 117 (in Hungarian); Budapest.
BALDINI, U. (1894) : Contributions to the study of the Hymenoptera of Modena. Sphecidae - Vespidae. Atti della Società de Naturalisti di Modena, (3) **13** (28) : 45 - 86 (in Italian); Modena.
BALTHASAR, V. (1948) : Chrysididae, Sphegidae and Scoliidae of the environs of Parkan and Kovacov-hills (CSR - Slovakia). Casopis Ceskoslovenské Spolecnosti Entomologické, **45** : 133 - 146 (in Czech); Prague.
BALTHASAR, V. (1972) : Grabwespen - Sphecoidea. Fauna CSSR, **20** : 471 pp.; Academia, Prague.
BALTHASAR, V. & HRUBANT, M. (1961) : Beitrag zur Kenntnis der Hymenopteren-Fauna der Tschechoslowakei. Acta Faunistica Entomologica Musei Nationalis Pragae, **7** : 11 -17; Prague.
BATA, L. (1939) : Some remarks to the genus *Andrena* F. (Hymen., Apidae) and to other Hymenoptera. Entomologicke Listy, **2** : 9 - 16 (in Czech); Brno.
BATA, L. (1942) : Contribution to the faunistics of the Hymenoptera of Bohemia and Moravia. Entomologicke Listy, **5** : 85 - 88 (in Czech); Brno.
BEAUMONT, J.d. (1945) : Notes sur les Sphecidae de la Suisse. Mitteilungen der Schweizerischen Entomologischen Gesellschaft, **19**/10 : 467 - 481; Berne.
BEAUMONT, J.d. (1964) : Hymenoptera Sphecidae. Insecta Helvetica, **3**: 169 pp.; Concorde, Lausanne.
BECKER, A. (1866) : Reise in die Kirgisensteppe, nach Astrachan und an das Caspische Meer. Bulletin de la Société Impériale des Naturalistes de Moscou, **39**/2 : 163 - 207; Moscow.
BECKER, A. (1880) : Beiträge zu meinen Verzeichnissen der um Sarepta und am Bogdo vorkommenden Pflanzen und Insekten, und Beschreibung einer *Mylabris*-Larve. Bulletin de la Société Impériale des Naturalistes de Moscou, **55**/1 : 145 - 156; Moscow.
BELECKIJ, N. (1873) : List of the species of hymenopterous insects of the surroundings of Charkov. Trudy Obscestva Ispytateley Prirody pri Imperatorskom Charkovskom Universitete, **7** : 75 - 83 (in Russian); Charkov.
BELKE, G. (1853) : Quelques mots sur le climat et la faune de Kamieniec-Podolski. Bulletin de la Société Impériale des Naturalistes de Moscou, **26**/1 : 410 - 437; Moscow.
BELKE, G. (1858 a) : Short outline of the natural history of Kamieniec Podolski. Biblioteka Warszawska, Nowa Seria, **3** : 151 - 165, 353 - 379, 718 - 739 (all in Polish); Warsaw.
BELKE, G. (1858 b/1859) : Esquisse de l'histoire naturelle de Kamienietz-Podolski. Bulletin de la Société Impériale des Naturalistes de Moscou, **31**/3 (1858) : 97 - 158, **32**/1 (1859) : 24 - 106; Moscow.
BELKE, G. (1866) : Notice sur l'histoire naturelle du district de Radomysl (gouvernement de Kief). Bulletin de la Société Impériale des Naturalistes de Moscou, **39**/1 : 491 - 526; Moscow.
BELLMANN, H. (1999) : Der neue Kosmos-Insektenführer. 446 pp.; Franckh-Kosmos, Stuttgart. ISBN 3-440-07682-2.
BENEDEK, P. (1968) : The biotopes and the flower-visiting of the Hungarian Sphecoidea (Hym.). Folia Entomologica Hungarica, Nova Series, **21** : 63 - 88 (in Hungarian); Budapest.
BENEDEK, P. (1969) : A study on the sphecoid (Hymenoptera) fauna of marshy meadows, its zoogeographical and ecological aspects. Opuscula Zoologica, **9** : 77 - 86; Budapest.
BENEDEK, P. (1970) : Data to the insect fauna of Tapolca brook and its surroundings. IV. Sphecoidea (Hym.). Folia Entomologica Hungarica, Nova Series, **23** : 93 - 112 (in Hungarian); Budapest.
BENEDEK, P. (1975) : Specific structure and pollen gathering of hymenopterous visitors of blooming seed onion fields and their food plant relationships. Folia Entomologica Hungarica, Nova Series, **28** : 249 - 261 (in Hungarian); Budapest.
BENEDEK, P. (1979) : A zoogeographical analysis of the sphecoid (Hymenoptera : Sphecoidea) fauna of the Bakony Mountains. Veszprém Megyei Múzeumok Közleményei, Természettudomány, **14** : 221 - 238 (in Hungarian); Veszprém.
BEREZIN, A.U. (2010) : Ordinary yellow mud-dauber *Sceliphron destillatorium* (ILLIGER, 1807). In : Red data book of Chuvashia republic, **1**/2 : 135 - 136 (in Russian); Cheboksary.
BEREZIN, A.U. & KRASILNIKOV, V.A. (1998) : On some rare species of hymenoptera of Chuvashia republic. In : Entomological investigations in Chuvashia. Materials of the First Republican Entomologi-

cal Conference of Chuvashia in Cheboksary 1998 : 23 - 25 (in Russian); Cheboksary.
BERLAND, L. (1928) : Hyménoptères vespiformes II (Eumenidae, Vespidae, Masaridae, Bethylidae, Dryinidae, Embolemidae). Faune de France, **19** : 208 pp.; Lechevalier, Paris.
BERNARD, F. (1933) : Observations sur les Hyménoptères vespiformes des environs de Dieulefit (Drôme). Bulletin de la Société Entomologique de France, **38** : 59 - 63; Paris.
BERNARD, F. (1935) : Hyménoptères prédateurs des environs de Fréjus. Annales de la Société Entomologique de France, **104** : 31 - 72; Paris.
BIEGELEBEN, F. (1928/1929) : Aus dem Leben einheimischer Hautflügler. Der Schlern, **9** (1928) : 469 - 474, 503 - 508; **10** (1929) : 23 - 27, 59 - 64, 109 - 112; Bolzano.
BILANSKI, P., KOŁODZIEJ, Z. & PAJĄK, M. (2012) : Distribution of *Sceliphron destillatorium* ILLIGER, 1807 (Hymenoptera, Sphecidae) in Poland. Fragmenta Faunistica, **55** : 131 - 137; Warsaw.
BITSCH, J. (2010) : Compléments au volume 2 des Hyménoptères Sphecidae d'Europe occidentale (Faune de France 82). Bulletin de la Société Entomologique de France, **115**: 99 - 136; Paris.
BITSCH, J. & BARBIER, Y. (2006) : Répartition de l'espèce invasive *Sceliphron curvatum* (F. SMITH) en Europe et plus particulièrement en France (Hymenoptera, Sphecidae). Bulletin de la Société Entomologique de France, **111** : 227 - 237; Paris.
BITSCH, J., BARBIER, Y., GAYUBO, S.F., SCHMIDT, K. & OHL, M. (1997) : Hyménoptères Sphecidae d'Europe occidentale, **2**. Faune de France, **82** : 429 pp.; Paris.
BLÖSCH, M. (2000) : Die Grabwespen Deutschlands (Sphecidae s. str., Crabronidae) : Lebensweise, Verhalten, Verbreitung. In : BLANK, S.M. & TAEGER, A. (Editors), Die Tierwelt Deutschlands und der angrenzenden Meeresteile nach ihren Merkmalen und nach ihrer Lebensweise, **71**, Hymenoptera, II : 480 pp.; Goecke & Evers, Keltern. ISBN 3-931374-26-2.
BLÖSCH, M. (2012) : Grabwespen : Illustrierter Katalog der einheimischen Arten. 219 pp.; Westarp, Hohenwarsleben. ISBN 978-3-89432-257-1.
BLÜTHGEN, P. (1961) : Die Faltenwespen Mitteleuropas (Hymenoptera, Diploptera). Abhandlungen der Deutschen Akademie der Wissenschaften Berlin, Klasse Chemie, Geologie, Biologie, **1961**/2 : 1 - 251; Berlin. Deutsche Entomologische Zeitschrift, Neue Folge, **12** (1965) : 371 - 373; Berlin.
BOGUSCH, P., LISKA, P., LUKAS, J. & DUDICH, A. (2005) : Spreading and summary of the knowledge of the invasive sphecid wasp *Sceliphron curvatum* (SMITH 1870) in the Czech Republic and Slovakia (Hymenoptera : Apocrita, Sphecidae). Linzer Biologische Beiträge, **37** : 215 - 221; Linz.
BOGUSCH, P. & MACEK, J. (2005) : *Sceliphron caementarium* (DRURY 1773) in the Czech Republic in 1942 - first record from Europe? Linzer Biologische Beiträge, **37** : 1071 - 1075; Linz.
BOHART, R.M. & MENKE, A.S. (1963) : A reclassification of the Sphecinae, with a revision of the Nearctic species of the tribes Sceliphronini and Sphecini (Hymenoptera, Sphecidae). University of California Publications in Entomology, **30** : 91 - 181; Berkeley/California.
BOHART, R.M. & MENKE, A.S. (1976) : Sphecid wasps of the world : a generic revision. 695 pp.; University of California Press, Berkeley/California.
BROWNE, F.B. (1922) : On the life-history of *Melittobia acasta*, WALKER; a chalcid parasite of bees and wasps. Parasitology, **14** : 349 - 370; Cambridge.
BURGER, F., SAURE, C. & OEHLKE, J. (1998) : Rote Liste und Artenliste der Grabwespen und weiterer Hautflüglergruppen des Landes Brandenburg (Hymenoptera : Sphecidae, Vespoidea part., Evanioidea, Trigonalyoidea). Naturschutz und Landschaftspflege in Brandenburg, **2** : 24 - 43; Potsdam.
BURY, J., SUDOŁ, D., ZIĘBA, P. & ZYŁA, W. (2009) : New data of occurrence of the genus *Sceliphron* KLUG, 1801 (Hymenoptera, Sphecidae) in Poland. Acta Entomologica Silesiana, **17** : 11 - 18 (in Polish); Bytom.
BUYSSON, R.d. (1887/1888) : Descriptions de Chrysidides nouvelles. Revue d'Entomologie, **6** (1887) : 167 - 201, **7** (1888) : 1 - 13; Caen.
CAMPADELLI, G. & PAGLIANO, G. (1987) : In a nest of insects ... : a biocoenosis in nests of *Sceliphron destillatorium* (Hym. : Sphecidae). Agricoltura, **15**/8-9 : 39 - 41 (in Italian); Rome.
CARRIERE, J. (2003) : Les Pélopées de Saint-Michel du Bagnas : notes diverses de terrain (Hymenoptera, Sphecidae). Lambillionea, **103** : 419 - 425; Bruxelles.
CARRIERE, J. (2004) : A propos de *Sceliphron curvatum* (F. SMITH, 1870) dans l'Hérault - mythe ou réalité? (Hymenoptera : Sphecidae). Lambillionea, **104** : 159 - 164; Bruxelles.
CARRIERE, J. (2005) : *Sceliphron curvatum* (SMITH, 1870) dans l'Hérault : note etho-biologique complémentaire (Hymenoptera : Sphecidae). Lambillionea, **105** : 257 - 262; Bruxelles.
CELARY, W. (1996) : Remarks on the biology and distribution of *Sceliphron destillatorium* (ILLIGER) (Hymenoptera : Sphecidae) in Poland. Polskie Pismo Entomologiczny, **65** : 253 - 256; Wrocław.
CELARY, W. (1998) : New and rare species of Hymenoptera Aculeata confirmed in southern Poland.

Chrońmy Przyrodę Ojczystą, **54**/6 : 105 - 110 (in Polish); Cracow.
CETKOVIC, A., MOKROUSOV, M.V., PLECAS, M., BOGUSCH, P., ANTIC, D., DOROVIC-JOVANOVIC, L., KRPO-CETKOVIC, J. & KARAMAN, M. (2011) : Status of the potentially invasive Asian species *Sceliphron deforme* in Europe and an update on the distribution of *S. curvatum* (Hymenoptera : Sphecidae). Acta Entomologica Serbica, **16** : 91 - 114; Belgrade.
CETKOVIC, A., RADOVIC, I. & DOROVIC, L. (2004) : Further evidence of the Asian mud-daubing wasps in Europe (Hymenoptera : Sphecidae). Entomological Science, **7**: 225 - 229; Mito.
CHRIST, J.L. (1791) : Naturgeschichte, Klassifikation und Nomenclatur der Insekten vom Bienen, Wespen und Ameisengeschlecht; als der fünften Klasse fünfte Ordnung des Linneischen Natursystems von den Insekten : Hymenoptera (mit häutigen Flügeln). 535 pp.; Herrmann, Frankfurt am Main.
CHYZER, K. (1901/1902) : The Hymenoptera of the comitate of Zemplén. Rovartani Lapok, **8** (1901) : 184 - 186, 206 - 209; **9** (1902) : 16 - 18, 32 - 34, 54 - 56 (all in Hungarian); Budapest.
CINGOVSKI, J. (1960) : Contribution to the knowledge of the Aculeata fauna (Aculeata Hymenoptera) in Makedonia. Acta Musei Macedonici Scientiarum Naturalium, **7**/1 (61) : 1 - 18 (in Makedonian); Skopje.
COULON, L. (1925) : Les Sphégides ou Guêpes fouisseuses du Musée d'Elbeuf (collection européenne). Bulletin de la Société d'Etude des Sciences Naturelles et du Musée d'Histoire Naturelle d'Elbeuf, **43** : 105 - 126; Elbeuf.
CURTIS, J. (1828 - 1834) : British Entomology : being illustrations and descriptions of the genera of insects found in Great Britain and Ireland, **5** (1828) : 195 - 241, **8** (1831) : 338 - 385, **9** (1832) : 386 - 433, **10** (1833) : 434 - 481, **11** (1834) : 482 - 529; Curtis, London.
DAHLBOM, A.G. (1843 - 1845) : *Sphex* in sensu Linneano. In : Hymenoptera Europaea praecipue borealia, **1** : 528 pp.; Lundberg, Lund.
DAHMS, E.C. (1984) : Revision of the genus *Melittobia* (Chalcidoidea : Eulophidae) with the description of seven new species. Memoirs of the Queensland Museum, **21**/2 : 271 - 336; Brisbane.
DEVAN, P. (1999) : Interesting records of sphecid wasps in Biele Karpaty mountains. Sborník Prírodovedného Klubu v Uherském Hradisti, **4** : 119 - 120 (in Slovakian); Uherské Hradiste.
DITTRICH, R. (1924) : *Chalicodoma muraria* F. in einem Steinbruch der Umgegend von Frankenstein. In : Auszüge aus den Sitzungsberichten 1921 - 1923. Jahreshefte des Vereins für Schlesische Insektenkunde Breslau, **14** : p. 6; Breslau.
DOLLFUSS, H. (1987) : Neue und bemerkenswerte Funde von Grabwespen (Hymenoptera, Sphecidae) in Österreich. Linzer Biologische Beiträge, **19** : 17 - 25; Linz.
DOLLFUSS, H. (1991) : Bestimmungsschlüssel der Grabwespen Nord- und Zentraleuropas (Hymenoptera, Sphecidae) mit speziellen Angaben zur Grabwespenfauna Österreichs. Stapfia, **24** : 1 - 247; Linz.
DOLLFUSS, H., GUSENLEITNER, J. & BREGANT, E. (1998) : Grabwespen im Burgenland (Hymenoptera, Sphecidae). Stapfia, **55** : 507 - 552; Linz.
DOROW, W. (1988) : Die größte mitteleuropäische Eumenide, *Delta unguiculatus* (VILL. 1789), neu für Hessen (Hymenoptera : Eumenidae). Mitteilungen des Internationalen Entomologischen Vereins, **13**/1 : 25 - 27; Frankfurt am Main.
DOURS, A. (1873) : Catalogue synonymique des Hyménoptères de France. Mémoires de la Société Linnéenne du Nord de la France, **3** : 1 - 230; Amiens.
DREWES, B. (2003) : Revision der Grabwespen der Sammlung H. WEIFFENBACH des Landesmuseums für Natur und Mensch Oldenburg (Hymenoptera, Sphecidae). Drosera, **2003** : 131 - 144; Oldenburg.
DRURY, D. (1773) : Illustrations of natural history, **2** : 90 pp.; White, London.
DULAC, A. (1956) : Groupes divers. Travaux du Laboratoire de Zoologie et de la Station Aquicole Grimaldi de la Faculté des Sciences de Dijon, **14** : 12 - 13; Dijon.
EGGER, A. (1974) : Ein seltener Grabwespenfund, *Sceliphron destillatorius* ILL. vor den Toren Wiens (Hymenoptera, Fossores). Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen, **25** : 57 - 62; Vienna.
ELLIGSEN, H. (1998) : Die Stechimmenfauna von Magerrasen und Uferabbrüchen in den ukrainischen Vorkarpaten (Hymenoptera : Aculeata). Entomologische Zeitschrift, **108** : 65 - 79; Essen.
ERLANDSSON, S. (1974) : Hymenoptera aculeata from the European parts of the Mediterranean countries. Eos, Revista Española de Entomologia, **48** : 11 - 93; Madrid.
ESENBEKOVA, P.A. (2001) : Digger wasps (Hymenoptera, Sphecidae) of anthropogenical biotopes in foreland and low hills of the Zailiyskiy Alatau. Vestnik Kazakhskogo Gosudarstvennogo Universiteta, Serija Biologija, **4** : 84 - 97 (in Russian); Almaty.

EVANS, H.E. & EBERHARD, M.J.W. (1970) : The wasps. 265 pp.; David & Charles, Newton Abbot.
EVERSMANN, E. (1848) : Die Brutstelle des *Pelopaeus destillatorius* ILLIG. DAHLB. (*Sphex spirifex* PANZ. faun. germ. 76. 15.). Bulletin de la Société Impériale des Naturalistes de Moscou, **21**/3 : 248 - 251; Moscow.
EVERSMANN, E. (1849) : Fauna hymenopterologica Volgo-Uralensis. Fam. III. Sphegidae LATR. Bulletin de la Société Impériale des Naturalistes de Moscou, **22**/2 : 359 - 436; Moscow.
FABRICIUS, J.C. (1775) : Systema entomologiae sistens insectorum classes, ordines, genera, species, adjectis synonymis, locis, descriptionibus, observationibus. 832 pp.; Korte, Flensburg/Leipzig.
FABRICIUS, J.C. (1781) : Species insectorum exhibentes eorum differentias specificas, synonyma auctorum, loca natalia, metamorphosin adiectis observationibus, descriptionibus, **1** : 552 pp., **2** : 517 pp.; Bohn, Hamburg/Kiel.
FABRICIUS, J.C. (1787) : Mantissa insectorum sistens eorum species nuper detectas adiectis characteribus genericis, differentiis, specificis, emendationibus, **1** : 348 pp.; Proft, Hafniae.
FABRICIUS, J.C. (1793) : Entomologia systematica emendata et aucta secundum classes, ordines, genera, species, adjectis synonymis, locis, observationibus, descriptionibus, **2** : 519 pp.; Proft, Hafniae.
FABRICIUS, J.C. (1804) : Systema piezatorum, secundum ordines, genera, species, adjectis synonymis, locis, observationibus, descriptionibus. 440 pp.; Reichard, Braunschweig.
FAHRINGER, J. (1922) : Hymenopterologische Ergebnisse einer wissenschaftlichen Studienreise nach der Türkei und Kleinasien (mit Ausschluß des Amanusgebirges). Archiv für Naturgeschichte, (A) **88**/9 : 149 - 222; Berlin.
FATERYGA, A.V. (2007) : Utilization of cells of nests of the genus *Sceliphron* (Hymenoptera, Sphecidae) by the solitary wasp *Ancistrocerus auctus* (Hymenoptera, Vespidae) in Crimea. In : Problems and perspectives of general entomology. Abstracts of the papers of the 13th congress of the Russian Entomological Society 09.09. - 15.09.2007 in Krasnodar : p. 372 (in Russian); Krasnodar.
FATERYGA, A.V. & KOVBLYUK, M.M. (2013 a) : Nesting ecology of the wasp *Sceliphron destillatorium* (ILLIGER, 1807) (Hymenoptera, Sphecidae) in the Crimea. Caucasian Entomological Bulletin, **9** : in press (in Russian); Rostov-on-Don.
FATERYGA, A.V. & KOVBLYUK, M.M. (2013 b) : Nesting ecology of the wasp *Sceliphron curvatum* (F. SMITH, 1870) (Hymenoptera, Sphecidae) in Ukraina. Eurasian Entomological Journal, **12** : in press (in Russian); Novosibirsk.
FLECHTNER, G. & KLINGER, R. (1990) : Innerstädtische Lebensräume als Refugien für Insekten. In : CONERT, H.J. (Editor), Ergebnisse der 10. Sitzung der Arbeitsgruppe "Biotopkartierung im besiedelten Bereich". Courier des Forschungs-Institutes Senckenberg, **126** : 59 - 68; Frankfurt am Main.
FOMICEV, A.I. & MINORANSKIJ, V.A. (1971) : Adaptations of the species *Sceliphron destillatorium* (ILL.), allowing its settlement in northern direction. Proceedings of the 13th International Congress of Entomology 1968 in Moscow, **1** : 494 - 495 (in Russian); Nauka, Leningrad.
FORSTER, J.R. (1771) : Novae species Insectorum, Centuria I. 100 pp.; White, London.
FOURCROY, A.F. (1785) : Entomologia parisiensis, sive catalogus insectorum, quae in agro parisiensi reperiuntur. 544 pp.; Paris.
FRAUENFELD, G.v. (1861) : Dritter Beitrag zur Fauna Dalmatiens, nebst einer ornithologischen Notiz. Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien, **11** : 97 - 110; Vienna.
FRIESE, H. (1926) : Die Bienen, Wespen, Grab- und Goldwespen. In : SCHRÖDER, C. (Editor), Die Insekten Mitteleuropas insbesondere Deutschlands, **1** : Hymenopteren, Teil **1** : 1 - 192; Franckh, Stuttgart.
FRILLI, F. (1966) : Studies on the ichneumonid hymenoptera. II. Revision of the European and Mediterranean species of the genus *Acroricnus* RATZENBURG (Cryptinae). Entomologica, **2** : 1 - 20 (in Italian).
FRITSCH, C. (1858) : Beobachtungen über periodische Erscheinungen im Pflanzen- und Tierreiche. Jahrbuch der Central-Anstalt für Meteorologie und Erdmagnetik, **5** (1853), Anhang : 1 - 84; Vienna.
FRITSCH, K. (1878) : Jährliche Periode der Insektenfauna von Österreich-Ungarn. III. Die Hautflügler (Hymenoptera). Denkschriften der Akademie der Wissenschaften Wien, Mathematisch-Naturwissenschaftliche Klasse, (I) **38** : 97 - 166; Vienna.
FRITSCH, K. (1915) : Untersuchungen über die Bestäubungsverhältnisse südeuropäischer Pflanzenarten, insbesondere solcher aus dem österreichischen Küstenlande (Fünfter und letzter Teil). Sitzungs-Berichte der Akademie der Wissenschaften Wien, Mathematisch-Naturwissenschaftliche Klasse, (I) **124** : 255 - 290; Vienna.
FROMMER, U. (2012) : Mediterrane Stechimmen (Hymenoptera, Aculeata) in Deutschland und angrenzenden Gebieten nach 1990. Eine Übersicht anlässlich des aktuellen Nachweises der mediterra-

nen Töpferwespe *Eumenes m. mediterraneus* KRIECHBAUMER, 1879 (Vespidae, Eumeninae). Mitteilungen des Internationalen Entomologischen Vereins, **37** : 175 - 197; Frankfurt am Main.
GASPERINI, R. (1887) : Notes on the fauna of Hymenoptera in Dalmatia. Annuario Dalmatico, **4** (in Italian); Zara.
GASPERINI, R. (1889) : Notes on the fauna of Hymenoptera in Dalmatia. Annuario Dalmatico, **5** (in Italian); Zara.
GAUSS, R. (1967) : Verzeichnis der im badischen Gebiet bekanntgewordenen aculeaten Hautflügler und Goldwespen (Hymenoptera) sowie von stylopisierten Arten. Mitteilungen des Badischen Landesvereins für Naturkunde und Naturschutz, Neue Folge, **9**/3 : 529 - 587; Freiburg.
GAUSS, R. (1997) : *Sceliphron* - Gast oder Migrant? Bembix, **9** : p. 17; Bielefeld.
GAYUBO, S.F. (1981) : Higher Hymenoptera of the Sierra de Béjar : Sphecidae II : Ampulicinae, Sphecinae and Pemphredoninae (Hym.). Boletin de la Asociación Española de Entomologia, **4** (1980) : 131 - 149 (in Spanish); Salamanca.
GAYUBO, S.F. (1984) : Contribution to the knowledge of the digger wasps of the Algarve (Portugal) (Hym., Sphecidae). Boletim da Sociedad Portuguesa de Entomologia, **59** : 349 - 387 (in Spanish); Lisboa.
GAYUBO, S.F. & HERAS, C. (1986) : Fauna of digger wasps of the areas of Cuéllar and Segovia (provinces of Segovia and Valladolid) (Hymenoptera : Sphecidae). Acta Salamanticensia, Seria Varia, **78** : 106 pp. (in Spanish); Salamanca.
GEPP, J. (1995) : Die Orientalische Mauerwespe *Sceliphron curvatum* (SMITH 1870) : Biologie und Ausbreitungsgeschichte in Ostösterreich (Hymenoptera, Sphecidae). In : Einwanderer : Neue Tierarten erobern Österreich. Stapfia, **37**, zugleich Kataloge des Oberösterreichischen Landesmuseums, Neue Folge, **84** : 153 - 166; Linz.
GEPP, J. (2003) : Verdrängt die eingeschleppte Mauerwespe *Sceliphron curvatum* autochthone Hymenopteren im Südosten Österreichs? Entomologica Austriaca, **8** : p. 18; Vienna.
GEPP, J. & BREGANT, E. (1986) : Zur Biologie der synanthropen, in Europa eingeschleppten Orientalischen Mauerwespe *Sceliphron (Prosceliphron) curvatum* (SMITH, 1870) (Hymenoptera, Sphecidae). Mitteilungen des Naturwissenschaftlichen Vereins der Steiermark, **116**: 221 - 240; Graz.
GERMAR, E.F. (1817) : Reise nach Dalmatien und in das Gebiet von Ragusa. 323 pp.; Brockhaus, Leipzig/Altenburg.
GIRARD, M. (1879) : Traité élémentaire d'Entomologie comprenant l'histoire des espèces utiles et de leurs produits, des espèces nuisibles et des moyens de les détruire, l'étude des métamorphoses et des moeurs, les procédés de chasse et de conservation, **2** : 1028 pp.; Baillière, Paris.
GOGALA, A. (2011) : Sphecid wasps of Slovenia (Hymenoptera : Ampulicidae, Sphecidae and Crabronidae). Scopolia, Journal of the Slovenian Museum of Natural History, **73** : 1 - 39; Ljubljana.
GONSETH, Y., IMBECK, P. & TUSSAC, M. (2001) : *Sceliphron curvatum* (SMITH, 1870), une espèce nouvelle de la faune suisse et de la faune de France (Hymenoptera Sphecidae). Mitteilungen der Schweizerischen Entomologischen Gesellschaft, **74** : 99 - 103; Zürich.
GOROBCHISHIN, V.A. (1995) : Digger wasps (Hymenoptera, Sphecidae) of the Kanev nature reserve and adjacent territories. Izvestija Charkovskogo Entomologiceskogo Obscestva, **3** : 17 - 19 (in Russian); Charkov.
GOROBCHISHIN, V.A. (1996) : Biotopical distribution of digger wasps (Hymenoptera, Sphecidae) of the Kanev nature reserve and adjacent territories. Zapovydna Sprava v Ukrainy, **2** : 52 - 53 (in Russian); Kijiv.
GOROBCHISHIN, V.A. (1998) : Digger wasps (Hymenoptera, Sphecidae) of the city of Kijiv and its southern vicinity. Visnyk Kijivskogo Universiteta, Biologia, **28** : 48 - 50 (in Ukrainian); Kijiv.
GOROBCHISHIN, V.A. (2004) : Digger wasps (Hymenoptera, Sphecidae) of the reserve "Obyticna Kosa". In : Actual problems of zoological science. Materials of the All-Ukrainian Scientific Conference 2004 in Kijiv : 33 - 34 (in Ukrainian); Kijiv.
GOROBCHISHIN, V.A. (2005) : Digger wasps (Hymenoptera : Sphecidae : Sphecinae, Astatinae, Pemphredoninae) of forest-steppes of Ukraine (fauna and ecology information). Proceedings of Zoological Museum of Kijiv, **3** : 46 - 63 (in Ukrainian); Kijiv.
GRAEFFE, E. (1911) : Übersicht der Grabwespen (Fossores) des Küstenlandes. Bollettino della Società Adriatica di Scienze Naturali in Trieste, **25** : 41 - 53; Trieste.
GRANDI, G. (1937) : Contributions to the knowledge of aculeate Hymenoptera XVI. Bollettino dell'Istituto di Entomologia della Università di Bologna, **9** : 253 - 346 (in Italian); Bologna.
GRANDI, G. (1961) : Studies of an entomologist on higher Hymenoptera. Bollettino dell'Istituto di Entomologia della Università di Bologna, **25** : 1 - 659 (in Italian); Bologna.
GROZDANOVIC, J. (1957) : Sphegidae of the vicinity of Belgrade. Zastita Bilja, **39/40** : 3 - 24 (in Serbo-

croatian); Belgrade.
GUSENLEITNER, J. (1991) : Neue und bemerkenswerte Grabwespenfunde für Österreich (Hymenoptera, Sphecidae). Linzer Biologische Beiträge, **23** : 643 - 648; Linz.
GUSENLEITNER, J. (1992) : Neue und bemerkenswerte Grabwespenfunde für Österreich (Hymenoptera, Sphecidae). Linzer Biologische Beiträge, **24** : 683 - 689; Linz.
GUSENLEITNER, J. (1996 a) : Hymenopterologische Notizen aus Österreich - 6 (Insecta : Hymenoptera aculeata). Linzer Biologische Beiträge, **28** : 809 - 816; Linz.
GUSENLEITNER, J. (1996 b) : Kurzbericht über Sphecinae in Istrien (Croatia) (Hymenoptera, Sphecidae). Linzer Biologische Beiträge, **28** : 817 - 819; Linz.
GUSSAKOVSKIJ, V. (1935) : On the fauna of the wasps (Hymenoptera, Sphecoidea and Vespoidea) of Tadzikistan. Trudy Tadzikskoj Bazy Akademii Nauk SSSR, **5** : 409 - 467 (in Russian); Moscow/Leningrad.
GUSSAKOVSKY, V. (1936) : Schwedisch-chinesische wissenschaftliche Expedition nach den nordwestlichen Provinzen Chinas, unter Leitung von Dr. Sven Hedin und Prof. Sü Ping-chang. Insekten, gesammelt vom schwedischen Arzt der Expedition Dr. David Hummel 1927 - 1930. 41. Hymenoptera. 6. Sphegidae. Arkiv för Zoologi, **27**/A 21 : 1 - 15; Stockholm.
HAMON, J., BITSCH, J., SCHWARTZ, F., MALDES, J.M., DELMAS, R., ADAMSKI, A. & TUSSAC, H. (1989) : Quelques observations sur la distribution en France d'un insecte américain *Sceliphron caementarium* (DRURY, 1773) (Hymenoptera, Sphecidae). Entomologiste, **45** : 115 - 120; Paris.
HEDICKE, H. (1930) : Hautflügler, Hymenoptera. In : BROHMER, P., EHRMANN, P. & ULMER, G. (Editors), Die Tierwelt Mitteleuropas : ein Handbuch zu ihrer Bestimmung als Grundlage für faunistisch-zoogeographische Arbeiten, **5**/11 : 1 - 246; Quelle & Meyer, Leipzig.
HELLRIGL, K. (2004) : Zur Verbreitung eingeschleppter Grabwespen (Hymenoptera : Sphecidae) in Südtirol und Norditalien. Forest Observer, **1** : 181 - 196; Bolzano.
HENSEN, R.V. (1986) : Revision of the subgenus *Prosceliphron* VAN DER VECHT (Hymenoptera, Sphecidae). Tijdschrift voor Entomologie, **129** : 217 - 261; Amsterdam.
HERBST, J.F.W. (1783) : Kritisches Verzeichnis meiner Insektensammlung. Archiv der Insektengeschichte, **4** (1783) : 1 - 72, **5** (1784) : 73 - 151; Zürich.
HERMAN, O. (1873) : The Mezöség. II. The Mezö-Záh-Tóháti, as well as the Méhesi, Báldi and Mezö-Sályi series of ponds, concerning natural history and particularly zoology. Az Erdélyi Muzeum-Egylet Evkönyvei, **6** (1871 - 1873) : 42 - 67 (in Hungarian); Kolozsvárt.
HERRICH-SCHÄFFER, G.A.W. (1835) : Nomenclator entomologicus. Verzeichnis der europäischen Insekten; zur Erleichterung des Tauschverkehrs mit Preisen versehen. **1** : 116 pp., **2** : 244 pp.; Pustet, Regensburg.
HERRICH-SCHÄFFER, A. (1840) : II. Animalia articulata. Classis I. Insecta. In : KOCH, K.L., HERRICH-SCHÄFFER, A. & FORSTER, F., Fauna Ratisbonensis, oder Übersicht der in der Gegend um Regensburg einheimischen Tiere. In : FÜRNROHR, A.E. (Editor), Naturhistorische Topographie von Regensburg, **3** : 45 - 386; Manz, Regensburg.
HERRICH-SCHÄFFER, G.A.W. (1841) : Deutschlands Insekten, herausgegeben von Dr. G.W.F. PANZER, fortgesetzt von Dr. G.A.W. HERRICH-SCHÄFFER, **27**; Pustet, Regensburg.
HERRMANN, M. (2007) : Zur Unterscheidung der Nester der Schwarzen Mörtelbiene (*Megachile (Chalicodoma) parietina*) und der Deltawespe (*Delta unguiculatum*) in Mitteleuropa. Bembix, **25** : 10 - 14; Bielefeld.
HEYMONS, R. (1915) : Die Vielfüßler, Insekten und Spinnenkerfe. In : STRASSEN, O.z. (Editor), Brehms Tierleben : Allgemeine Kunde des Tierreichs, 4th Edition, **2** : 716 pp.; Bibliographisches Institut; Leipzig/Vienna.
HOFFER, A. (1954) : Observations to the distribution and biology of *Sceliphron destillatorius* ILL. in Czechoslovakia in special regard to her existence in Bohemia. Casopis Národniho Musea, Oddil Prírodovedny, **123** : 122 - 123 (in Czech and in English); Prague.
HORN, W. & SCHENKLING, S. (1928) : Index Litteraturae Entomologicae. Serie I : Die Welt-Literatur über die gesamte Entomologie bis inklusive 1863. 1426 pp. (4 volumes); Horn, Berlin.
HUBER, A. (1916) : Die wärmeliebende Tierwelt der weitern Umgebung Basels. Archiv für Naturgeschichte, (A) **82**/7 : 1 - 120; Berlin.
ILLIGER, K. (1807) : Fauna Etrusca sistens Insecta quae in provinciis Florentina et Pisana praesertim collegit Petrus Rossius, **2** : 511 pp.; Fleckeisen, Helmstadt.
ISLAMOV, S.D. (1971) : Study of the digger wasp genus *Sceliphron* KLUG (Hymenoptera, Sphecidae) in Uzbekistan. Uzbekskij Biologiceskij Zhurnal, **1971**/4 : 55 - 57 (in Russian); Taskent.
ISLAMOV, S.D. (1986) : Digger wasps (Hymenoptera, Sphecidae) of the mountaineous regions of Uzbekistan. Entomologiceskoe Obozrenie, **65** : 513 - 534 (in Russian); Leningrad. Entomological Review,

66/2 (1987) : 35 - 59; New York.
ISLAMOV, S.D. (1989) : Digger wasps (Hymenoptera, Sphecidae) hunting straight-winged insects in the western Tien-Shan. Uzbekskij Biologiceskij Zhurnal, **1989**/5 : 49 - 50 (in Russian); Taskent.
ISLAMOV, S.D. & KAZENAS, V.L. (1979) : Feeding relationships of digger wasps (Hymenoptera, Sphecidae) with entomophilous plants in mountaineous regions of Uzbekistan. Uzbekskij Biologiceskij Zhurnal, **1979**/4 : 64 - 65 (in Russian); Taskent.
IVANOV, P. (1872) : List of the Hymenoptera Monotrocha having been found in the surroundings of Kupjansk. Trudy Obscestva Ispytatelej Prirody pri Imperatorskom Charkovskom Universitete, **6** : 149 - 166 (in Russian); Charkov.
IVANOV, S.P. & FATERYGA, A.V. (2003) : Nesting of solitary eumenid wasp *Ancistrocerus auctus* (Hymenoptera : Vespidae : Eumeninae) in the nests of the sphecid wasp *Sceliphron destillatorium* (Hymenoptera : Sphecidae) in the Crimea. Ecosystems of the Crimea, their Optimization and Protection, **13** : 89 - 94 (in Russian); Simferopol.
IWATA, K. (1976) : Evolution of instinct. Comparative ethology of hymenoptera. 535 pp.; Amerind, New Delhi.
JACOBS, H.J. (2007) : Die Grabwespen Deutschlands (Ampulicidae, Sphecidae, Crabronidae) : Bestimmungsschlüssel. In : BLANK, S.M. & TAEGER, A. (Editors), Die Tierwelt Deutschlands und der angrenzenden Meeresteile nach ihren Merkmalen und nach ihrer Lebensweise, **79**, Hymenoptera, III : 207 pp.; Goecke & Evers, Keltern. ISBN 978-3-937783-33-8.
JACOBS, H.J. & OEHLKE, J. (1990) : Beiträge zur Insektenfauna der DDR : Hymenoptera : Sphecidae. 1. Nachtrag. Beiträge zur Entomologie, **40** : 121 - 229; Berlin.
JAHN, T., CALATIN-KRAUSS, A., HOFFRICHTER, O., LANGE, H., MIOTK, P. & NEUB, M. (1976) : Wirbellose 1. Brehms Neue Tierenzyklopädie, **11** : 328 pp.; Herder, Freiburg/Basel/Vienna.
JANKOWSKI, W. & POMORSKI, R.J. (1996) : Analysis of the occurrence of the mason bee *Chalicodoma muraria* and other species of the entomofauna in the reservation Skałki Stoleckie. Scientific-entomological documentation. Expert opinion by order of the Wydział Ochrony Srodowiska of the Urząd Wojewódzki in Wałbrzych : 11 pp. (in Polish); Wrocław (unpublished).
JAROSEVSKIJ, V.A. (1881) : Materials for the entomology of the gouvernement of Charkov. III. List of the hymenopterous insects (Hymenoptera) having been found in the gouvernement of Charkov. Trudy Obscestva Ispytateley Prirody pri Imperatorskom Charkovskom Universitete, **15** : 105 - 144 (in Russian); Charkov.
JAROSIEWICZ, G. (2012) : New record of *Sceliphron destillatorium* (ILLIGER, 1807) (Hymenoptera : Sphecidae) from the Western Beskidy Mts. Acta Entomologica Silesiana, **20** : p. 89 (in Polish); Bytom.
JASZAY, T. & PANIGAJ, L. (1988) : Results of the entomological research during the 12th Východoslovenský Tábor Ochrancov Prírody in the district of Presov. In : CIBULKOVA, S. & BUDAIVA, J. (Editors), Prehlad odborných výsledkov, 12th Východoslovenský Tábor Ochrancov Prírody 30.07. - 06.08.1988 in Sigord - Kokosovce : 154 - 169 (in Slovakian); Presov.
JOZAN, Z. (1983) : The Aculeata fauna of the juniper woodland of Barcs, Hungary I. Studia Pannonica, (A) Series Historico-Naturalis, **3** : 89 - 113 (in Hungarian); Pécs.
JOZAN, Z. (1985) : Fundamental faunistic data on Sphecoid wasps (Hymenoptera, Sphecoidea) of south Transdanubia, Hungary. Janus Pannonius Múzeum Evkönyve, **29** (1984) : 53 - 86 (in Hungarian); Pécs.
JOZAN, Z. (1989) : The Aculeata fauna of the nature reservation of Tihany, Hungary (Hymenoptera). Folia Musei Historico-Naturalis Bakonyiensis, **8** : 79 - 110 (in Hungarian); Zirc.
JOZAN, Z. (1990) : The Scolioidea, Sphecoidea and Apoidea fauna of the Bátorliget nature reserves (Hymenoptera : Aculeata). In : MAHUNKA, S. (Editor), The Bátorliget nature reserves - after forty years. Studia Naturalia, **1** : 601 - 621 (in Hungarian); Budapest.
JOZAN, Z. (1992 a) : Zoogeographical and oecofaunistic examination of the Zselic hills digger wasp fauna (Hymenoptera, Sphecoidea). Somogyi Múzeumok Közleményei, **9** : 279 - 292 (in Hungarian); Kaposvár.
JOZAN, Z. (1992 b) : Compendium of Aculeata (Hymenoptera) fauna of the Béda-Karapancsa landscape protection area, South Hungary. Studia Pannonica, (A) Series Historico-Naturalis, **6** : 219 - 248 (in Hungarian); Pécs.
JOZAN, Z. (1996) : Standard work on the fauna Hymenoptera Aculeata of the Baláta region. Somogyi Múzeumok Közleményei, **12** : 271 - 297 (in Hungarian); Kaposvár.
JOZAN, Z. (1998) : The Aculeata fauna of the Duna-Dráva National Park, Hungary (Hymenoptera, Aculeata). Studia Pannonica, (A) Series Historico-Naturalis, **9** : 291 - 327 (in Hungarian); Pécs.
JOZAN, Z. (2000 a) : Further data to the knowledge of the sphecoid fauna (Hymenoptera : Sphecoidea) of the Bakony Mountains. Folia Musei Historico-Naturalis Bakonyiensis, **15** (1996) : 101 - 123 (in

Hungarian); Zirc.
JOZAN, Z. (2000 b) : The Aculeata (Hymenoptera) fauna of the Villány Hills, South Hungary. Studia Pannonica, (A) Series Historico-Naturalis, **10** : 267 - 283 (in Hungarian); Pécs.
JOZAN, Z. (2001) : The Aculeata fauna of Somogy county (Hymenoptera, Aculeata). In : LEVENTE, A. (Editor), Catalogue of the fauna of Somogy county. Natura Somogyiensis, **1** : 269 - 293 (in Hungarian); Kaposvár. ISBN 963-7212-25-6.
JOZAN, Z. (2002 a) : The Aculeata fauna of Örség and its vicinity (Western Hungary). Praenorica, Folia Historico-Naturalia, **6** : 59 - 96 (in Hungarian); Szombathely.
JOZAN, Z. (2002 b) : Faunistical, zoogeographical and ecofaunistical investigation on the Sphecoids fauna of the Mecsek Mountains (Hymenoptera : Sphecoidea). Natura Somogyiensis, **3** : 45 - 56 (in Hungarian); Kaposvár. ISBN 963-7212-27-2.
JOZAN, Z. (2003) : Aculeata fauna of the Látrányi Puszta nature conservation area (Hymenoptera : Aculeata). In : LEVENTE, A. (Editor), Fauna and vegetation of the Látrányi Puszta nature conservation area. Natura Somogyiensis, **5** : 209 - 233 (in Hungarian); Kaposvár. ISBN 963-7212-36-1.
JOZAN, Z. (2006) : Contribution to the knowledge of Aculeata fauna of the Transdanubian region (SW Hungary) (Hymenoptera : Aculeata). Natura Somogyiensis, **9** : 279 - 288 (in Hungarian); Kaposvár. ISBN 963-7212-52-3.
JOZAN, Z. (2007) : New data to the Aculeata fauna of the Zselic hills (Hymenoptera, Aculeata). Somogyi Múzeumok Közleményei, B (Természettudomány), **17** (2006) : 169 - 182 (in Hungarian); Kaposvár.
JOZAN, Z. (2009) : Contribution to the knowledge of the Croatian Aculeata fauna (Hymenoptera, Aculeata). Natura Somogyiensis, **15** : 159 - 180; Kaposvár. ISBN 978-963-7212-69-7.
JOZAN, Z. (2010) : New data to the fauna of Aculeata (Hymenoptera) in Somogy county (Hungary). Natura Somogyiensis, **17** : 251 - 256 (in Hungarian); Kaposvár. ISBN 978-963--7212-73-4.
KARSAI, I. (1988) : Ecofaunistical investigation of sphecoid fauna on a sandy grassland. Acta Biologica Szegediensis, Nova Series, **34** : 97 - 106; Szeged.
KAZAKOVA, M.V., KRIVTSOV, V.A., NAZAROV, I.P., IVANCEV, V.P., PRIKLONSKIJ, S.G. & SOBOLEV, N.A. (2004) : National nature reserve of regional significance "Valley of the Wysh River". In : Nature reserve fund of Rjazan region : 339 - 343 (in Russian); Russian Word, Rjazan.
KAZENAS, V.L. (1971) : Digger wasps (Hymenoptera, Sphecidae) of the Zailijskij Alatau. In : Fauna and biology of insects of Kazakhstan. Proceedings of the Institute of Zoology of the Academy of Sciences of the Kazakh SSR, **32** : 153 - 162 (in Russian); Alma-Ata.
KAZENAS, V.L. (1972) : Sphecidae (Hymenoptera) of the south-east Kazakhstan. In : Insects of the arid regions of the USSR and neighbouring countries. Horae Societatis Entomologicae Unionis Soveticae, **55** : 93 - 186 (in Russian); Leningrad.
KAZENAS, V.L. (1978) : Digger wasps of Kazakhstan and Middle Asia (Hymenoptera, Sphecidae) : the determinant. 172 pp. (in Russian); Institute of Zoology of the Academy of Sciences of Kazakh SSR, Alma-Ata.
KAZENAS, V.L. (1998) : Digger wasps (Hymenoptera, Sphecidae) of Kazakhstan. Part 1 : General characteristics of the family, and subfamilies Ampulicinae, Sphecinae. The Fauna of Kazakhstan, **9** : 377 pp. (in Russian); Ministry of Sciences and Academy of Sciences of Kazakhstan, KazgosINTI, Almaty.
KAZENAS, V.L. (2001) : Fauna and biology of digger wasps (Hymenoptera, Sphecidae) of Kazakhstan and Middle Asia. 334 pp. (in Russian); KazgosINTI, Almaty. ISBN 9965-466-31-9.
KAZENAS, V.L. (2002) : Digger wasps (Hymenoptera, Sphecidae) of Kazakhstan. Tethys Entomological Research, **4** : 176 pp. (in Russian); Almaty. ISBN 9965-9151-8-0.
KAZENAS, V.L. (2008) : Digger wasps of loess steeps in low hills of the Zailiyskiy Alatau. Tethys Entomological Research, **16** : 109 - 166 (in Russian); Almaty.
KAZENAS, V.L. & ESENBEKOVA, P.A. (2001) : The digger wasps (Hymenoptera, Sphecidae) of Almatinskiy reserve and adjacent territories. Selevinia, **2001** : 133 - 137 (in Russian); Almaty.
KERENSKIJ, I.P. (1919) : On the knowledge of the fauna of the Hymenoptera of Russia. 1. Hymenoptera from the Kerenskij and Cembar uyezda, Penza gouvernement. Izvestija Donskogo Universiteta, 1/1 (1918) : 1 - 48 (in Russian); Rostov-on-Don. Varsavskie Universitetskie Izvestija, **5** (1916); Warsaw.
KINEL, J. & NOSKIEWICZ, J. (1929) : Etude sur les conditions zoogéographiques dans le sudest de la Pologne, basée sur la faune des insectes. Proceedings of the 10th International Congress of Zoology 1927 in Budapest : p. 1255; Stephaneum, Budapest.
KINEL, J. & NOSKIEWICZ, J. (1930) : Einige Bemerkungen über die zoogeographischen Verhältnisse von Podolien und Volhynien des polnischen Anteils. Polskie Pismo Entomologiczny, **9** : 272 - 288; Lwów.

KIRCHNER, L. (1854) : Verzeichnis der in der Gegend von Kaplitz, Budweiser Kreises in Böhmen, vorkommenden Aderflügler. Verhandlungen des Zoologisch-Botanischen Vereins in Wien, **4**, Abh. : 285 - 316, Sitzungs-Berichte : 93 - 94; Vienna.
KIRCHNER, L. (1857) : Die Bienen des Budweiser Kreises in Böhmen. Lotos, **7** : 30 - 39, 49 - 55, 69 - 78, 121 - 126, 165 - 170, 180 - 190, 213 - 214, 228 - 234; Prague.
KIRCHNER, L. (1867) : Catalogus Hymenopterorum Europae. 285 pp.; Zoologisch-Botanische Gesellschaft, Vienna.
KLINGER, R. (1992) : Zur Entomofauna der Großstädte. *Delta unguiculata* (VILLERS) (Hymenoptera : Eumenidae), *Calamobius filum* (ROSSI) (Coleoptera : Cerambycidae) und *Otiorhynchus dieckmanni* MAGNANO (Coleoptera : Curculionidae), drei markante Arten des Frankfurter Stadtgebietes. Entomologische Zeitschrift, **102** : 413 - 421; Essen.
KLINGER, R. & REDER, G. (1995) : Die größte heimische Töpferwespe, *Delta unguiculatum* (VILLERS), in Rheinhessen-Pfalz. Mitteilungen der Rheinischen Naturforschenden Gesellschaft, **16** : 35 - 38; Mainz.
KOCETKOV, D.N. (2001) : Yellow mud-dauber *Sceliphron (S.) destillatorium* ILLIGER. In : Red data book of Rjazan region : p. 221 (in Russian); Rjazan.
KOHL, F.F. (1880) : Die Raubwespen Tirol's nach ihrer horizontalen und vertikalen Verbreitung, mit einem Anhange biologischer und kritischer Notizen. Zeitschrift des Ferdinandeums Tirol Vorarlberg, (3) **24** : 95 - 242; Innsbruck.
KOHL, F.F. (1883) : Die Fossorien der Schweiz. Mitteilungen der Schweizerischen Entomologischen Gesellschaft, **6**/10 : 647 - 684; Schaffhausen.
KOHL, F.F. (1888) : Zur Hymenopterenfauna Tirols. Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien, **38** : 719 - 734; Wien.
KOHL, F.F. (1893) : Zur Hymenopteren-Fauna Niederösterreichs. Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien, **43** : 20 - 42; Vienna.
KOHL, F.F. (1918) : Die Hautflüglergruppe "Sphecinae". IV. Teil. Die natürliche Gattung *Sceliphron* KLUG (*Pelopoeus* LATR.). Annalen des Naturhistorischen Museums Wien, **32** : 1 - 171; Vienna.
KOKUJEV, N. (1902) : Materials for the fauna of the Hymenoptera of Russia. Entomologiceskoe Obozrenie, **2** : 4 - 15 (in Russian); Jaroslavl.
KOLESNIKOV, V.A. (1977) : Sphecid wasps (Hymenoptera, Sphecidae) of the Bryansk region as entomophagous insects. Entomologiceskoe Obozrenie, **56** : 315 - 325 (in Russian); Leningrad. Entomological Review, **56**/2 : 57 - 65; Washington.
KOLUBAJIV, S. (1938) : Occurrence of rare hymenoptera in Czechoslovakia. Casopis Ceskoslovenské Spolecnosti Entomologické, **35** : 21 - 28 (in Czech); Prague.
KÖNIG, C. (1896) : Was wußten die alten Griechen und Römer von den Wespen und Hornissen? Illustrierte Wochenschrift für Entomologie, **1** : 261 - 266; Neudamm.
KORLEVIC, A. (1890) : Contributions to the fauna of the Croatian Hymenoptera. Glasnik Hrvatskog Naravoslovnog Druztva, **5** : 189 - 250 (in Serbocroatian); Zagreb.
KOSIBOWICZ, M. (2009) : Exotical wasp in Cracow. Wszechświat, **110**/4-6 : 78 - 79 (in Polish); Cracow.
KOWALCZYK, J.K., KURZAC, T. & SOSZYNSKI, B. (2009) : New localities of interesting Aculeata (Hymenoptera) in Łódz region. Parki Narodowe i Rezerwaty Przyrody, **28**/2 : 127 - 134 (in Polish); Białowieza.
KUNTZE, R. (1931 a) : Vergleichende Beobachtungen und Betrachtungen über die xerotherme Fauna in Podolien, Brandenburg, Österreich und der Schweiz. Zeitschrift für Morphologie und Ökologie der Tiere, **21** : 629 - 690; Berlin.
KUNTZE, R. (1931 b) : Comparative studies on the xerothermic fauna in Podolia, Brandenburg, Austria and Switzerland. Archiwum Towarszystwa Naukowego we Lwowie, (3) **5**/6 : 265 - 345 (in Polish); Lwów.
KUNTZE, R. (1939) : Entomofaunistical characteristics of the slope of Wołczyniec near Stanisławów. Polskie Pismo Entomologiczny, **16/17** (1937/1938) : 1 - 15 (in Polish); Lwów.
KUNTZE, R. & NOSKIEWICZ, J. (1925) : Einige Bemerkungen zu der Arbeit von Dr. A. PONGRACZ : Beiträge zur Tiergeographie Polens. Archiv für Naturgeschichte, (A) **91**/5 : 110 - 121; Berlin.
KUNTZE, R. & NOSKIEWICZ, J. (1938) : Outline of the zoogeography of Polish Podolia. Prace Naukowe Towarszystwa Naukowego we Lwowie, (2) **4** : 1 - 538 (in Polish); Lwów. Supplements in : Kosmos, **65** (1948) : 117 - 149 (in Polish); Wrocław.
LANGHOFFER, A. (1896) : Entomological results of the journey "Margite" with some other entomological contributions to Dalmacia. Glasnik Hrvatskog Naravoslovnog Druztva, **9** : 346 - 358 (in Serbocroatian); Zagreb.
LATREILLE, P.A. (1802) : Histoire naturelle des fourmis, et recueil de mémoires et d'observations sur

les abeilles, les araignées, les faucheurs, et autres insectes. 445 pp.; Barrois, Paris.
LATREILLE, P.A. (1805) : Histoire naturelle, générale et particulière, des crustacés et des insectes, **13** : 432 pp., **14** : 432 pp.; Dufart, Paris.
LATREILLE, P.A. (1809) : Genera crustaceorum et insectorum, secundum ordinem naturalem in familias disposita, iconibus exemplisque plurimis explicata, **4** : 399 pp.; Koenig, Paris.
LATREILLE, P.A. (1811) : Encyclopédie méthodique histoire naturelle. Insectes. Genus *Osmia*. Encyclopédie Méthodique des Insectes, **8** : 567 - 587; Paris.
LECLERCQ, J. & CLAPAREDE, L. (1978) : La guêpe maçonne *Sceliphron caementarium* (DRURY) (Hymenoptera Sphecidae) s'installe en Europe méridionale. Entomops, **47** : 245 - 252; Nice.
LEHRER, A.Z. & SCUTARU, M. (1963) : Contribution à la connaissance des Sphecidae (Hym.) de Moldavie. Travaux du Muséum National d'Histoire Naturelle Grigore Antipa, **4**: 283 - 289; Bucharest.
LENZ, H.O. (1856) : Zoologie der alten Griechen und Römer - deutsch in Auszügen aus deren Schriften. 656 pp. (Nachdruck 1966); Sändig, Wiesbaden.
LEPELETIER, A. (1836 - 1846) : Histoire naturelle des insectes, suites à Buffon, Hyménoptères, **1** (1836) : 547 pp., **2** (1841) : 680 pp., **3** (1845) : 646 pp., **4** (1846) : 680 pp.; Roret, Paris.
LICHTENSTEIN, J. (1873) : Observations sur deux espèces de Chrysides. Annales de la Société Entomologique de France, (5) **3**/2, Bulletin des Séances de la Société Entomologique de France, **1873** : XV - XVI; Paris.
LICHTENSTEIN, J. (1883) : Nidification de l'*Eumenes dimidiatus* BRULLE (= *E. amedaei* LEP.). Annales de la Société Entomologique de France, (6) **3**/2, Bulletin des Séances de la Société Entomologique de France, **1883** : CV - CVI; Paris.
LINNAEUS, C. (1758) : Systema Naturae. 10th Edition, **1**: 824 pp.; Salvius, Stockholm.
LISKA, P. (2006) : Digger and spider wasps (Hymenoptera : Sphecidae, Pompilidae) of the Váh river floodplain near Trencín with emphasis on anthropogenous biotopes. Sborník Prírodovedného Klubu v Uherském Hradisti, **8** (2003) : 83 - 90 (in Slovakian); Uherské Hradiste.
ŁOMNICKI, M. (1870) : Notes of an excursion in Podolia having taken place in the year 1869 in the region between Seret, Zbrucz and Dniester. Sprawozdanie Komisyi Fizyograficznej Towarzystwa Naukowego Krakowskiego, 4/2 (1869) : 41 - 85 (in Polish); Cracow.
LUKAS, J. (1979) : Finds of more rare bees (Hymenoptera : Apoidea) in Slovakia. Biológia, **34** : 171 - 176 (in Slovakian); Bratislava.
LUKAS, J. (1991) : Distribution of selected families of aculeate Hymenoptera in the vicinity of Zobor at Nitra. Zobor, **2** : 83 - 93 (in Slovakian).
LUKAS, J. (1998) : Devínska Kobyla - refugium of the protected and endangered insect species. Natura Carpatica, **39** : 129 - 136 (in Slovakian); Kosice.
LUKAS, J. (2002) : Contribution to the knowledge of the fauna of Hymenoptera (Sphecidae, Pompilidae and Chrysididae) of Hájnica hill near the Trencianske Bohuslavice. Sborník Prírodovedného Klubu v Uherském Hradisti, **7** : 189 - 192 (in Slovakian); Uherské Hradiste.
LUKAS, J. (2003) : Fauna of hymenoptera in an old orchard in Bratislava. Folia Faunistica Slovaca, **8** : 71 - 74 (in Slovakian); Bratislava.
LUKAS, J., BOGUSCH, P. & LISKA, P. (2006) : Distribution of *Sceliphron destillatorium* (ILLIGER 1807) (Hymenoptera : Sphecidae) in Moravia and Slovakia with notes on the invasion to the anthropogenous localities. Linzer Biologische Beiträge, **38** : 731 - 738; Linz.
MACKO, S. & NOSKIEWICZ, J. (1954) : A station of *Sedum album* L. on Góra Wapienna near Stolec in the vicinity of Ząbkowice (Lower Silesia). A characteristic of the flora and fauna. Ochrona Przyrody, **22** : 167 - 194 (in Polish); Cracow.
MADER, D. (1980) : Zur Substratgebundenheit von Nestbauten der solitären Urbiene *Colletes daviesanus* (Hymenoptera : Colletidae). Entomologia Generalis, **6**: 57 - 63; Stuttgart.
MADER, D. (1981 a) : Beiträge zur Substratgebundenheit von Nestbauten der solitären Urbiene *Colletes daviesanus* (Hymenoptera : Colletidae) in quartären Sedimenten im Norden der Bundesrepublik Deutschland. Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere, **108** : 84 - 93; Jena.
MADER, D. (1981 b) : Beiträge zur Substratgebundenheit von Nestbauten der solitären Urbiene *Colletes daviesanus* (Hymenoptera : Colletidae) im Buntsandstein der Südeifel. Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere, **108** : 165 - 177; Jena.
MADER, D. (1982) : Lokale Substratselektion und Auswahl gesteinsspezifischer Standorte zur Anlage von Nestbauten der solitären Urbiene *Colletes daviesanus* (Hymenoptera : Colletidae). Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere, **109**: 521 - 544; Jena.
MADER, D. (1984) : Beiträge zur Substratgebundenheit von Nestbauten der solitären Urbiene *Colletes daviesanus* (Hymenoptera : Colletidae) im Rotliegenden und Tertiär von Rheinhessen, Bundesrepu-

blik Deutschland. Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere, **111** : 145 - 173; Jena.
MADER, D. (1985 a) : Beiträge zur Substratgebundenheit von Nestbauten der solitären Urbiene *Colletes daviesanus* (Hymenoptera : Colletidae) im Buntsandstein des Solling und im Dogger der Deisterumgebung. Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere, **112** : 495 - 523; Jena.
MADER, D. (1985 b) : Stratibound construction of nest burrows of the solitary bee *Colletes daviesanus* (Hymenoptera : Colletidae). Mitteilungen der Deutschen Gesellschaft für Allgemeine und Angewandte Entomologie, **4** : 233 - 235; Bremen. 2nd European Congress of Entomology 1982 in Kiel, Abstracts : p. 97; Kiel. 17th International Congress of Entomology 1984 in Hamburg, Abstracts : p. 330; Hamburg.
MADER, D. (1992) : Substratgebundene Anlage von Nestbauten der solitären Urbiene *Colletes daviesanus* im Mittleren Buntsandstein von Ostthüringen. In : MADER, D. (Editor), Beiträge zu Paläoökologie und Paläoenvironment des Buntsandsteins sowie ausgewählte Bibliographie von Buntsandstein und Keuper in Thüringen, Franken und Umgebung : 409 - 444; Fischer, Stuttgart/Jena/New York. ISBN 3-437-30694-4.
MADER, D. (1995 a) : Aeolian and adhesion morphodynamics and phytoecology in recent coastal and inland sand and snow flats and dunes from mainly North Sea and Baltic Sea to Mars and Venus. 2348 pp.; Lang, Frankfurt am Main/Berne/New York. ISBN 3-631-48258-2.
MADER, D. (1997) : Wer kennt Niststandorte der Seidenbiene *Colletes daviesanus*? Bembix, **9** : 11 - 12; Bielefeld.
MADER, D. (1998) : Geologie, Substratformationen, Substratprovinzen und langfristige Populationsdynamik der Niststandorte der rezenten Seidenbiene *Colletes daviesanus* in der Eifel. Dendrocopos, **25** : 143 - 186; Trier.
MADER, D. (1999 a) : Entomoökologie der Nestbauten und Nistsubstrate der Seidenbiene *Colletes daviesanus* und anderer rezenter solitärer Wildbienen und Wespen in Buntsandstein, Rotliegend, Keuper, Lias, Dogger, Tertiär und Quartär. Band 1 : Geologische und biologische Entomoökologie der rezenten Seidenbiene *Colletes*. 807 pp.; Logabook, Cologne. ISBN 3-87361-263-1.
MADER, D. (1999 b) : Nestbauten der Seidenbiene *Colletes daviesanus* und anderer solitärer Wildbienen und Wespen in quartären vulkanischen Tuffen der Eifel. Dendrocopos, **26** : 79 - 169; Trier.
MADER, D. (1999 c) : Einmietung der Mauerbiene *Osmia adunca* und anderer solitärer Wildbienen und Wespen in Nestbauten der Seidenbiene *Colletes daviesanus* in Eifel, Saarland und Pfalz. Dendrocopos, **26** : 170 - 215; Trier.
MADER, D. (1999 d) : Nestbauten der Schornstein-Lehmwespe *Odynerus spinipes* in Buntsandstein und Quartär in Eifel, Saarland und Pfalz. Dendrocopos, **26** : 216 - 234; Trier.
MADER, D. (1999 e) : Niststandorte von Mörtelbienen gesucht. Nachrichten der Deutschen Gesellschaft für Allgemeine und Angewandte Entomologie, **13** : p. 121; Eberswalde. Bembix, **13** (2000) : p. 7; Bielefeld.
MADER, D. (2000 a) : Nistökologie, Biogeographie und Migration der synanthropen Delta-Lehmwespe *Delta unguiculatum* (Eumenidae) in Deutschland und Umgebung. 245 pp.; Logabook, Cologne. ISBN 3-934346-04-9.
MADER, D. (2000 b) : Erstnachweise von Niststandorten der Delta-Lehmwespe *Delta unguiculatum* (Hymenoptera : Eumenidae) in Bayern. Galathea, Berichte des Kreises Nürnberger Entomologen, **16**/4 : 147 - 170; Nürnberg.
MADER, D. (2000 c) : Erstnachweise von Niststandorten der Delta-Lehmwespe *Delta unguiculatum* (Hymenoptera : Eumenidae) im Saarland. Abhandlungen Delattinia, **26** : 23 - 36; Saarbrücken.
MADER, D. (2000 d) : Nistökologie, Biogeographie und Migration eines Freibautennisters : Wann wandert die Delta-Lehmwespe *Delta unguiculatum* in das Moseltal ein? Dendrocopos, **27** : 59 - 136; Trier.
MADER, D. (2000 e) : Nistökologie der Delta-Lehmwespe *Delta unguiculatum* (Eumenidae) und der Mörtelbiene *Megachile (Chalicodoma) parietina* (Megachilidae). In : OSTEN, T. (Editor), Beiträge der Hymenopterologen-Tagung in Stuttgart (6. - 8.10.2000) : 33 - 36; Stuttgart.
MADER, D. (2000 f) : Biogeographie der Delta-Lehmwespe *Delta unguiculatum* (Eumenidae) in Deutschland außerhalb des Oberrheingrabens. In : OSTEN, T. (Editor), Beiträge der Hymenopterologen-Tagung in Stuttgart (6. - 8.10.2000) : 52 - 56; Stuttgart.
MADER, D. (2001 a) : Niststandorte der Mauerbiene *Osmia anthocopoides* und der Mörtelbiene *Megachile (Chalicodoma) parietina* (Hymenoptera : Megachilidae) im Nördlinger Ries. Galathea, Berichte des Kreises Nürnberger Entomologen, **17**/1 : 27 - 55; Nürnberg.
MADER, D. (2001 b) : Potentielle Einwanderungswege der Mauerwespe *Sceliphron destillatorium* nach Deutschland. Galathea, Berichte des Kreises Nürnberger Entomologen, **17**/2 : 99 - 111; Nürnberg.

MADER, D. (2001 c) : Populationsstärke und Nestverteilung der Mörtelbiene *Megachile (Chalicodoma) parietina* (Hymenoptera : Megachilidae) am Goldberg im Nördlinger Ries in 2001. Galathea, Berichte des Kreises Nürnberger Entomologen, **17**/3 : 115 - 142; Nürnberg.
MADER, D. (2001 d) : Einwanderung der Delta-Lehmwespe *Delta unguiculatum* (VILLERS 1789) (Hymenoptera : Eumenidae) in das Alpenrheintal (Österreich und Schweiz). Linzer Biologische Beiträge, **33** : 819 - 826; Linz.
MADER, D. (2001 e) : Niststandorte des Bienenwolfes *Philanthus triangulum* (Grabwespen, Sphecidae) in Eifel, Saarland und Pfalz. Dendrocopos, **28** : 87 - 113; Trier.
MADER, D. (2001 f) : Niststandorte von kleinen Furchenbienen (Halictidae) und/oder Grabwespen (Sphecidae) in Eifel, Saarland und Pfalz. Dendrocopos, **28** : 114 - 129; Trier.
MADER, D. (2002 a) : Isolierte Niststandorte mit endemischen Vorkommen der Delta-Lehmwespe *Delta unguiculatum* (Hymenoptera : Eumenidae) im Donautal. Galathea, Berichte des Kreises Nürnberger Entomologen, **18**/3 : 89 - 115; Nürnberg.
MADER, D. (2002 b) : Verbreitung der Delta-Lehmwespe *Delta unguiculatum* (Hymenoptera : Eumenidae) im Rhônetal oberhalb des Genfer Sees (Schweiz). Galathea, Berichte des Kreises Nürnberger Entomologen, **18**/2 : 55 - 66; Nürnberg.
MADER, D. (2002 c) : Zur früheren Verbreitung der Mörtelbiene *Megachile (Chalicodoma) parietina* (Hymenoptera : Megachilidae) in Deutschland und Umgebung. Galathea, Berichte des Kreises Nürnberger Entomologen, **18**/1 : 20 - 43; Nürnberg.
MADER, D. (2003) : Mestbauten der Seidenbiene *Colletes daviesanus* (Hymenoptera : Colletidae) in Gebäudewänden und Aufschlüssen in der Fränkischen Alb in Bayern. Galathea, Berichte des Kreises Nürnberger Entomologen, **19**/1 : 3 - 30; Nürnberg.
MADER, D. (2009 a) : Populationsdynamik, Ökologie und Schutz des Hirschkäfers (*Lucanus cervus*) im Raum um Heidelberg und Mannheim. 418 pp.; Regionalkultur, Ubstadt-Weiher. ISBN 978-3-89735-594-1. Price 49 €. Order Address : dr.detlef.mader&web.de
MADER, D. (2009 b) : Three size classes of wing-spread and dwarf forms of the Orange Tip *Anthocharis cardamines* (Lepidoptera : Pieridae) and other butterflies. Galathea, Berichte des Kreises Nürnberger Entomologen, **25**/2 : 67 - 82; Nürnberg.
MADER, D. (2010 a) : Moon-related population dynamics and ecology of the Stag Beetle *Lucanus cervus*, other beetles, butterflies, dragonflies and other insects. 654 pp.; Regionalkultur, Ubstadt-Weiher. ISBN 978-3-89735-645-0. Price 79 €. Order Address : dr.detlef.mader&web.de
MADER, D. (2010 b) : Das letzte Paradies des Apollofalters (*Parnassius apollo*) in den Weinbergen und an den Waldrändern an den Steilhängen des Moseltales zwischen Koblenz und Trier (Deutschland). Galathea, Berichte des Kreises Nürnberger Entomologen, **26**/3 : 119 - 150; Nürnberg.
MADER, D. (2010 c) : Mondgesteuerter Schwärmflug der Maikäfer, Hirschkäfer und Junikäfer. Allgemeine Forstzeitschrift, **65**/12: p. 35; München.
MADER, D. (2011 a) : Lunarzyklische Populationsdynamik des Mosel-Apollo (*Parnassius apollo vinningensis*) und anderer Insekten im Moseltal zwischen Koblenz und Trier (Deutschland). Galathea, Berichte des Kreises Nürnberger Entomologen, Supplement, **21** : 1 - 283; Nürnberg.
MADER, D. (2011 b) : Mondgesteuerter Schwärmflug dämmerungsaktiver Großkäfer (Maikäfer, Hirschkäfer, Junikäfer und Sägebock) (Coleoptera: Scarabaeidae, Lucanidae und Cerambycidae). Galathea, Berichte des Kreises Nürnberger Entomologen, **27**/1 : 5 - 42; Nürnberg.
MADER, D. (2012 a) : Akzeleration der Imaginalentwicklung im extrem trockenen und sonnigen Frühling 2011 aufgrund Antizipation des Wetterwechsels der Eisheiligen und Einfluß vorgeschalteter später Frostnächte bei Mosel-Apollo, Baumweißling, Hirschkäfer und anderen Insekten. Galathea, Berichte des Kreises Nürnberger Entomologen, Supplement, **22** : 1 - 310; Nürnberg.
MADER, D. (2012 b) : Aufgesetztes Papiernest mit Diskordanzen in der Schichtung der Hornisse (*Vespa crabro*) im Freien auf der Glasscheibe eines Fensters am Balkon eines Hauses am Ortsrand nahe Feld und Wald und 100 andere Papiernester mit und ohne Diskordanzen. Galathea, Berichte des Kreises Nürnberger Entomologen, Supplement, **23** : 1 - 378; Nürnberg.
MADER, D. (2013) : Drastischer Populationszusammenbruch und Gefahr des Aussterbens des Mosel-Apollo als Folge des mehrwöchigen Dauerfrostes mit zweistelligen Minusgraden im Winter 2012, Vergleich mit Hirschkäfer und anderen Insekten, und Biochronologie und Kryochronologie des Mosel-Apollo. Documenta Naturae, Sonderband, **63** : 1 - 704; München. ISBN 978-3-86544-563-6.
MADER, L. (1939) : Beitrag zur Kenntnis der Hymenopteren ILL. Entomologisches Nachrichtenblatt, **13** : 93 - 110; Troppau.
MADL, M. & VIDLAR, M. (2005) : *Melittobia acasta* (WALKER, 1839) (Hymenoptera : Chalcidoidea : Eulophidae), ein Parasitoid von *Sceliphron curvatum* (SMITH, 1870). Beiträge zur Entomofaunistik, **6** : 164 - 165; Vienna.

MAGRETTI, P. (1881) : On the Hymenoptera of Lombardia. Bullettino della Società Entomologica Italiana, **13** : 3 - 42, 89 - 123, 213 - 273 (all in Italian); Firenze/Rome.
MAIDL, F. (1922) : Beiträge zur Hymenopterenfauna Dalmatiens, Montenegros und Albaniens. I. Teil : Aculeata und Chrysididae. Annalen des Naturhistorischen Museums Wien, **35** : 36 - 106; Vienna.
MANSION, J. (1913) : Hyménoptères de Corse. Le Pélopée tourneur. Bulletin de la Société des Sciences Historiques et Naturelles de Corse, **33** : 139 - 174; Bastia.
MANSION, J. (1926) : Gestes dysharmoniques de la ponte de *Cryptus seductorius* L. Bulletin de la Société Entomologique de France, **1926** : 122 - 123; Paris.
MARQUET, C. (1875) : Note sur les insectes hyménoptères du Languedoc. Bulletin de la Sociéte de l'Histoire Naturelle de Toulouse, **9** : 193 - 221; Paris.
MAZEK-FIALLA, K. (1935 a) : Die Mordwespe (*Sceliphron destillatorius*) am Neusiedlersee. Natur und Volk, **65** : 470 - 473; Frankfurt am Main.
MAZEK-FIALLA, K. (1935 b) : Aus der Kleintierwelt der Steppe am Neusiedlersee. Aus der Heimat, **48** : 171 - 176; Stuttgart.
MAZEK-FIALLA, K. (1936 a) : Angaben zur Lebensweise von *Sceliphron destillatorius* ILLIG. am Neusiedlersee, mit besonderer Berücksichtigung des Nestbaues. Zeitschrift für Wissenschaftliche Zoologie, (A) **148** : 298 - 308; Leipzig.
MAZEK-FIALLA, K. (1936 b) : Die tiergeographische Stellung und die Biotope der Steppe am Neusiedler See in bezug auf pontische, mediterrane und halophile Tierformen. Archiv für Naturgeschichte, Neue Folge, **5** : 449 - 482; Leipzig.
MEI, M., PEZZI, G., TOGNI, R.d. & DEVINCENZO, U. (2012) : The oriental mud-dauber wasp *Chalybion bengalense* (DAHLBOM) introduced in Italy (Hymenoptera, Sphecidae). Ampulex, **5** : 37 - 41; Berlin/Oldenburg (online edition).
MEIGEN, J.W. (1818 - 1838) : Systematische Beschreibung der bekannten europäischen zweiflügligen Insekten, **1** (1818) : 324 pp., **2** (1820) : 363 pp., **3** (1822) : 416 pp., **4** (1824) : 428 pp., **5** (1826) : 412 pp., **6** (1830) : 401 pp., **7** (1838) : 434 pp.; Forstmann, Aachen/Hamm. Schmidt, Halle (1851).
MIHLIN, V.E. (2008) : Ordinary yellow mud-dauber *Sceliphron destillatorium* ILL. In : Red data book of Vladimir region : p. 277 (in Russian); Vladimir.
MINORANSKIJ, V.A. (1971) : The common mud-dauber. Priroda, **1971**/9 : 71 - 76 (in Russian); Moscow.
MINORANSKIJ, V.A., CHARCENKO, V.I. & FOMICEV, A.I. (1970) : Some data on the common mud-dauber - *Sceliphron destillatorium* K 1. (Sphecidae, Hymenoptera). Vestnik Zoologii, **1970**/6 : 15 - 20 (in Russian); Kiev.
MINORANSKIJ, V.A. & SHKURATOV, A.V. (1996) : On the fauna of digger wasps (Hymenoptera, Sphecidae) of Rostov oblast, Russia. Izvestija Vysshich Ucebnych Zavedenij, Severo-Kavkazkij region, Estestvennye Nauki, **1996**/4 (96) : 80 - 83 (in Russian); Rostov-on-Don.
MJARCEVA, S.N. (1963) : Ecological distribution of digger wasps (Hymenoptera, Sphecidae) in the lower reaches of the Murgab. Izvestija Akademii Nauk Turkmenskoj SSR, Serija Biologiceskich Nauk, **1963**/4 : 56 - 63 (in Russian); Ascabad.
MJARCEVA, S.N. (1965) : Digger wasps (Hymenoptera, Sphecidae) of the lower reaches of Murgab and Tedzen and their role as entomophages in nature and village agriculture. Ph.D. Thesis : 279 pp. (in Russian); Ascabad.
MJARCEVA, S.N. (1968) : Digger wasps of the genus *Sceliphron* KLUG (Hymenoptera, Sphecidae) of Turkmenistan. Izvestija Akademii Nauk Turkmenskoj SSR, Serija Biologiceskich Nauk, **1968**/2 : 61 - 66 (in Russian); Ascabad.
MOCSARY, A. (1872) : Contributions to the fauna of the comitate of Bihar. Mathematikai és Természettudomanyi Közlemények, **10** : 163 - 200 (in Hungarian); Budapest.
MOCSARY, A. (1874) : Zur Hymenopteren-Fauna Siebenbürgens. Verhandlungen und Mitteilungen des Siebenbürgischen Vereins für Naturwissenschaften, **24** : 117 - 122; Hermannstadt.
MOCSARY, A. (1875) : Contributions to the fauna of the comitates of Zemplén and Ung. Mathematikai és Természettudomanyi Közlemények, **13** : 131 - 185 (in Hungarian); Budapest.
MOCSARY, A. (1877) : Hymenoptera, Diptera, Neuroptera, Orthoptera and Hemiptera of the comitates of Bihar and Hajdú. Mathematikai és Természettudomanyi Közleméyek, **14** : 37 - 80 (in Hungarian); Budapest.
MOCSARY, A. (1879) : New contributions to the fauna of the Hymenoptera of the comitate of Temes. Mathematikai és Természettudomanyi Közleméyek, **16** : 1 - 70 (in Hungarian); Budapest.
MOCSARY, A. (1884) : The way of life of the Mud-Dauber wasp. Rovartani Lapok, **1** : 82 - 83 (in Hungarian); Budapest.
MOCSARY, A. (1897) : Ordo Hymenoptera. In : Fauna Regni Hungariae. Animalium hungariae hucus-

que cognitorum enumeratio systematica. III. Arthropoda, Insecta, **2** : 7 - 113; Regia Societas Scientiarum Naturalium Hungarica, Budapest.
MOCSARY, A. (1909) : The occurrences of *Sceliphron destillatorium*. Természettudomanyi Közlöny, **41** : p. 718 (in Hungarian); Budapest.
MOCZAR, L. (1938 a) : Contributions to the knowledge of the fauna of the Hymenoptera of the Köszeg Mountains. Vasi Szemle, **5** : 72 - 86 (in Hungarian); Szombathely.
MOCZAR, L. (1938 b/1939) : Beiträge zur Kenntnis der Hymenopterenfauna des Kudsir-Hochgebirges. Entomologishe Rundschau, **55** (1938) : 677 - 679, **56** (1939) : 49 - 52; Stuttgart.
MOCZAR, L. (1946) : Beobachtungen bei Uferabstürzen der Halbinsel Tihany (Hymenoptera). Folia Entomologica Hungarica, Nova Series, **1** : 35 - 46 (in Hungarian and in German); Budapest.
MOCZAR, L. (1953) : The hymenopterous fauna of Bátorliget. In : SZEKESSY, V., The living world of Bátorliget : 286 - 316 (in Hungarian); Budapest.
MOCZAR, L. (1960) : The loess wall of Tihany and the nesting of *Odynerus spiricornis* SPIN. (Hymenoptera, Eumenidae). Annales Historico-Naturales Musei Nationalis Hungarici, **52** : 383 - 409; Budapest.
MOCZAR, L. (1961) : On the habits of *Stilbum cyanurum cyanurum* FORST. (Hymenoptera, Chrysididae). Annales Historico-Naturales Musei Nationalis Hungarici, **53** : 463 - 466; Budapest.
MOCZAR, L. (1972) : The index of finding places of the catalogue of the fauna of the Hymenoptera I - XXIV of the Carpathian Basin (Cat. Hym. XXV). Folia Entomologica Hungarica, Nova Series, **25** : 111 - 164 (in Hungarian); Budapest.
MOCZAR, L. (1973) : Eindringen solitärer Hymenopteren in das Nest fremder Arten (Fam. : Eumenidae, Sphecidae, Megachilidae). Acta Biologica Szegediensis, Nova Series, **19** : 143 - 146; Szeged.
MOCZAR, M. & HENTER, P. (1907) : New contributions to the fauna of the Hymenoptera of Hungary. Rovartani Lapok, **14** : 200 - 210 (in Hungarian); Budapest.
MOKROUSOV, M.V. (2000 a) : Rare and interesting finds of vespomorphs (Hymenoptera, Vespomorpha) on the territory of the region of Nizhegorod. In : Biosystems : structure and regulation. Trudy Biologiceskaya Fakulteta Gosudarstvennogo Universiteta Niznij Novgorod, **3** : 22 - 25 (in Russian); Niznij Novgorod.
MOKROUSOV, M.V. (2000 b) : Fauna of digger wasps (Hymenoptera, Sphecidae) of Nishegorod region. In : Readings to the memory of Prof. V.V. STANCIN, **3** : 29 - 33 (in Russian); Smolensk.
MOKROUSOV, M.V. (2003) : Ordinary yellow mud-dauber - *Sceliphron destillatorium* ILL. In : Red data book of Nishegorod region, **1** : 221 - 222 (in Russian); Niznij Novgorod.
MOKROUSOV, M.V. (2010) : Fauna of digger wasps (Hymenoptera : Ampulicidae, Sphecidae, Crabronidae) of the upper and middle Volga basin. Proceedings of the Russian Entomological Society, **81**/2 : 59 - 66 (in Russian); St. Petersburg.
MOKROUSOV, M.V., BEREZIN, A.Y. & EGOROV, L.V. (2011) : The digger wasps (Hymenoptera : Ampulicidae, Sphecidae, Crabronidae) of the Chuvashia republic. Eversmannia, **27/28** : 62 - 86 (in Russian); Rostov-on-Don.
MOKROUSOV, M.V., RUCHIN, A.B. & EGOROV, L.V. (2013) : Materials on the fauna of wasps (Hymenoptera, Vespomorpha) of the Mordovia national nature reserve and adjacent territories. Trudy Mordovskogo Gosudarstvennogo Prirodnogo Zapovednika Imeni P.G. SMIDOVIC, **11** : 193 - 205 (in Russian); Saransk.
MORAWITZ, F. (1870) : Beitrag zur Bienenfauna Russlands. Horae Societatis Entomologicae Rossicae, **7** : 305 - 333; St. Petersburg.
MORAWITZ, F. (1890) : Über Astrachan'sche Fossoria. Horae Societatis Entomologicae Rossicae, **25** : 175 - 233; St. Petersburg.
MORICE, F.D. (1901) : Illustrations of the 6th male ventral segment in 17 *Osmia* species of the *adunca*-group, with a note on the synonymy of four species, and descriptions of four which seem new. Transactions of the Entomological Society of London, **1901** : 161 - 177; London.
MORICE, F.D. (1911) : Hymenoptera aculeata collected in Algeria. The Sphegidae. Transactions of the Entomological Society of London, **1911** : 62 - 135; London.
MOTSCHULSKY, V. (1859) : Catalogue des insectes rapportés des environs du fl. Amour, depuis la Schilka jusqu'à Nikolaëvsk, examinés et énumérés. Bulletin de la Société Impériale des Naturalistes de Moscou, **32**/3 : 487 - 507; Moscow.
MUCALICA, Z. (1979) : Distribution and biological investigations of the digger wasps *Sceliphron (Sceliphron) destillatorium* ILL. and *Sc. (Sc.) spirifex* L. (Sphecidae, Hymenoptera). Glasnik Prirodonjackog Muzeja, (B) **34** : 181 - 190 (in Serbocroatian); Belgrade.
MÜLLER, A. (1930) : Zur Kenntnis der Insektenfauna der Süddobrudscha und Südbessarabiens. Verhandlungen und Mitteilungen des Siebenbürgischen Vereins für Naturwissenschaften, **79/80** :

167 - 187; Hermannstadt.
MÜLLER, H. (1944) : Beiträge zur Kenntnis der Bienenfauna Sachsens (Hym. Apid.). Mitteilungen der Deutschen Entomologischen Gesellschaft, **13** : 65 - 108; Berlin.
MÜLLER, O.F. (1764) : Fauna Insectorum Fridrichsdalina. 96 pp.; Gleditsch, Kopenhagen/Leipzig.
NEMKOV, P.G. (2008) : Fauna of digger wasps (Hymenoptera : Sphecidae, Crabronidae) of the Asiatic part of Russia. Shtenija Pamjati Alekseja Ivanovicha Kurentsova, **19** : 15 - 34 (in Russian); Vladivostok.
NEMKOV, P.G., KAZENAS, V.L., BUDRIS, E.R. & ANTROPOV, A.V. (1995) : Superfamily Sphecoidea. 67. Family Sphecidae - digger wasps. In : LER, P.A. (Editor), Determination book of the insects of the Far East of Russia in six volumes, **4**/1 : 368 - 480 (in Russian); Nauka, St. Petersburg.
NIEZABITOWSKI. E.L. (1902) : Materials to the fauna of the wasps (Vespidae) of Galicia. Sprawozdanie Komisyi Fizyograficznej Towarzystwa Umiejętności w Krakowie, **36**/2 (1901) : 31 - 35 (in Polish); Cracow.
NIKOLAEVA, A.M. & ANANEVA, S.I. (2011) : Ordinary yellow mud-dauber *Sceliphron destillatorium* ILLIGER, 1807. In : Red data book of Rjazan region : p. 245 (in Russian); Rjazan.
NOSKIEWICZ, J. (1922 a) : From hymenopterological excursions in Podolia. Rozprawy i Wiadomości z Muzeum Dzieduszyckich, **5/6** (1919/1920) : 54 - 63, 191 - 234 (all in Polish); Lwów.
NOSKIEWICZ, J. (1922 b) : Bees (Apidae) of the surroundings of Lwów. Sprawozdanie Komisji Fizjograficznej Polskiego Akademia Umiejętności w Krakowie, **55/56** : 157 - 179 (in Polish); Cracow.
NOSKIEWICZ, J. (1934) : Die wichtigsten Ergebnisse meiner Forschungen über die Hymenopterenfauna Podoliens in den Jahren 1932 - 1935. Polskie Pismo Entomologiczny, **13** : 132 - 182 (in Polish and in German); Lwów.
NOSKIEWICZ, J. (1946) : Critical review of the species of the genus *Megachile* LATR. of western Podolia. Nauk. Zapiski Lvivsk. Univ., **4**/1 : 21 - 34 (in Ukrainian); Lviv.
NOSKIEWICZ, J. (1948) : Remarks on some species of the genus *Megachile* of Silesia and adjacent countries. Polskie Pismo Entomologiczny, **18** : 31 - 59 (in Polish); Wrocław.
NOSKIEWICZ, J. & PUŁAWSKI, W. (1960) : Błonkówki - Hymenoptera, Grzebaczowate - Sphecidae. Klucze do oznaczania owadów Polski, **24**/67 : 185 pp. (in Polish); Warsaw.
OEHLKE, J. (1970) : Beiträge zur Insektenfauna der DDR : Hymenoptera - Sphecidae. Beiträge zur Entomologie, **20** : 615 - 812; Berlin.
OHL, M. (2001) : Sphecidae. In : DATHE, H.H., TAEGER, A. & BLANK, S.M. (Editors), Entomofauna Germanica, **4** : Verzeichnis der Hautflügler Deutschlands. Entomologische Nachrichten und Berichte, Beihefte, **7** : 137 - 143; Dresden. http://www2.rz.hu-berlin.de/h0662dgt/akteg.html; Berlin.
OLBERG, G. (1959) : Das Verhalten der solitären Wespen Mitteleuropas (Vespidae, Pompilidae, Sphecidae). 402 pp.; Deutscher Verlag der Wissenschaften, Berlin.
OLIVIER, A.G. (1790) : Encyclopédie méthodique. Dictionnaire des insectes, **5** : 793 pp.; Pankouke, Paris.
ONCUROV, M.V. (2000) : Spiders as prey of the larvae of the digger wasp *Sceliphron destillatorium* ILLIGER (Hymenoptera, Sphecidae). In : Actual questions of contemporary biology. Materials of the first republican conference of young students of Crimea 18.05.2000 in Simferopol : 86 - 88 (in Russian); Simferopol.
ORGANISCIAK, J., DUDZIAK, T. & DZIEDZIC, M. (1997) : Narrations of Ząbkowice Śląskie. Part 3 : Surroundings of Ząbkowice Śląskie. Monography of local history and geography. 273 pp. (in Polish); Ząbkowice Śląskie.
OSYCNJUK, A.Z. (1961 a) : To the study of the fauna and the ecology of the bees in the western woodlands (polesja) of the Ukraine. Praci Instituta Zoologii Akademia Nauk Ukrainskoj RSR, **17** : 99 - 107 (in Ukrainian); Kijiv.
OSYCNJUK, A.Z. (1961 b) : Landscape distribution of the bees (Apoidea) in the Ukrainian Carpathians and Transcarpathians. Praci Instituta Zoologii Akademia Nauk Ukrainskoj RSR, **17** : 108 - 117 (in Ukrainian); Kijiv.
OSYCNJUK, A.Z. (1964) : The bees (Apoidea) of the Ukrainian woodlands (polesja). Praci Instituta Zoologii Akademia Nauk Ukrainskoj RSR, **20** : 120 - 149 (in Ukrainian); Kijiv.
PADR, Z. (1989) : Sphecoidea. In : SEDIVY, J. (Editor), Enumeratio insectorum Bohemoslovakiae. Check list of Czechoslovak insects III (Hymenoptera). Acta Faunistica Entomologica Musei Nationalis Pragae, **19** : 165 - 171; Prague.
PAGLIANO, G. & NEGRISOLO, E. (2005) : Hymenoptera, Sphecidae. Fauna d'Italia, **40** : 559 pp.; Calderini, Bologna.
PALLAS, P.S. (1767 - 1774) : Specilegia zoologica quibus novae imprimus et obscolae animalum species iconibus, descriptionibus atque commentariis illustrantur, **1**/1 - 4 (1767), **1**/5 - 7 (1769), **1**/8 (1770),

1/9 (1772) : 86 pp., 1/10 (1774); Reimer, Berlin; Lange, Berlin.
PANIGAJ, L. (2003) : On the occurrence of some remarkable species of invertebrates (Evertebrata) confirmed during the 27th Východoslovenský Tábor Ochrancov Prírody in Vysná Pisaná. In : KONECNA, E. & CURLIK, J. (Editors), Zborník odborných výsledkov, 27th Východoslovenský Tábor Ochrancov Prírody 26.07. - 02.08.2003 in Vysná Pisaná : 84 - 87 (in Slovakian); Presov.
PANZER, G.W.F. (1793 - 1812) : Faunae Insectorum Germanicae, H. 1 - 12 (1793), H. 13 - 24 (1794), H. 25 - 36 (1796), H. 37 - 48 (1797), H. 49 - 60 (1798), H. 61 - 72 (1799), H. 73 - 84 (1801), H. 85 - 96 (1805), H. 97 - 108 (1809), H. 109 (1812); Felssecker, Nürnberg.
PANZER, G.W.F. (1804) : Systematische Nomenklatur über weiland Herrn Dr. Jacob Christian Schäffers natürlich ausgemalte Abbildungen regensburgischer Insekten. 260 pp.; Palm, Erlangen.
PANZER, G.W.F. (1806) : Entomologischer Versuch die Jurineschen Gattungen der Linnéschen Hymenopteren nach dem Fabriziusschen System zu prüfen : im Bezug auf die in der deutschen Insektenfaune bekannt gemachten Gattungen und Arten dieser Klasse. Kritische Revision der Insektenfaune Deutschlands nach dem System bearbeitet, **2**/1-100 : 1 - 271; Felssecker, Regensburg.
PARRE, F. (1964) : Bienen aus Staßfurt und ein neuer Fundort zweier seltener Hymenopteren-Arten aus Sachsen-Anhalt. Entomologische Zeitschrift, **74** : 97 - 100; Stuttgart.
PASZLAVSZKY, J. (1884) : How builds the Mud-Dauber wasp? Rovartani Lapok, **1** : 41 - 42 (in Hungarian); Budapest.
PECKHAM, G.W. & PECKHAM, E.G. (1898) : On the instincts and habits of the solitary wasps. Bulletin of the Wisconsin Geological and Natural History Survey, Science Series, (1) **2** : 1 - 245; Madison/Wisconsin.
PESENKO, Y. & ASTAFUROVA, Y.V. (2003) : Annotated bibliography of Russian and Soviet publications on the bees 1771 - 2002 (Hymenoptera : Apoidea; excluding *Apis mellifera*). Denisia, **11** : 1 - 616; Linz.
PIEK, T. (1989) : *Ancistrocerus renimaculata* renting a *Sceliphron* mud-nest (Hymenoptera : Eumenidae). Entomologische Berichten, **49** : 54 - 55; Amsterdam.
POLIDORI, C., TROMBINO, L., FUMAGALLI, C. & ANDRIETTI, F. (2005) : The nest of the mud-dauber wasp, *Sceliphron spirifex* (Hymenoptera, Sphecidae) : application of geological methods to structure and brood cell content analysis. Italian Journal of Zoology, **72** : 153 - 159; Modena.
PONGRACZ, A. (1923) : Beiträge zur Tiergeographie Polens. Archiv für Naturgeschichte, (A) **89**/11 : 244 - 259; Berlin.
PORTER, B.A. (1926) : American wasps of the genus *Sceliphron* KLUG. Proceedings of the United States National Museum, **70**/1 (2650) : 1 - 22; Washington.
PRISNIJ, A.V. (2012) : Digger wasps (Hymenoptera : Sphecidae, Crabronidae) of the Belgorod oblast. Eurasian Entomological Journal, **11** : 44 - 54 (in Russian); Novosibirsk.
PROKOFIEV, A.M. & SKOMOROKHOV, M.O. (2010) : *Sceliphron curvatum* (F. SMITH, 1870), a new in the fauna of Russia and invasive species of digger wasps (Hymenoptera : Sphecidae). Russian Entomological Journal, **19** : 67 - 70 (in Russian); Moscow.
PROTSENKO, Y.V. (2003) : Digger wasps (Hymenoptera, Sphecidae) of the island Maliy Tataru and their trophical relationships with flowering plants. Zapovidna Sprava v Ukraini, **9** : 67 - 70 (in Russian); Kijiv.
PROTSENKO, Y.V., FATERYGA, A.V., IVANOV, S.P. & PUZANOV, D.V. (2012) : Digger wasps (Hymenoptera : Apoidea : Ampulicidae, Sphecidae) of the collection of V.I. Vernadskiy Taurida National University. Ecosystems, their Optimization and Protection, **6** : 50 - 61 (in Russian); Simferopol.
PUŁAWSKI, W. (1957) : Sphecidae (Hymenoptera) récoltés pendant un voyage en Bulgarie. Polskie Pismo Entomologiczne, **27** : 161 - 192; Wrocław.
PUŁAWSKI, W. (1967) : Błonkówki - Hymenoptera; Osowate - Vespidae, Masaridae. Klucze do oznaczania owadów Polski, **24**/64-65 : 84 pp. (in Polish); Warsaw.
PULAWSKI, W.J. (2013 a) : Catalog of Sphecidae sensu lato (= Apoidea excluding Apidae). *Sceliphron*. Last updated : 17 May 2013. http://research.calacademy.org/sites/research.calacademy.org/files/Departments/ent/sphecidae/Genera_and_species_pdf/Sceliphron.pdf : 38 pp.; California Academy of Sciences; San Francisco/California.
PULAWSKI, W.J. (2013 b) : Bibliography of Sphecidae sensu lato (= Apoidea excluding Apidae) (= Heterogynaidae, Ampulicidae, Sphecidae, and Crabronidae). Last updated : 23 May 2013. http://research.calacademy.org/sites/research.calacademy.org/files/Departments/ent/sphecidae/Bibliography.pdf : 587 pp.; California Academy of Sciences; San Francisco/California.
RADDE, G.I. (1899) : The collections of the Caucasian museum, **1** (Zoology) : 1 - 521 (in Russian and in German); Tiflis.
RADOSZKOVSKY, O. (1865) : Description d'un genre nouveau *Pseudomelecta*, et de quelques espèces

du genre *Eumenes*. Horae Societatis Entomologicae Rossicae, **3** : 53 - 60; St. Petersburg.
RADOSZKOVSKY, O. (1871) : Hyménoptères de l'Asie. Description et énumération de quelques espèces reçues de Samarkand, Astrabad, Himalayaq et Ning-Po, en Chine. Horae Societatis Entomologicae Rossicae, **8** : 187 - 200; St. Petersburg.
RADOSZKOWSKI, O. (1876) : Matériaux pour servir à une faune hyménoptèrologique de la Russie (II). Horae Societatis Entomologicae Rossicae, **12** : 82 - 110; St. Petersburg.
RADOSZKOWSKI, O. (1886 - 1893) : Faune Hyménoptèrologique Transcaspienne. Horae Societatis Entomologicae Rossicae, **20** (1886) : 3 - 56, **21** (1887) : 88 - 101, **22** (1888) : 338 - 349, **23** (1889) : 305 - 312; **27** (1893) : 38 - 81, 490 - 493; St. Petersburg.
RADOVIC, I. (1976) : Morphological characteristics of the life form of the digger wasps (Sphecidae) with special reference to adaptive changes of fore legs and sting. M. Sc. Thesis : 126 pp. (in Serbocroatian); Faculty of Science of the University of Belgrade (unpublished).
RAFAJLOVIC, A. & SELESI, D. (1958) : From the entomological collection of prof. A. TAUBERT (Subotica). Part I. Zbornik Matice Srpske za Prirodne Nauke, **14** : 86 - 142 (in Serbocroatian); Novi Sad.
RAHOLA, P. (2005) : Observations sur la biologie de *Sceliphron curvatum* (SMITH, 1870) dans le Gard (sud de la France) (Hymenoptera, Sphecidae). Bulletin de la Société Entomologique de France, **110** : 331 - 336; Paris.
RANDUSKA, P. (1993) : Nesting of *Sceliphron destillatorium* ILLIG. Správy Slovenskeho Entomologickeho Spolecnosti pri Slovenskej Akadémie Vied, **5** : 25 - 28 (in Slovakian); Bratislava.
RAU, P. (1928) : Field studies in the behavior of the non-social wasps. Transactions of the Academy of Sciences in St. Louis, **25**/9 : 325 - 489; St. Louis/Missouri.
REDER, G. (2006) : Von Asien bis in deutsche Kaffeetassen - Die Orientalische Mörtelwespe ist erstmals in Worms nachgewiesen. Heimatjahrbuch für die Stadt Worms, **2007** : 203 - 204; Worms.
REDER, G. (2010) : Weit verbreitet, kaum bekannt : die Delta-Wespe. Heimatjahrbuch für die Stadt Worms, **2011** : 222 - 227; Worms.
ROHDENDORF, B.B. (1935) : Sarcophagidae. In : LINDNER, E. (Editor), Die Fliegen der Palaearktischen Region, **88** : 49 - 128; Schweizerbart, Stuttgart.
ROMANOVA, V.P. (1969) : On the fauna of sphecid wasps (Hymenoptera, Sphecidae) from the north Caucasus. Entomologiceskoe Obozrenie, **48** : 132 - 137 (in Russian); Leningrad. Entomological Review, **48**/1 : 75 - 78; Washington.
RÖMER, J.J. (1789) : Genera Insectorum Linnei et Fabricii iconibus illustrata. 86 pp.; Steiner, Winterthur.
RONDANI, C. (1856) : Genera Italica ordinis Dipterorum ordinatim disposita et distincta et in familias et stirpes aggregata. Dipterologiae Italicae prodromus, **1** : 228 pp.; Stocchi, Parma.
RONDANI, C. (1859) : Genera Italica ordinis Dipterorum ordinatim disposita et distincta et in familias et stirpes aggregata. Dipterologiae Italicae prodromus, **3**; Stocchi, Parma.
RONDANI, C. (1877) : Species Italicae ordinis Dipterorum ordinatim dispositae, methodo analitica distinctae, et novis vel minus cognitis descriptis, **5**/17 (Anthomyinae) : 304 pp.; Parma.
ROSSI, P. (1790) : Fauna Etrusca, sistens Insecta quae in provinciis Florentina et Pisana praesertim collegit, **2** : 348 pp.; Masi, Livorno.
ROTARIDES, M. (1934) : Daten zur Biologie von *Sceliphron destillatorium* ILLIG. (Hymenoptera) auf der Halbinsel Tihany. Arbeiten des Ungarischen Biologischen Forschungs-Institutes, **7** : 66 - 79; Tihany.
ROVARTANI LAPOK (1897) : A popular description of insects. Rovartani Lapok, **4** : p. 201 (in Hungarian); Budapest.
RUCHIN, A.B., ANTROPOV, A.V. & SHIBAEV, S.V. (2009) : Materials on the fauna of wasps (Hymenoptera : Chrysididae, Scoliidae, Tiphiidae, Pompilidae, Vespidae, Sphecidae, Trigonalyidae) of Mordovia republic. Vestnik Mordovskogo Universiteta, **1** : 164 - 172 (in Russian); Saransk.
RUDOW, F. (1901/1902) : Die Schmarotzer, Feinde und Mitbewohner der Nester bauenden Hautflügler, Hymenoptera. Insektenbörse, **1901** : 421 - 423; **1902** : 220 - 221, 227 - 228; Leipzig.
RUDOW, F. (1912) : Lebensweise und Nestbau der Raub-, Mord- und Grabwespen, Sphegidae und Crabronidae. Entomologische Zeitschrift, **26** : 30 - 32, 35 - 36, 39 - 40, 42 - 44, p. 46, 54 - 55, 59 - 60, p. 64, 66 - 67, 70 - 72, 75 - 76; Frankfurt am Main.
SAJO, K. (1880/1882) : Entomologische Bilder aus den ungarischen Flugsandsteppen. Entomologische Nachrichten, **6**/18 (1880) : 198 - 202, **8**/1 (1882) : 1 - 10; Putbus/Stettin.
SAJO, K. (1896) : *Pelopoeus* = Ichneumon des Plinius. Illustrierte Wochenschrift für Entomologie, **1** : 402 - 403; Neudamm.
SALVIONI, A. (1997) : Die Hymenoptera Aculeata (excl. Apoidea, Formicoidea) im unteren Misox (Kanton Graubünden) und in den tieferen Lagen des Sopraceneri (Kanton Tessin) : faunistisch-ökolo-

gische Dokumentation der Veränderungen in den letzten 50 Jahren. M.Sc. Thesis : 76 pp.; Zürich (unpublished).
SALZMANN-WANDELER, I. & REZBANYAI-RESER, L. (1999) : Zur Grabwespenfauna vom Monte Generoso, Kanton Tessin, Südschweiz (Hymenoptera : Sphecidae). Entomologische Berichte Luzern, **42** : 95 - 102; Luzern.
SALZMANN-WANDELER, I. & REZBANYAI-RESER, L. (2001) : Grabwespen aus der Umgebung von Meride und Lugano-Brè, Kanton Tessin, Südschweiz (Hymenoptera : Sphecidae). Entomologische Berichte Luzern, **45** : 151 - 160; Luzern.
SCHÄFFER, J.C. (1764) : Die Maurerbiene. Abhandlungen von Insekten, **2** : 1 - 38; Montag, Regensburg.
SCHÄFFER, J.C. (1766) : Natürlich ausgemalte Abbildungen regensburgischer Insekten, **1** : Taf. 1 - 100, **2** : Taf. 101 - 200, **3** : Taf. 201 - 280; Zunkel, Regensburg (Reprint 1804; Palm, Erlangen).
SCHARDT, L., RENKER, C., STAUDT, A. & REDER, G. (2012) : Auf stetigem Vormarsch : Die aktuelle Verbreitung von *Sceliphron curvatum* (F. SMITH, 1870) in Deutschland (Hymenoptera : Sphecidae). Mainzer Naturwissenschaftliches Archiv, **49** : 143 - 164; Mainz.
SCHARRER, S. (1995) : Die Grabwespen (Hymenoptera, Sphecidae) der Sammlung des Naturwissenschaftlichen Museums der Stadt Aschaffenburg. Nachrichten des Naturwissenschaftlichen Museums der Stadt Aschaffenburg, **102** : 21 - 32; Aschaffenburg.
SCHEFFER, J. (1851) : Verzeichnis der größtenteils in der Wiener Gegend vorkommenden Aderflügler (Hymenoptera). Sitzungs-Berichte der Akademie der Wissenschaften Wien, Mathematisch-Naturwissenschaftliche Klasse, **6** : 370 - 387; Vienna.
SCHENCK, A. (1857) : Beschreibung der in Nassau aufgefundenen Grabwespen. Jahrbuch des Vereins für Naturkunde Nassau, **12** : 1 - 341; Wiesbaden.
SCHENCK, A. (1861) : Zusätze und Berichtigungen zu der Beschreibung der nassauischen Grabwespen (Heft XII), Goldwespen (Heft XI), Bienen (Heft XIV) und Ameisen (Heft VIII und XI). Jahrbuch des Vereins für Naturkunde Nassau, **16** : 137 - 206; Wiesbaden.
SCHENCK, A. (1866) : Verzeichnis der nassauischen Hymenoptera aculeata mit Hinzufügung der übrigen deutschen Arten. Berliner Entomologische Zeitschrift, **10** : 317 - 369; Berlin.
SCHMID-EGGER, C. (2005) : *Sceliphron curvatum* (F. SMITH 1870) in Europa mit einem Bestimmungsschlüssel für die europäischen und mediterranen *Sceliphron*-Arten (Hymenoptera, Sphecidae). Bembix, **19** : 7 - 28; Bielefeld.
SCHMID-EGGER, C., RISCH, S. & NIEHUIS, O. (1995) : Die Wildbienen und Wespen in Rheinland-Pfalz (Hymenoptera, Aculeata). Verbreitung, Ökologie und Gefährdungssituation. Fauna Flora Rheinland-Pfalz, Beihefte, **16** : 296 pp.; Landau.
SCHMIDT, K. (1981) : Materialien zur Aufstellung einer Roten Liste der Sphecidae (Grabwespen) Baden-Württembergs III. Oxybelini, Larrinae (außer *Trypoxylon*), Astatinae, Sphecinae und Ampulicinae. Veröffentlichungen für Naturschutz und Landschaftspflege in Baden-Württemberg, **53/54** : 155 - 234; Karlsruhe.
SCHMIDT, K. & SCHMID-EGGER, C. (1997) : Kritisches Verzeichnis der deutschen Grabwespenarten (Hymenoptera, Sphecidae). Mitteilungen der Arbeitsgemeinschaft Ostwestfälisch-Lippischer Entomologen, **13**, Beihefte, **3** : 1 - 35; Bielefeld.
SCHMIDT-GOEBEL, A. (1876) : Coleopterologische Kleinigkeiten. Stettiner Entomologische Zeitung, **37** : 388 - 401; Stettin.
SCHMIEDEKNECHT, O. (1907) : Die Hymenopteren Mitteleuropas. 804 pp.; Fischer, Jena.
SCHMIEDEKNECHT, O. (1930) : Die Hymenopteren Nord- und Mitteleuropas mit Einschluß von England, Südschweiz, Südtirol und Ungarn. Nach ihren Gattungen und zum großen Teil auch nach ihren Arten analytisch bearbeitet. 2nd Edition : 1062 pp.; Fischer, Jena.
SCHOLZ, E.J.R. (1938) : Bienen und Wespen, ihre Lebensgewohnheiten und Bauten. 208 pp.; Quelle & Meyer, Leipzig.
SCHULZ, W.A. (1904) : Ein Beitrag zur Faunistik der paläarktischen Spheciden. Zeitschrift für Entomologie, Neue Folge, **29** : 90 - 102; Breslau.
SCHWAMMBERGER, K.H. & PRIESNER, E. (1990) : Beitrag zur Grabwespenfauna Kärntens (Hymenoptera : Sphecidae). Carinthia, (II) **180/100** : 527 - 559; Klagenfurt.
SCHWARZ, M. (1999) : Hautflügler (Hymenoptera : Siricidae, Xiphihydriidae, Argidae, Cephidae, Aulacidae, Evaniidae, Gasteruptiidae, Sapygidae, Eumenidae, Vespidae, Sphecidae) im Stadtgebiet von Linz. Nuturkundliches Jahrbuch der Stadt Linz, **45** : 73 - 134; Linz.
SCOBIOLA, X. (1950) : Contributions to the fauna of the Sphecidae (Hymenoptera) of the people's republic of Romania. Buletin Ştiinţific Academia Republici Populare Române, **2** : 17 - 23 (in Romanian); Bucharest.

SCOBIOLA, X. (1959) : Contributions à la connaissance des Sphecidae (Hymenoptera) de la Dobrogea. Lucrarile Sesiuni Ştiinţifice a Staţiuni Zoologice Marine "Prof. Ioan Borcea", **1956** : 495 - 501; Agigea/Iaşi.
SCOBIOLA-PALADE, X. (1967) : Ord. Hymenoptera. Superfam. Tenthredinoidea, Scolioidea, Vespoidea, Sphecoidea et Pompiloidea. In : L'entomofaune des forêts du sud de la Dobroudja. Travaux du Muséum National d'Histoire Naturelle Grigore Antipa, **7**: 153 - 164; Bucharest.
SCOBIOLA-PALADE, X. (1968 a) : Contributions à l'étude des Hyménoptères de la région sudique de la Valachie. Travaux du Muséum National d'Histoire Naturelle Grigore Antipa, **9** : 369 - 393; Bucharest.
SCOBIOLA-PALADE, X. (1968 b) : Ord. Hymenoptera. Superfam. Tenthredinoidea, Scolioidea, Vespoidea, Pompiloidea et Sphecoidea. In : L'entomofaune de l'île de Letea (Delta du Danube). Travaux du Muséum National d'Histoire Naturelle Grigore Antipa, **9**: 133 - 147; Bucharest.
SCOBIOLA-PALADE, X. (1972) : Ord. Hymenoptera - Sousord. Symphyta, Superfam. Vespoidea, Pompiloidea et Sphecoidea. In : L'entomofaune du "Grind" de Caraorman, Delta du Danube. Travaux du Muséum National d'Histoire Naturelle Grigore Antipa, **12** : 141 - 154; Bucharest.
SCOBIOLA-PALADE, X. (1974 a) : Ord. Hymenoptera (Subord. Symphyta, Superfam. Vespoidea, Pompiloidea, Sphecoidea). In : L'entomofaune du "Grind" Saraturile - Sf. Gheorghe (Delta du Danube). Travaux du Muséum National d'Histoire Naturelle Grigore Antipa, **14** : 141 - 148; Bucharest.
SCOBIOLA-PALADE, X. (1974 b) : Les nids d'insectes dans les collections du musée d'histoire naturelle "Gr. Antipa". Travaux du Muséum National d'Histoire Naturelle Grigore Antipa, **15** : 421 - 426; Bucharest.
SCOBIOLA-PALADE, X. (1987) : Données concernant les Hyménoptères du nord de la Dobrogea (Roumanie). Travaux du Muséum National d'Histoire Naturelle Grigore Antipa, **29** : 63 - 67; Bucharest.
SCOBIOLA-PALADE, X. (1989) : L'ordre Hymenoptera (sous-ordre Symphyta, superfamilles Vespoidea, Pompiloidea, Sphecoidea) du cordon de sable Saraturile - Sf. Gheorghe (Delta du Danube, Roumanie). Travaux du Muséum d'Histoire Naturelle Grigore Antipa, **30** : 85 - 89; Bucharest.
SCOPOLI, J.A. (1763) : Entomologia Carniolica exhibens insecta Carnioliae indigena et distributa in ordines, genera, species, varietates, methodo Linnaeana. 420 pp.; Trattner, Vienna.
SCOPOLI, J.A. (1768 - 1772) : Annus historico naturalis, **1** (1768) : 168 pp., **2** (1769) : 118 pp., **3** (1769) : 103 pp., **4** (1770) : 150 pp., **5** (1772) : 128 pp.; Hilscher, Leipzig.
SCOPOLI, J.A. (1786) : Deliciae Florae et Faunae Insubricae. 86 pp.; Ticino.
SELESI, D. & RAFAJLOVIC, A. (1963) : From the entomological collection of prof. A. TAUBERT (Subotica). Part II. Zbornik Matice Srpske za Prirodne Nauke, **25** : 155 - 182 (in Serbocroatian); Novi Sad.
SHAFER, G.D. (1949) : The ways of a mud-dauber. 78 pp.; Stanford Univ. Press, Stanford/California.
SHLYAKHTENOK, A.S. & SKIBINSKA, E. (2002) : Contribution to the knowledge of aculeate Hymenoptera of Byelorus : family digger wasps (Sphecidae). Vestnik Zoologii, **36** : 31 - 40 (in Russian); Kijiv.
SHORENKO, K.I. (2005 a) : On the fauna of digger wasps (Hymenoptera : Ampulicidae, Sphecidae, Crabronidae) of Crimea. Caucasian Entomological Bulletin, **1**/2 : 161 - 170 (in Russian); Rostov-on-Don.
SHORENKO, K.I. (2005 b) : Digger wasps (Hymenoptera : Sphecidae, Crabronidae) of the Karadag nature reserve. In : Nature reserves of the Crimea : nature protection, biodiversity, ecoformation. Materials of the III. Scientific Conference 2005 in Simferopol, **2** : 97 - 100 (in Russian); Simferopol.
SHORENKO, K.I. (2007) : First find of *Sphex caementarium* (Hymenoptera, Sphecidae) in Crimea. Vestnik Zoologii, **41**/6 : p. 554 (in Russian); Kijiv.
SHORENKO, K.I. & KONOVALOV, S.V. (2010) : New data on the digger wasps (Hymenoptera : Ampulicidae, Sphecidae, Crabronidae) in the fauna of Ukraine. Ukrainska Entomofaunistyka, **2010**/1 (2) : 9 - 32 (in Russian); Kijiv.
SICKMANN, F. (1895) : Beiträge zur Kenntnis der Hymenopteren-Fauna des nördlichen China. Zoologische Jahrbücher für Systematik, **8** : 195 - 236; Jena.
SMETANA, V. (1996) : Research results of the bumble-bees, wasps and sphecoid wasps (Hymenoptera : Bombidae, Vespidae et Sphecidae) on the localities in the surroundings of the town Snina. Natura Carpatica, **37** : 161 - 172 (in Slovakian); Kosice.
SMITH, F. (1870) : An appendix, containing descriptions of some new species of Apidae and Vespidae collected by Mr. Horne. Transactions of the Zoological Society of London, **7**: 186 - 196; London.
SNIEZEK, J. (1910) : Bee-like Hymenoptera (Apidae) collected in Galicia. Sprawozdanie Komisyi Fizyograficznej Towarzystwa Umiejętności w Krakowie, **44**/2 (1909) : 31 - 46 (in Polish); Cracow.
SOSZYNSKI, B. & SOSZYNSKI, M. (1985) : *Sceliphron destillatorium* (ILL.) (Hymenoptera, Sphecidae) in Poland. Polskie Pismo Entomologiczny, **55** : 213 - 215 (in Polish); Wrocław.
SPINOLA, M. (1808) : Insectorum Liguriae species novae aut rariores, quae in agro Ligustico nuper de-

texit, descripsit, et iconibus illustravit, **2** : 262 pp.; Gravier, Genova; Jaeger, Frankfurt am Main (1809).
STALLING, T. (2002) : Erster Fortpflanzungsnachweis der Mauerwespe *Sceliphron destillatorium* ILLIGER, 1807 (Hymenoptera : Sphecidae) in Deutschland sowie ihr Auftreten nördlich der Alpen. Naturschutz am Südlichen Oberrhein, **3** : 185 - 188; Freiburg.
STARY, B. (1939) : The murderer of spiders. Nasí Prírodou, **1939** (in Czech); Prague (according to a remark in HOFFER 1954).
STEFANI, T.d. (1883) : Miscellanea hymenopterologica. Naturalista Siciliano, **2**/12 : 280 - 284 (in Italian), **3**/1 : 9 - 13 (in Italian); Palermo.
STEFANI, T.d. (1888) : Notes on chrysidides of Sicily. Naturalista Siciliano, **7** : 1 - 73 (in Italian); Palermo.
STEINER, A. (1954) : Les Hyménoptères prédateurs du Périgord Noir. I. Hyménoptères Sphecoidea de la région des Eyzies (Dordogne). Annales de la Société Entomologique de France, **123** : 127 - 147; Paris.
STICHEL, H. (1899) : *Parnassius apollo bartholomaeus* n. subsp. und monographische Behandlung benannter paläarktischer Apollo-Formen. Insekten-Börse, Internationales Wochenblatt der Entomologie, **16** : 294 - 296, 302 - 304, 310 - 312; Leipzig.
STOLLE, E., BURGER, F. & DREWES, B. (2004) : Rote Liste der Grabwespen (Hymenoptera : "Sphecidae") des Landes Sachsen-Anhalt. Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt, **39** : 369 - 381; Halle.
STRAND, E. (1915) : Über einige orientalische und paläarktische Crabroniden der Gattungen *Sphex*, *Sceliphron* und *Ammophila* im Deutschen Entomologischen Museum. Archiv für Naturgeschichte, (A) **81**/5 : 88 - 97; Berlin.
STROJNY, W. (1959) : Solitary bee. Turysta, **8**/14 (115) (1959) : p. 21 (in Polish); Warsaw.
STROJNY, W. (1961 a) : On the subject of nature protection of the Skałki Stoleckie. Chrońmy Przyrodę Ojczystą, **17**/5 : 32 - 34 (in Polish); Warsaw/Cracow.
STROJNY, W. (1961 b) : On the biology of *Chalicodoma muraria* (FAB.). Wszechświat, **80**/9 (1961) : 225 - 226 (in Polish); Cracow.
STROJNY, W. (1963) : *Chalicodoma muraria* (FAB.) (Hymenoptera, Apidae) in nature reservation "Skałki Stoleckie" near Ząbkowice Śląskie. Polskie Pismo Entomologiczny, **33** : 199 - 219 (in Polish); Wrocław.
STROJNY, W. (1966) : Biological observations in the faunistic nature reserve "Skałki Stoleckie" near Ząbkowice Śląskie. Chrońmy Przyrodę Ojczystą, **22**/4 : 36 - 41 (in Polish); Warsaw/Cracow.
STROJNY, W. (1967) : In the world of insects. 116 pp. (in Polish); Wiedza Powszechna; Warsaw.
STROJNY, W. (1968) : The winged mason. Poznaj Swój Kraj, **11**/5 (117) : 18 - 19 (in Polish); Warsaw.
STROJNY, W. (1970) : Our protected animals. 164 pp. (in Polish); Państwowe Wydawnictwo Rolnicze i Leśne, Warsaw.
STROJNY, W. (1971 a) : Meetings with insects. 212 pp. (in Polish); Państwowe Zakłady Wydawnictw Szkolnych, Warsaw.
STROJNY, W. (1971 b) : The world of insects. 214 pp. (in Polish); Nasza Księgarnia, Warsaw.
STROJNY, W. (1975) : The actual population state of *Chalicodoma muraria* (FAB.) (Hymenoptera, Apidae) in the nature reservation Skałki Stoleckie near Ząbkowice Śląskie. Polskie Pismo Entomologiczny, **45** : 415 - 422 (in Polish); Wrocław.
STROJNY, W. (1979) : Expert opinion in natural science concerning the population of *Chalicodoma muraria* (FAB.) (Hymenoptera, Apidae) in the nature reservation "Skałki Stoleckie" near Ząbkowice Śląskie (submission of results and recommendations for the protection of the reservation and its zones of protection, fotografical documentation). Expert opinion by order of the Wojewódzki Konserwator Przyrody in Wałbrzych : 32 pp. (in Polish); Wrocław (unpublished).
STROJNY, W. (1981 a) : The Polish colony of *Chalicodoma muraria* (F.) in the natural reserve Skałki Stoleckie near Ząbkowice Śląskie during 1975 - 1979 (Hymenoptera, Apidae). Polskie Pismo Entomologiczny, **51** : 147 - 151 (in Polish); Wrocław.
STROJNY, W. (1981 b) : Our animals. 532 pp. (in Polish); Państwowe Wydawnictwo Rolnicze i Leśne, Warsaw (2nd Edition 1986 : 532 pp.).
STROJNY, W. (1984) : The Polish colony of *Chalicodoma muraria* (F.) (Hymenoptera, Apidae) in the natural reserve Skałki Stoleckie near Ząbkowice Śląskie during 1980 - 1983. Polskie Pismo Entomologiczny, **54** : 377 - 383 (in Polish); Wrocław.
STROJNY, W. (1986) : The extraordinary history of the solitary bee *Chalicodoma muraria*. Manuscript submitted to Krajowa Agencja Wydawnicza on 04.11.1986 : 84 pp. (in Polish) (unpublished) (missing).
STROJNY, W. (1987) : The sole Polish colony of *Chalicodoma muraria* (F.) (Hymenoptera, Apidae) ex-

tinct in the reserve Skałki Stoleckie, near Ząbkowice Śląskie. Przeglad Zoologiczny, **31** : 341 - 348 (in Polish); Warsaw/Wrocław.
STROJNY, W. (1989) : The "Skałki Stoleckie" faunistic nature reserve near Ząbkowice Śląskie in the province of Wałbrzych. Chrońmy Przyrodę Ojczystą, **45**/3 : 30 - 46 (in Polish); Warsaw/Cracow.
SULZER, J.H. (1776) : Abgekürzte Geschichte der Insekten nach dem Linnéischen System, **1** : 274 pp., **2** : 71 pp.; Steiner, Winterthur.
SZILADY, Z. (1914) : Lists of insects collected in Hungary. III. Hymenoptera. Rovartani Lapok, **21** : 78 - 95 (in Hungarian); Budapest.
TASCHENBERG, E.L. (1858) : Schlüssel zur Bestimmung der bisher in Deutschland aufgefundenen Gattungen und Arten der Mordwespen (*Sphex* L.). Zeitschrift für die Gesamten Naturwissenschaften, **12** : 57 - 122; Berlin.
TASCHENBERG, E.L. (1866) : Die Hymenopteren Deutschlands nach ihren Gattungen und teilweise nach ihren Arten als Wegweiser für angehende Hymenopterologen und gleichzeitig als Verzeichnis der Halle'schen Hymenopterenfauna. 277 pp.; Kummer, Leipzig.
TASCHENBERG, E.L. (1869) : Leben der Insekten, Tausendfüßler und Spinnentiere. In : BREHM, A.E. (Editor), Illustriertes Tierleben : eine allgemeine Kunde des Tierreichs, **6** : 1 - 618; Bibliographisches Institut, Hildburghausen.
TASCHENBERG, E.L. (1884) : Die Insekten, Tausendfüßler und Spinnen. Brehms Tierleben, 2nd Edition, Kolorierte Ausgabe, **9** (Wirbellose Tiere, **1**) : 711 pp.; Bibliographisches Institut, Leipzig.
TASCHENBERG, E.L. (1929) : Die Insekten, Tausendfüßler und Spinnen, **3** : Die Immen oder Hymenopteren. In : MEYER, A. (Editor), Brehms Tierleben, **27** : 364 pp.; Christensen, Vienna/Hamburg/Zürich.
TÖLG, F. & FAHRINGER, J. (1911) : Beitrag zur Dipteren- und Hymenopterenfauna Bosniens, der Herzegowina und Dalmatiens. Mitteilungen des Naturwissenschaftlichen Vereins an der Universität Wien, **9** : 1 - 14, 23 - 28; Vienna.
TORMOS, J. & JIMENEZ, R. (1985) : Contribution to the knowledge of the fauna of the digger wasps of the province of Alicante (Hym. Sphecidae). Mediterránea, Seria Biologia, **8** : 29 - 45 (in Spanish); Alicante.
TOTH, P., TOTHOVA, M. & LUKAS, J. (2005) : First records of some Chalcidoidea species (Hymenoptera) from Slovakia. Biológia, **60**: p. 164; Bratislava.
TSUNEKI, K. (1971) : Spheciden aus der inneren Mongolei und dem nördlichen China (Hym.). Etizenia, Occasional Publications of the Biological Laboratory of Fukui University Japan, **58** : 1 - 38; Fukui.
UNGRICHT, S. (1995) : Faunistik und Ökologie der Hymenoptera Aculeata (exkl. Apoidea und Formicoidea) der Stadt Zürich. M.Sc. Thesis : 57 pp.; Zürich (unpublished).
VANGEL, J. (1905) : Contributions to the insect fauna of Hungary. III. Hymenoptera. Rovartani Lapok, **12** : 143 - 147, 165 - 168, 186 - 189 (all in Hungarian); Budapest.
VECHT, J.v.d. (1984) : Die orientalische Mauerwespe, *Sceliphron curvatum* (SMITH, 1870) in der Steiermark, Österreich (Hymenoptera, Sphecidae). Entomofauna, **5** : 213 - 219; Linz.
VECHT, J.v.d. & BREUGEL, F.M.A.v. (1968) : Revision of the nominate subgenus *Sceliphron* LATREILLE (Hym., Sphecidae) (Studies on the Sceliphronini, Part I). Tijdschrift voor Entomologie, **111** : 185 - 255; Amsterdam.
VECHT, J.v.d. & FISCHER, F.C.J. (1972) : Palaearctic Eumenidae. Hymenopterorum Catalogus, **8** : 1 - 199; Junk, Den Haag.
VELITSCHKOVSKY, V. & KOHL, F.F. (1913) : Faune du district de Valouyki du gouvernement de Woronege (Russie). Fasc. II., Hymenoptera : 21 pp.; Zellmayer, Stockerau; Friedländer, Berlin.
VELLAY, I. (1899) : Contributions to the fauna of Szeged. Rovartani Lapok, **6** : 104 - 107, 121 - 125, 136 - 138, 168 - 172, 183 - 184 (all in Hungarian); Budapest.
VEPREK, D. & STRAKA, J. (2007) : Apoidea : Spheciformes (digger wasps). In : BOGUSCH, P., STRAKA, J. & KMENT, P. (Editors), Annotated checklist of the Aculeata (Hymenoptera) of the Czech Republic and Slovakia. Acta Entomologica Musei Nationalis Pragae, Supplementum, **11** : 191 - 239; Prague.
VERNIER, R. (2003) : Le genre *Sceliphron* (Hymenoptera, Sphecidae) dans le Bassin lémanique et les régions voisines : vers un point de la situation. Bulletin Romand d'Entomologie, **21** : 1 - 8; Genève.
VERNIER, R., BARBALAT, S. & GONSETH, Y. (1996) : *Sceliphron destillatorium* (ILL.) (Hymenoptera, Sphecidae) au nord des Alpes en 1995. Bulletin Romand d'Entomologie, **14** : 179 - 183; Genève.
VILLERS, C. (1789) : Caroli Linnaei Entomologia, faunae Suecicae descriptionibus aucta, **3** : 657 pp.; Piestre & Delamolliere, Lugundi.
VOBLENKO, A.S., GOROBCHISHIN, V.A. & NESTEROV, M.A. (1996) : Digger wasps (Hymenoptera, Sphecidae) of Ukrainian Polesye. Sphecos, **30** : 14 - 15; Washington.

VOGRIN, V. (1918) : Contributions to the fauna of the Hymenoptera of the surroundings of Stridóvár. Rovartani Lapok, **25** : 87 - 92 (in Hungarian); Budapest.
VOGRIN, V. (1955) : Contribution to the fauna of the Hymenoptera Aculeata of Yugoslavia. Zastita Bilja, **31**/Supplement : 1 - 74 (in Serbocroatian); Belgrade.
WALKER, F. (1839) : Monographia Chalciditum, **1** : 333 pp., **2** : 100 pp.; Ballière, London.
WALKER, F. (1842 - 1843) : Descriptions of Chalcidites. Annual Magazine of Natural History, **10** (1842) : 113 - 117, 271 - 274; **11** (1843) : 30 - 33, 115 - 117, 184 - 189; **12** (1843) : 45 - 49, 103 - 104; London.
WEIGAND, E. (2012) : Die Mörtelbiene *Megachile parietina* (GEOFFROY, 1785) hat sich im südlichen Saarland etabliert. Bembix, **33** : 52 - 53; Bielefeld.
WERNER, F. (1927) : Zur Kenntnis der Fauna einer xerothermischen Lokalität in Niederösterreich (Unteres Kamptal). Zeitschrift für Morphologie und Ökologie der Tiere, **9** : 1 - 96; Berlin.
WESTRICH, P. (2008) : Über eine gelungene Wiederansiedlung der Schwarzen Mörtelbiene (*Megachile parietina* (GEOFFROY, 1785)) (Hymenoptera, Apidae). Entomologische Nachrichten und Berichte, **51** : 197 - 201; Dresden.
WESTWOOD, J.O. (1837) : Illustrations of exotic entomology, containing upwards of six hundred and fifty figures and descriptions of foreign insects, interspersed with remarks and reflections on their nature and properties by DRU DRURY, **1** : 123 pp.; Bohn, London.
WIERZEJSKI, A. (1868) : Contribution to the fauna of hymenopterous insects (Hymenoptera). Sprawozdanie Komisyi Fizyograficznej Towarzystwa Naukowego Krakowskiego, **2**/2 (1867) : 108 - 120 (in Polish); Cracow.
WIERZEJSKI, A. (1874) : Supplement to the fauna of hymenopterous insects (Hymenoptera). Sprawozdanie Komisyi Fizyograficznej Towarzystwa Umiejętności w Krakowie, **8**/2 (1873) : 253 - 273 (in Polish); Cracow.
WISNIOWSKI, B. (2000) : Hymenoptera of the Polish Bieszczady Mts with the special regard to the Bieszczady National Park. Monografie Bieszczadzkie, **2000**/8 : 145 - 187 (in Polish); Ustrzyki Dolne.
WISNIOWSKI, B. (2002) : Tiphiidae, Sapygidae, Mutillidae, Pompilidae, Eumenidae, Vespidae and Sphecidae (Hymenoptera : Aculeata) of Ojców National Park. Part I. List of species and zoogeographical analysis. Parki Narodowe i Rezerwaty Przyrody, **21**/1 : 51 - 82 (in Polish); Białowieza.
WISNIOWSKI, B. (2004) : Annotated checklist of the Polish digger wasps (Hymenoptera : Sphecidae). Polskie Pismo Entomologiczne, **73** : 33 - 63; Opole.
WISNIOWSKI, B. (2007) : Additions to the hymenopteran fauna of Ojców National Park (Insecta, Hymenoptera). Prądnik, Prace i Materiały Muzeum im. Prof. WŁADYSŁAWA SZAFERA, **17** : 131 - 148 (in Polish); Cracow.
WISSMANN, A. (1849) : Verzeichnis der im Königreich Hannover, zumal im südlichen Teile und am Harze, bisher aufgefundenen Mordwespen. Stettiner Entomologische Zeitung, **10** : 8 - 17; Stettin.
YU, D.S., ACHTEMBERG, K.v. & HORSTMANN, K. (2005) : World Ichneumonoidea 2004. Taxonomy, biology, morphology and distribution. Taxapad CD; Vancouver/British Columbia.
ZAHRADNIK, J. & SEVERA, F. (1976) : Der Kosmos-Insektenführer. 319 pp.; Franckh, Stuttgart. ISBN 3-440-04123-9.
ZAVADIL, V. (1934) : Interesting finds of digger wasps (Sphecidae) in eastern Slovakia. Casopis Ceskoslovenské Spolecnosti Entomologické, **31** : 187 - 188 (in Czech); Prague.
ZAVADIL, V. (1939) : Supplements to the Prodromus Hymenopterorum I. (Sphecoidea). Entomologicke Listy, **2** : 120 - 122 (in Czech); Brno.
ZAVADIL, V. (1948) : Some interesting foundings of hymenopterous insects in the greater Ostrava district. Sbornik Prirodovedecké Spolecnosti v Moravské Ostrave, **9** (1936 - 1946) : 15 - 26 (in Czech); Ostrava.
ZAVADIL, V. & SNOFLAK, J. (1948) : Digger wasps (Sphecidae) of the Czechoslovakian Republic : descriptive and complete determination key. Entomologické Prírucky Entomologických Listu, **13** : 1 - 179 (in Czech); Vyskov.
ZAVADIL, V., SUSTERA, O. & BATA, L. (1937) : G.- Sphecoidea. In : BATA, L., GREGOR, F., HOFFER, A., SPACEK, K., SUSTERA, O., ZALESKY, M. & ZAVADIL, V., Prodromus of the hymenoptera of the Czechoslovakian Republic, pars I. Sbornik Entomologickeho Otdeleni Národniho Musea v Praze, **15** : 117 - 222 (in Czech); Prague.
ZETTEL, H. (2000) : Seltene und bemerkenswerte Grabwespen (Hymenoptera : Spheciformes) aus Ostösterreich. Beiträge zur Entomofaunistik, **1** : 19 - 33; Vienna.
ZETTEL, H., GROSS, H. & MAZZUCCO, K. (2001) : Liste der Grabwespen-Arten (Hymenoptera : Spheciformes) Wiens, Österreich. Beiträge zur Entomofaunistik, **2** : 61 - 86; Vienna.
ZETTEL, H. & WIESBAUER, H. (2011) : Grabwespen (Ampulicidae, Sphecidae, Crabronidae). In :

WIESBAUER, H., ZETTEL, H., FISCHER, M.A. & MAIER, R. (Editors), Der Bisamberg und die Alten Schanzen : Vielfalt am Rande der Großstadt Wien : 217 - 224, 354 - 357; Amt der Niederösterreichischen Landesregierung, Sankt Pölten.
ZILAHI-KISS, E. (1904) : Contributions to the fauna of the Hymenoptera of the comitate of Szilágy. Rovartani Lapok, **11** : 47 - 50, 77 - 79 (all in Hungarian); Budapest.
ZILAHI-SEBESS, G.v. (1939) : Neue Fundorte von einigen Hymenopteren auf der ungarischen Tiefebene. Fragmenta Faunistica Hungarica, **2** : 61 - 64; Budapest.
ZIVOJINOVIC, S. (1950) : The fauna of insects of the forest domain of Majdanpek (entomological monograph). Posebna Izdanja of the Serbian Academy of Sciences, **160**, Institute for Ecology and Biogeography, **2** : 262 pp. (in Serbocroatian); Belgrade.

15 Captions of Illustrations

The illustrations of the present monograph include 27 figures and 7 plates, and the captions of these illustrations are compiled as follows.

15.1 Figure Captions

Figure 1 : Morphology and colour distribution of the female of the Palaearctic Mud-Dauber *Sceliphron destillatorium* (ILLIGER 1807). Drawing : ERWIN SCHEUCHL (Ergolding).
Figure 2 : Morphology and colour distribution of the female of the Nearctic Mud-Dauber *Sceliphron caementarium* (DRURY 1773). Drawing : ERWIN SCHEUCHL (Ergolding).
Figure 3 : Morphology and colour distribution of the female of the Oriental Mud-Dauber *Sceliphron curvatum* (SMITH 1870). Drawing : ERWIN SCHEUCHL (Ergolding).
Figure 4 : Morphology and colour distribution of the female of the Palaearctic Mud-Dauber *Sceliphron spirifex* (LINNAEUS 1758). Drawing : ERWIN SCHEUCHL (Ergolding).
Figure 5 : Morphology and colour distribution of the female of the Palaearctic Mud-Dauber *Sceliphron madraspatanum tubifex* (LATREILLE 1809). Drawing : ERWIN SCHEUCHL (Ergolding).
Figure 6 : Morphology and colour distribution of the female of the Oriental Mud-Dauber *Sceliphron deforme* (SMITH 1856). Drawing : ERWIN SCHEUCHL (Ergolding).
Figure 7 : Morphology and colour distribution of the female of the Palaearctic Mud-Dauber *Sceliphron funestum* KOHL 1918. Drawing : ERWIN SCHEUCHL (Ergolding).
Figure 8 : Morphology and colour distribution of the female of the Palaearctic Mud-Dauber *Sceliphron arabs* (LEPELETIER 1845). Drawing : ERWIN SCHEUCHL (Ergolding).
Figure 9 : Morphology and colour distribution of the female of the Palaearctic Mud-Dauber *Sceliphron femoratum* (FABRICIUS 1781). Drawing : ERWIN SCHEUCHL (Ergolding).
Figure 10 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Europe and adjacent areas (original drawing based on a geographical map in the scale 1 : 5,000,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 11 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Europe (1) (original drawing based on a geographical map in the scale 1 : 2,750,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 12 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Europe (2) (original drawing based on a geographical map in the scale 1 : 2,000,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 13 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Europe (3) (original drawing based on a geographical map in the scale 1 : 3,500,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 14 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Europe (4) (original drawing based on a geographical map in the scale 1 : 750,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 15 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Europe (5) (original drawing based on a geographical map in the scale 1 : 1,000,000). Status 2001. Drawing : DETLEF MADER (Walldorf).

Figure 16 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Europe (6) (original drawing based on a geographical map in the scale 1 : 1,000,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 17 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Europe (7) (original drawing based on a geographical map in the scale 1 : 2,000,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 18 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) east of the Caspian Sea (original drawing based on a geographical map in the scale 1 : 3,500,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 19 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Western Ukraine (original drawing based on a geographical map in the scale 1 : 300,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 20 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Romania (original drawing based on a geographical map in the scale 1 : 1,000,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 21 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Slovakia, Czechia and Hungary (original drawing based on a geographical map in the scale 1 : 750,000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 22 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Southeastern Poland (1) (original drawing based on a geographical map in the scale 1 : 750 000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 23 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Southeastern Poland (2) (original drawing based on a geographical map in the scale 1 : 300 000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 24 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Southeastern Poland (3) (original drawing based on a geographical map in the scale 1 : 100 000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 25 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Southeastern Poland (4) (original drawing based on a geographical map in the scale 1 : 100 000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 26 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Southeastern Poland (5) (original drawing based on a geographical map in the scale 1 : 100 000). Status 2001. Drawing : DETLEF MADER (Walldorf).
Figure 27 : Biogeography of the Mud-Dauber *Sceliphron destillatorium* (Sphecidae) in Southwestern Poland (original drawing based on a geographical map in the scale 1 : 300 000). Status 2001. Drawing : DETLEF MADER (Walldorf).

15.2 Plate Captions

Plate 1 : Mason nests of the Mud-Dauber *Sceliphron destillatorium* on outer walls of buildings in the southeastern part of Poland. Photographs : DETLEF MADER (Walldorf).
Plate 1/1 - 1/2 : Mason nest of the Mud-Dauber *Sceliphron destillatorium* on the wall of the hotel Victoria in the Ordynacka street in Krosno.
Plate 1/3 : Mason nest of the Mud-Dauber *Sceliphron destillatorium* below the roof of the Spółdzielcy Dom Towarowy at the main street west of the bridge across the Ropa river in Ropa east of Nowy Sącz.
Plate 1/4 : Mason nest of the Mud-Dauber *Sceliphron destillatorium* in a recess in the sculptured wall of the Kasa Rolniczy in the Basztowa street in Przemyśl.
Plate 1/5 : Mason nest of the Mud-Dauber *Sceliphron destillatorium* below an arch on the wall of the town hall on the market place in Tarnów.
Plate 1/6 : Mason nest of the Mud-Dauber *Sceliphron destillatorium* below an arch of a window of the church in Ciężkowice northeast of Nowy Sącz.

Plate 2 : Examples of mason nests of other masoning wasps and bees in Europe and North America. Photographs : DETLEF MADER (Walldorf).
Plate 2/1 : Mason nest of the Mud-Dauber *Sceliphron destillatorium* below the roof in the church of

the monastery Kessariani (Kaisariani) in Athens in Greece.
Plate 2/2 : Mason nest of the Mud-Dauber *Sceliphron caementarium* below an arch of a window of a church in the Church street in Toronto in Canada.
Plate 2/3 - 2/4 : Mason nests of the Mud-Dauber *Sceliphron caementarium* below the roof of the Hockey Hall of Fame at the edge of Front street and Yonge street in Toronto in Canada.
Plate 2/5 : Mason nest of the Mason Bee *Megachile (Chalicodoma) parietina* on the wall of a quarry near Stolec east of Ząbkowice Śląskie south of Wrocław in Poland.
Plate 2/6 : Mason nest of the Delta Mud Wasp *Delta unguiculatum* on the wall of a building in Licey-sur-Vingeanne in France.

Plate 3 : Mason nests of the Mud-Dauber *Sceliphron destillatorium* on outer and inner walls of buildings in the southeastern part of Poland.
Plate 3/1 - 3/3 : Mason nest of the Mud-Dauber *Sceliphron destillatorium* in the attic of a house in Wola Mała eastnortheast of Biłgoraj southwest of Zamość. Photographs : MARIUSZ SZWED (Sól west of Biłgoraj) (SZWED in BURY, SUDOŁ, ZIĘBA & ZYŁA 2009).
Plate 3/4 - 3/7 : Mason nests of the Mud-Dauber *Sceliphron destillatorium* in the attic of a house in Srogów Górny northwest of Sanok. Photographs : PAWEŁ RYBA (Srogów Górny northwest of Sanok).
Plate 3/8 : Mason nest of the Mud-Dauber *Sceliphron destillatorium* below the balcony on the outer wall of a house in Markowa east of Rzeszów. Photograph : JAROSŁAW BURY (Markowa) (BURY in BURY, SUDOŁ, ZIĘBA & ZYŁA 2009).
Plate 3/9 : Mason nest of the Mud-Dauber *Sceliphron destillatorium* on the outer wall of a house in Janowice southsoutheast of Sobionowice westsouthwest of Wieliczka southeast of Cracow. Photograph : PIOTR BILANSKI (Cracow).

Plate 4 : Mason nests of the Mud-Dauber *Sceliphron destillatorium* on outer and inner walls of buildings in the southeastern part of Poland and in the southern part of Ukraina.
Plate 4/1 - 4/6 : Mason nests of the Mud-Dauber *Sceliphron destillatorium* in the attic of a house in Srogów Górny northwest of Sanok. Photographs : PAWEŁ RYBA (Srogów Górny northwest of Sanok).
Plate 4/7 - 4/8 : Mason nests of the Mud-Dauber *Sceliphron destillatorium* in the framework of a window on the outer wall of a house in Gursuf eastnortheast of Jalta southsoutheast of Simferopol. Photographs : ALEXANDER FATERYGA (Feodosija).
Plate 4/9 : Mason nest of the Mud-Dauber *Sceliphron destillatorium* on the outer wall of a house in Simferopol. Photograph : ALEXANDER FATERYGA (Feodosija).

Plate 5 : Mason nests of the Mud-Dauber *Sceliphron destillatorium* on outer and inner walls of buildings in the southeastern part of Poland and on the Canarian Islands.
Plate 5/1 - 5/3 : Mason nests of the Mud-Dauber *Sceliphron destillatorium* on the outer wall of a house in Janowice southsoutheast of Sobionowice westsouthwest of Wieliczka southeast of Cracow. Photographs : PIOTR BILANSKI (Cracow).
Plate 5/4 - 5/7 : Mason nests of the Mud-Dauber *Sceliphron destillatorium* in the attic of a house in Rozpucie northeast of Tyrawa eastnortheast of Sanok. Photographs : PIOTR BILANSKI (Cracow).
Plate 5/8 - 5/9 : Mason nests of the Mud-Dauber *Sceliphron destillatorium* on walls of rocks in Gomera. Photographs : HANS-JOACHIM KLEIN (Idstein).

Plate 6 : Individuals of the Mud-Dauber *Sceliphron destillatorium*. 1 - 3 : Male and female in preparation for copulation; 4 : flower visit, 5 : rest and outlook; 6 - 9 : material collection for nest building. Photographs : 1 - 3 : DAMIAN SUDOŁ (Głogów Malopolski), 4 - 6 : PIOTR BILANSKI (Cracow), 7 - 9 : CLAUDIA GACK (Freiburg).

Plate 7 : Individuals of the Mud-Dauber *Sceliphron destillatorium*. 1 - 4 and 6 - 7 : Material collection for nest building; 5, 8 and 9 : flower visits (8 and 9 : together with the Italian Striped-Bug *Graphosoma lineatum* (LINNAEUS 1758) (Hemiptera : Pentatomidae) left of the wasp). Photographs : 1 - 7 : VLADIMIR KAZENAS (Almaty), 8 - 9 : ALEXANDER FATERYGA (Feodosija).

Legend of the numbering of the photographs in plates 3 - 7 as seen in transverse format from the side : 1 : upper left, 2 : upper middle, 3 : upper right, 4 : middle left, 5 : middle middle, 6 : middle right, 7 : lower left, 8 : lower middle, 9 : lower right.



Fig. 1

Sceliphron destillatorium (Illiger 1807) – ♀



Fig. 2

Sceliphron caementarium (Drury 1773) – ♀



Fig. 3

Sceliphron curvatum (Smith 1870) – ♀



Fig. 4

Sceliphron spirifex (Linnaeus 1758) – ♀



Fig. 5

Sceliphron madraspatanum tubifex (Latreille 1809) – ♀



Fig. 6

Sceliphron deforme (Smith 1856) – ♀



Fig. 7

Sceliphron funestum (Kohl 1918) – ♀



Fig. 8

Sceliphron arabs (Lepeletier 1845) – ♀



Fig. 9

Sceliphron femoratum (Fabricius 1781) – ♀



Fig. 1

Sceliphron destillatorium (ILLIGER 1807) – ♀



Fig. 2

Sceliphron caementarium (DRURY 1773) – ♀



Fig. 3

Sceliphron curvatum (SMITH 1870) – ♀



Fig. 4

Sceliphron spirifex (LINNAEUS 1758) – ♀



Fig. 5

Sceliphron madraspatanum tubifex (LATREILLE 1809) – ♀

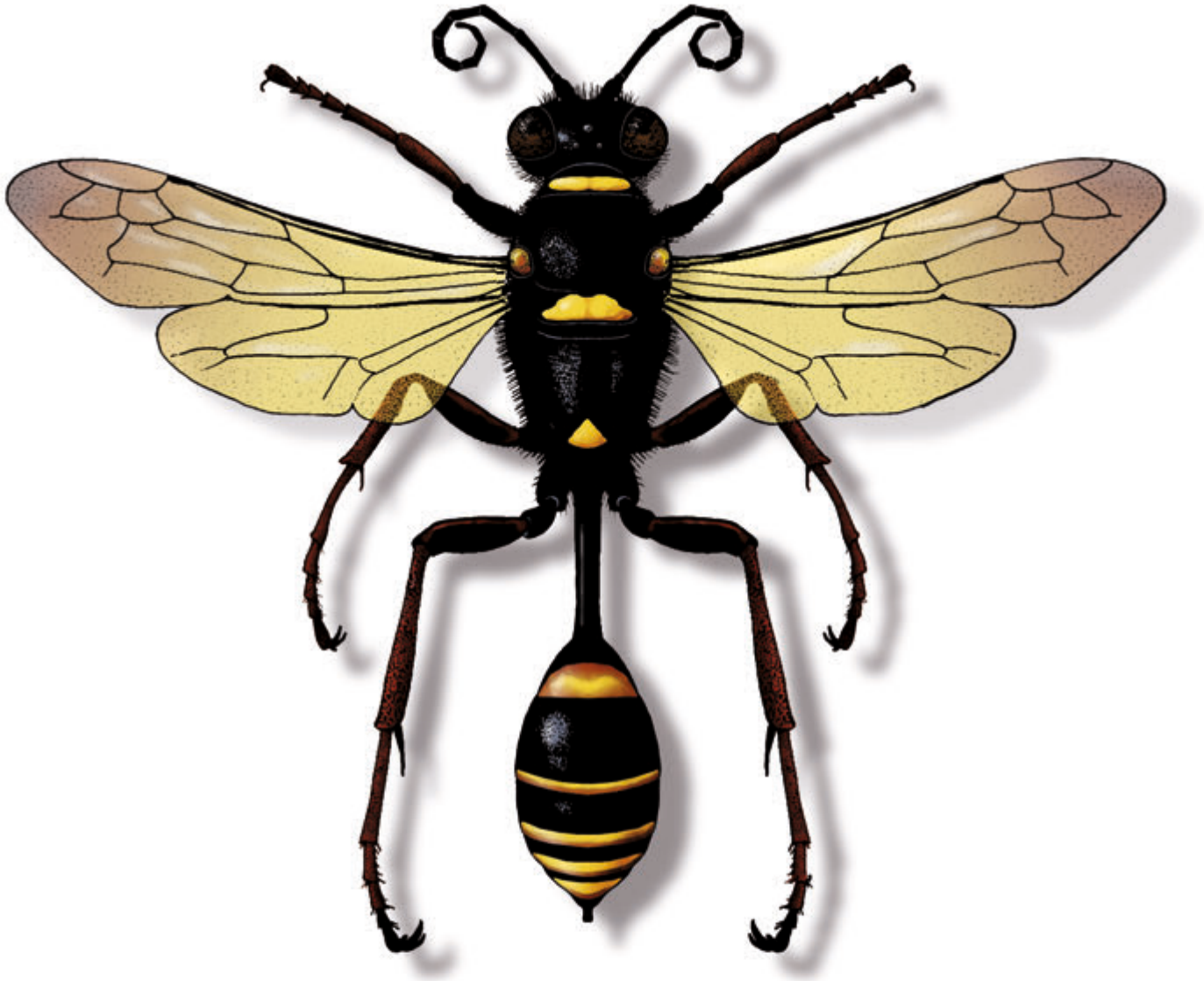


Fig. 6

Sceliphron deforme (SMITH 1856) – ♀

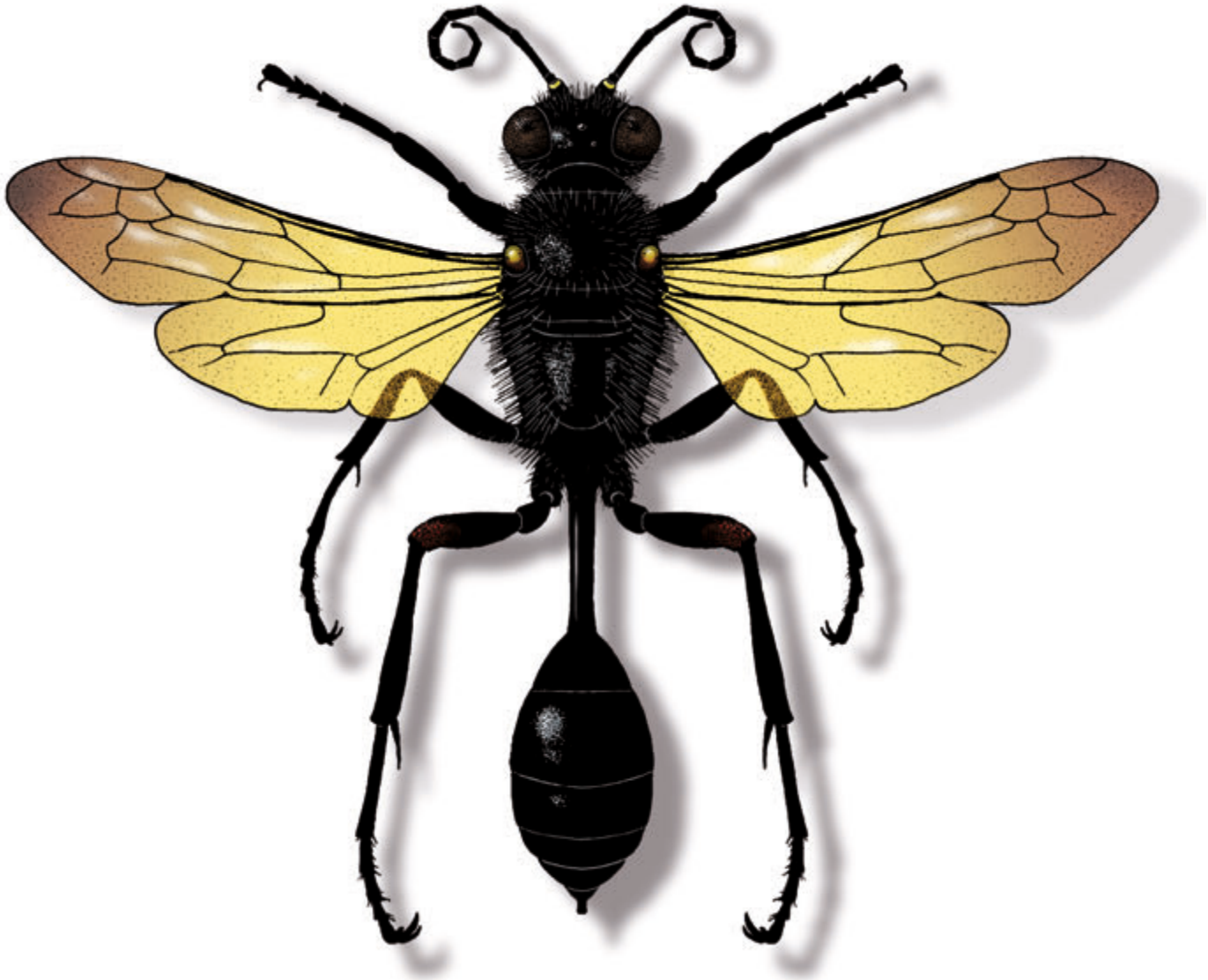


Fig. 7

Sceliphron funestum (KOHL 1918) – ♀



Fig. 8

Sceliphron arabs (LEPELETIER 1845) – ♀

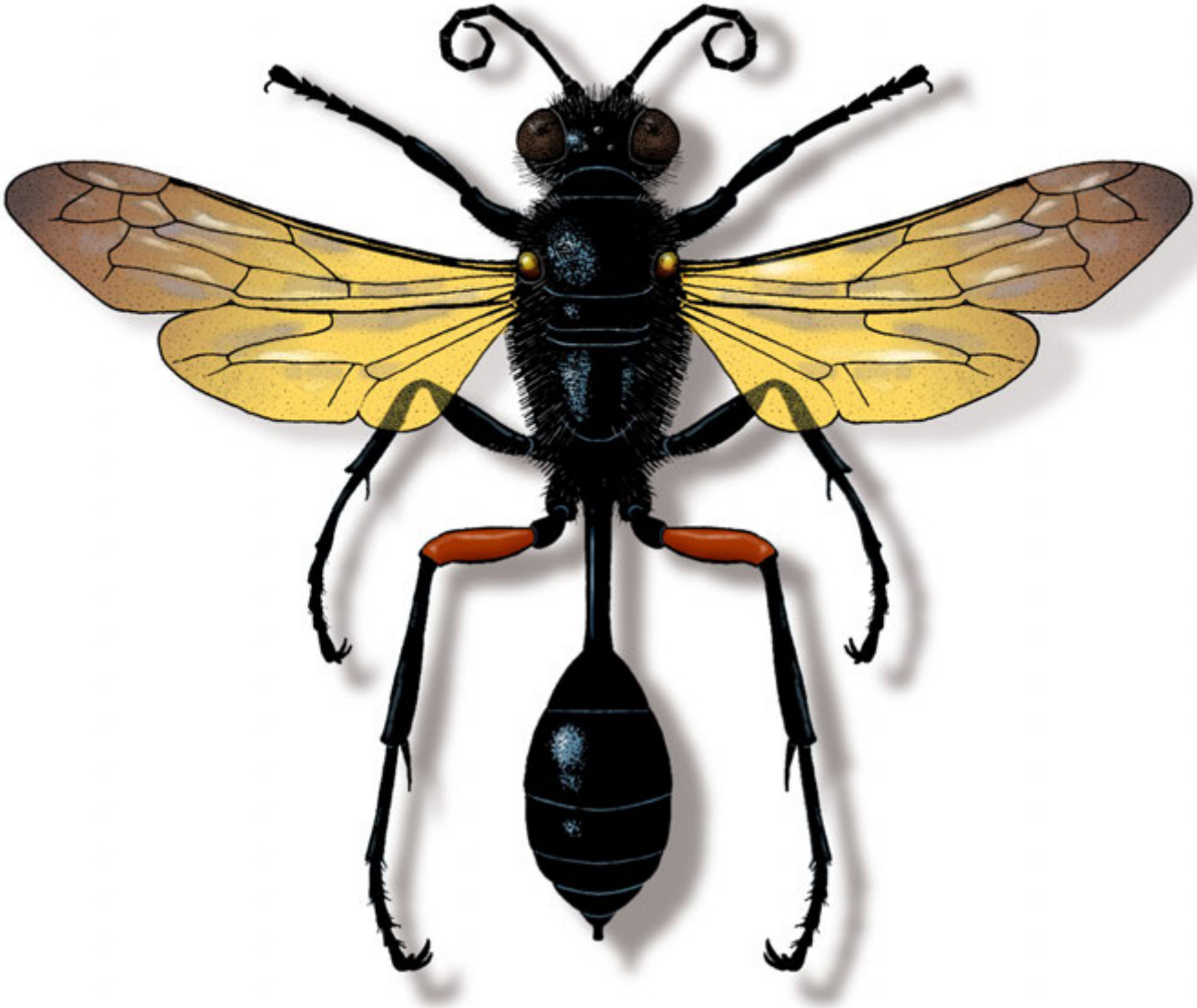


Fig. 9

Sceliphron femoratum (FABRICIUS 1781) – ♀

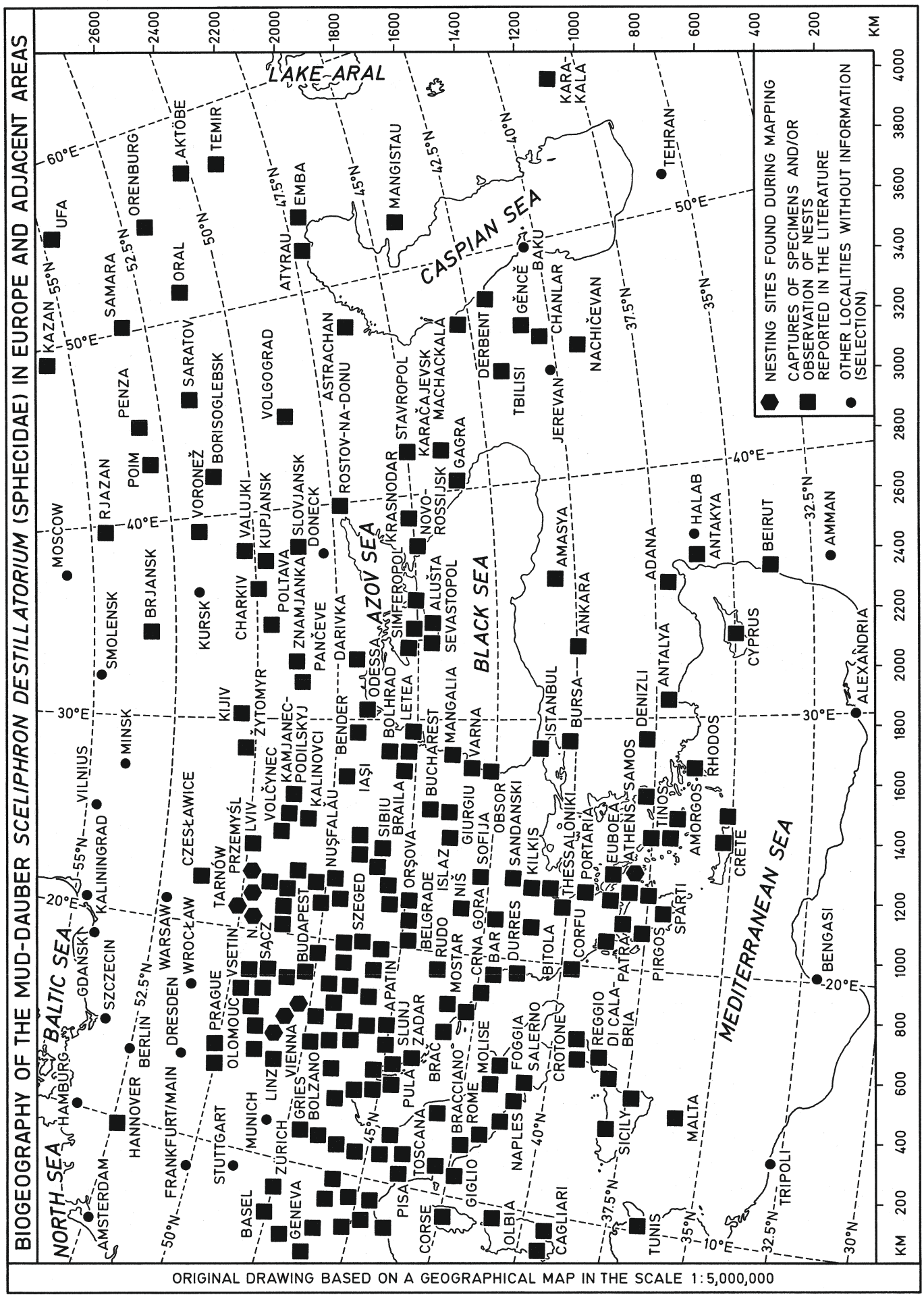

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN EUROPE AND ADJACENT AREAS
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS AND/OR OBSERVATION OF NESTS REPORTED IN THE LITERATURE
OTHER LOCALITIES WITHOUT INFORMATION (SELECTION)
NORTH SEA
BALTIC SEA
BLACK SEA
AZOV SEA
CASPIAN SEA
LAKE ARAL
MEDITERRANEAN SEA
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:5,000,000

Figure 10

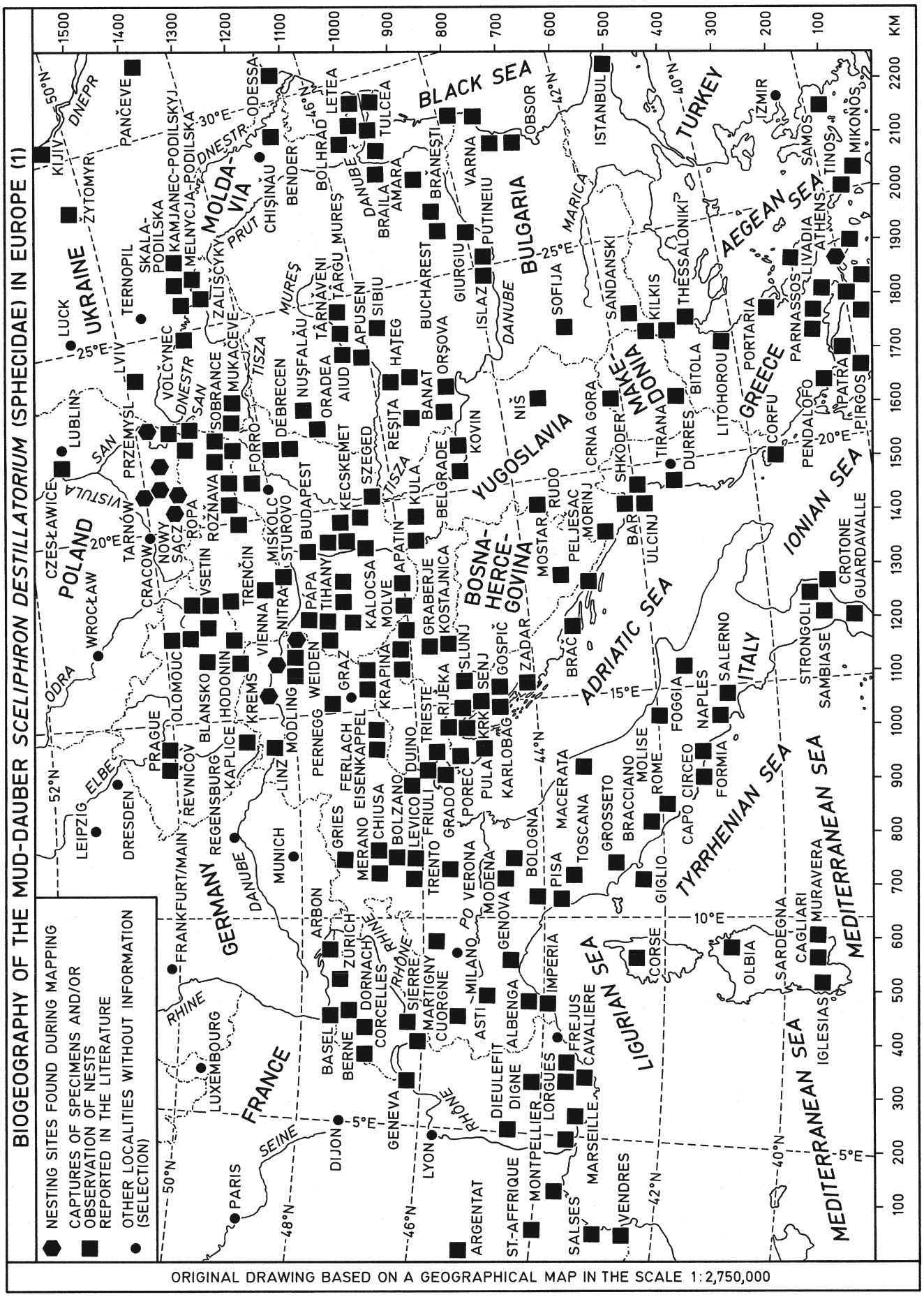

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN EUROPE (1)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS AND/OR OBSERVATION OF NESTS REPORTED IN THE LITERATURE
OTHER LOCALITIES WITHOUT INFORMATION (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:2,750,000
KM
BLACK SEA
ADRIATIC SEA
IONIAN SEA
AEGEAN SEA
TYRRHENIAN SEA
LIGURIAN SEA
MEDITERRANEAN SEA
MEDITERRANEAN SEA
GERMANY
POLAND
UKRAINE
MOLDAVIA
BULGARIA
YUGOSLAVIA
BOSNA-HERCEGOVINA
MAKEDONIA
GREECE
TURKEY
ITALY
FRANCE
SWITZERLAND
AUSTRIA
HUNGARY
ROMANIA
CZECHOSLOVAKIA
LUXEMBOURG
PARIS
DIJON
LYON
GENEVA
MARSEILLE
MONTPELLIER
ST.-AFFRIQUE
SALSES
VENDRES
ARGENTAT
DIEULEFIT
DIGNE
LORGUES
FREJUS
CAVALIERE
IMPERIA
ALBENGA
GENOVA
MILANO
ASTI
MARTIGNY
CUORGNE
SIERRE
CORSE
CORCELLES
DORNACH
BERNE
BASEL
ZÜRICH
ARBON
FRANKFURT/MAIN
LUXEMBOURG
REVNIČOV
PRAGUE
DRESDEN
LEIPZIG
REGENSBURG
KAPLICE
BLANSKO
HODONIN
KREMS
LINZ
MÖDLING
MUNICH
PERNEGG
WEIDEN
GRIES
MERANO
EISENKAPPEL
CHIUSA
BOLZANO
LEVICO
TRENTO
FRIULI
DUINO
TRIESTE
FERLACH
GRAZ
KRAPINA
GRADO
VERONA
MODENA
BOLOGNA
PISA
TOSCANA
MACERATA
GROSSETO
BRACCIANO
MOLISE
ROME
GIGLIO
CAPO CIRCEO
FOGGIA
NAPLES
FORMIA
SALERNO
STRONGOLI
SAMBIASE
CROTONE
GUARDAVALLE
SARDEGNA
CAGLIARI
MURAVERA
IGLESIAS
OLBIA
BRAČ
RIJEKA
KRK
PULA
POREČ
KARLOBAG
SLUNJ
SENJ
GOSPIĆ
ZADAR
KARLOVAC
KOSTAJNICA
GRABERJE
MOLVE
APATIN
KALOCSA
KECSKEMET
SZEGED
KULA
BELGRADE
KOVIN
NIŠ
MOSTAR
RUDO
PELJEŠAC
MORINJ
BAR
ULCINJ
SHKODER
CRNA GORA
TIRANA
DURRËS
BITOLA
LITOHOROU
PORTARIA
PENDALOFO
CORFU
PATRA
PIRGOS
PARNASSOS
LIVADIA
ATHENS
SAMOS
TINOS
MIKONOS
IZMIR
KILKIS
THESSALONIKI
SANDANSKI
SOFIJA
ISLAZ
GIURGIU
BUCHAREST
BANAT
ORŞOVA
PUTINEIU
VARNA
OBSOR
ISTANBUL
BRĂNEŞTI
BRAILA
AMARA
DANUBE
TULCEA
LETEA
BOLHRAD
MUREŞ
TÂRNĂVENI
TÂRGU
APUSENI
SIBIU
HAŢEG
REŞIŢA
ORADEA
AIUD
NUŞFALĂU
DEBRECEN
FORRÓ
MISKOLC
BUDAPEST
PÁPA
TIHANY
NITRA
STUROVO
TRENČIN
VIENNA
VSETIN
ROŽŇAVA
SOBRANCE
MUKAČEVE
ZALIŠČYKY
VOLČYNEC
TERNOPIL
LVIV
SKALA-PODILSKA
KAMJANEC-PODILSKYJ
MELNYCJA-PODILSKA
CHIŞINĂU
BENDER
ODESSA
PANČEVE
KIJIV
ŽYTOMYR
LUCK
LUBLIN
CZEŠŁAWICE
WROCŁAW
TARNOW
PRZEMYŚL
CRACOW
NOWY SĄCZ
RÓPA
ODRA
VISTULA
SAN
DNIEPR
DNIESTR
PRUT
TISZA
DANUBE
MARICA
RHINE
RHÔNE
SEINE
ELBE
50°N
52°N
48°N
46°N
42°N
40°N
5°E
10°E
15°E
20°E
25°E
30°E
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200

Figure 11

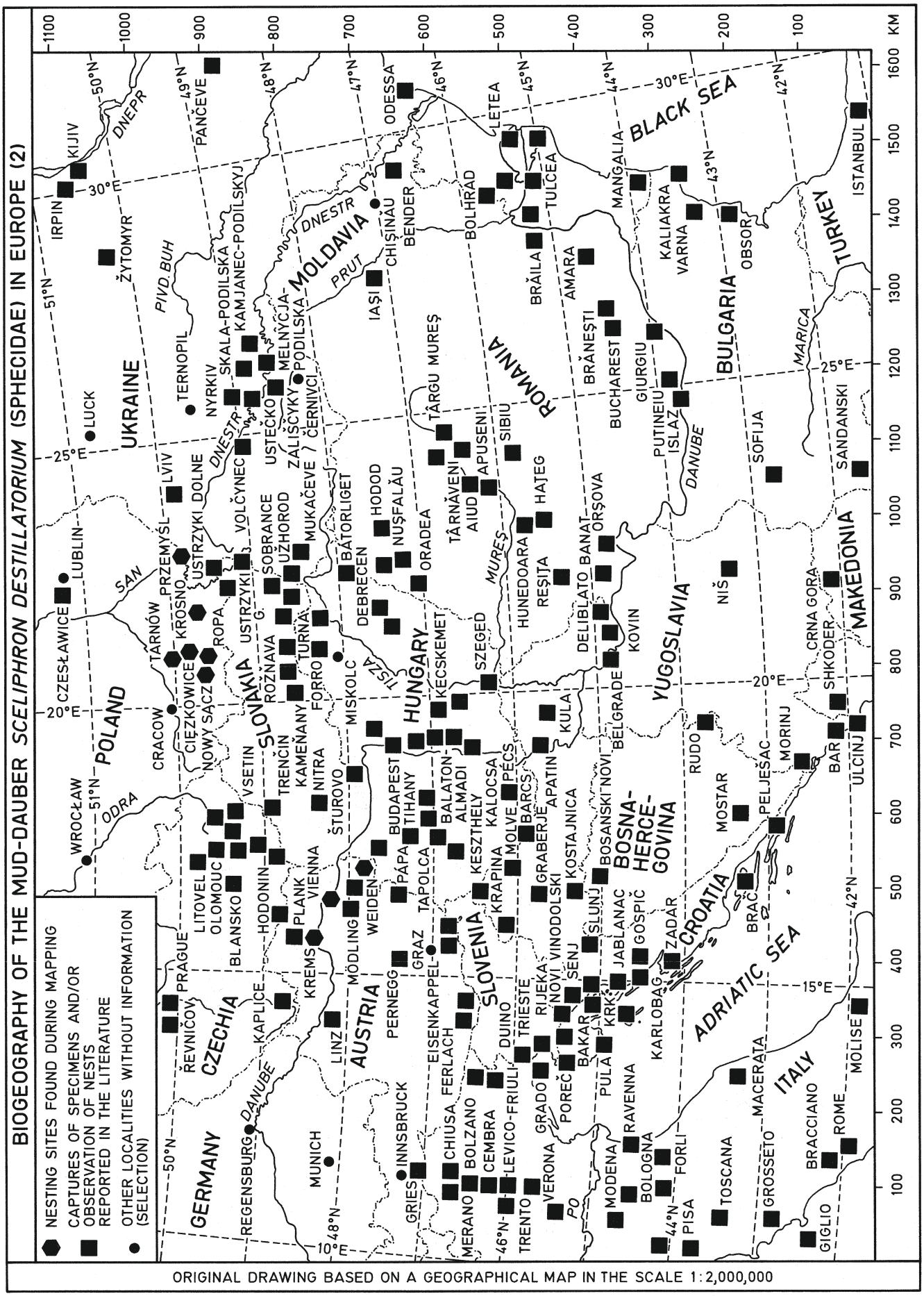

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN EUROPE (2)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS AND/OR OBSERVATION OF NESTS REPORTED IN THE LITERATURE
OTHER LOCALITIES WITHOUT INFORMATION (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:2,000,000
BLACK SEA
ADRIATIC SEA
UKRAINE
POLAND
CZECHIA
SLOVAKIA
HUNGARY
ROMANIA
MOLDAVIA
AUSTRIA
SLOVENIA
CROATIA
BOSNA-HERCE-GOVINA
YUGOSLAVIA
BULGARIA
TURKEY
GREECE
MAKEDONIA
ITALY
GERMANY
KM

Figure 12

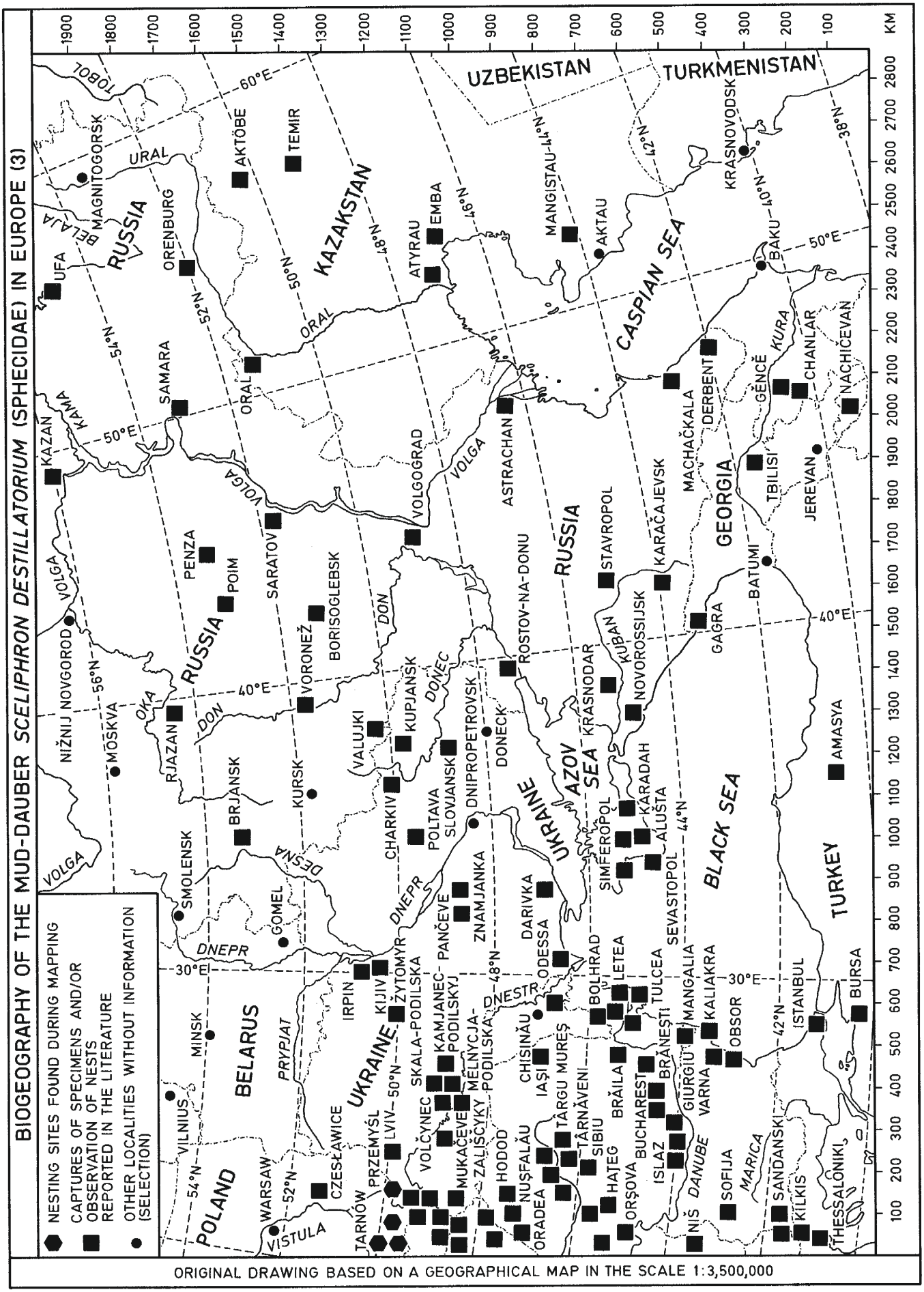

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN EUROPE (3)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS AND/OR OBSERVATION OF NESTS REPORTED IN THE LITERATURE
OTHER LOCALITIES WITHOUT INFORMATION (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:3,500,000
RUSSIA
KAZAKSTAN
UZBEKISTAN
TURKMENISTAN
BELARUS
UKRAINE
POLAND
GEORGIA
TURKEY
CASPIAN SEA
BLACK SEA
AZOV SEA
URAL
VOLGA
DON
DNEPR
DNESTR
DONEC
KAMA
ORAL
KURA
MARICA
DANUBE
PRYPJAT
VISTULA
OKA
DESNA
MOSKVA
MINSK
WARSAW
VILNIUS
KIEV
LVIV
ODESSA
SIMFEROPOL
SEVASTOPOL
KRASNODAR
ROSTOV-NA-DONU
VOLGOGRAD
ASTRACHAN
SARATOV
VORONEŽ
KAZAN
UFA
SAMARA
ORENBURG
AKTÖBE
TEMIR
ATYRAU
EMBA
MANGISTAU-44°N
AKTAU
KRASNOVODSK
BAKU
DERBENT
MACHAČKALA
KARAČAJEVSK
NOVOROSSIJSK
GAGRA
BATUMI
TBILISI
GENCE
CHANLAR
NACHICEVAN
JEREVAN
AMASYA
ISTANBUL
BURSA
KILKIS
THESSALONIKI
SANDANSKI
SOFIJA
NIŠ
ISLAZ
BUCHAREST
CRAIOVA
BRĂILA
GIURGIU
VARNA
KALIAKRA
OBSOR
MANGALIA
TULCEA
BRĂNEȘTI
CONSTANȚA
CHIȘINĂU
IAȘI
TÂRGU MUREȘ
TÂRNĂVENI
SIBIU
HAȚEG
ORȘOVA
ORADEA
NUȘFALĂU
HODOD
ZALIŠČYKY
MUKAČEVE
VOLČYNEC
SKALA-PODILSKA
KAMJANEC-PODILSKYJ
MELNYCJA-PODILSKA
PANČEVE
ZNAMJANKA
DARIVKA
BOLHRAD
LETEA
KARADAH
ALUŠTA
YALTA
KUBAN
DNIPROPETROVSK
DONECK
POLTAVA
SLOVJANSK
CHARKIV
KUPJANSK
VALUJKI
KURSK
BRJANSK
SMOLENSK
GOMEL
IRPIN
KIJIV
ŽYTOMYR
PRZEMYŚL
TARNÓW
CZEŁAWICE
LUBLIN
PENZA
POIM
RJAZAN
NIŽNIJ NOVGOROD
TOBOL
MAGNITOGORSK
BELAJA
KAMA
60°E
50°E
40°E
30°E
54°N
52°N
50°N
48°N
46°N
44°N
42°N
40°N
38°N
56°N
KM

Figure 13

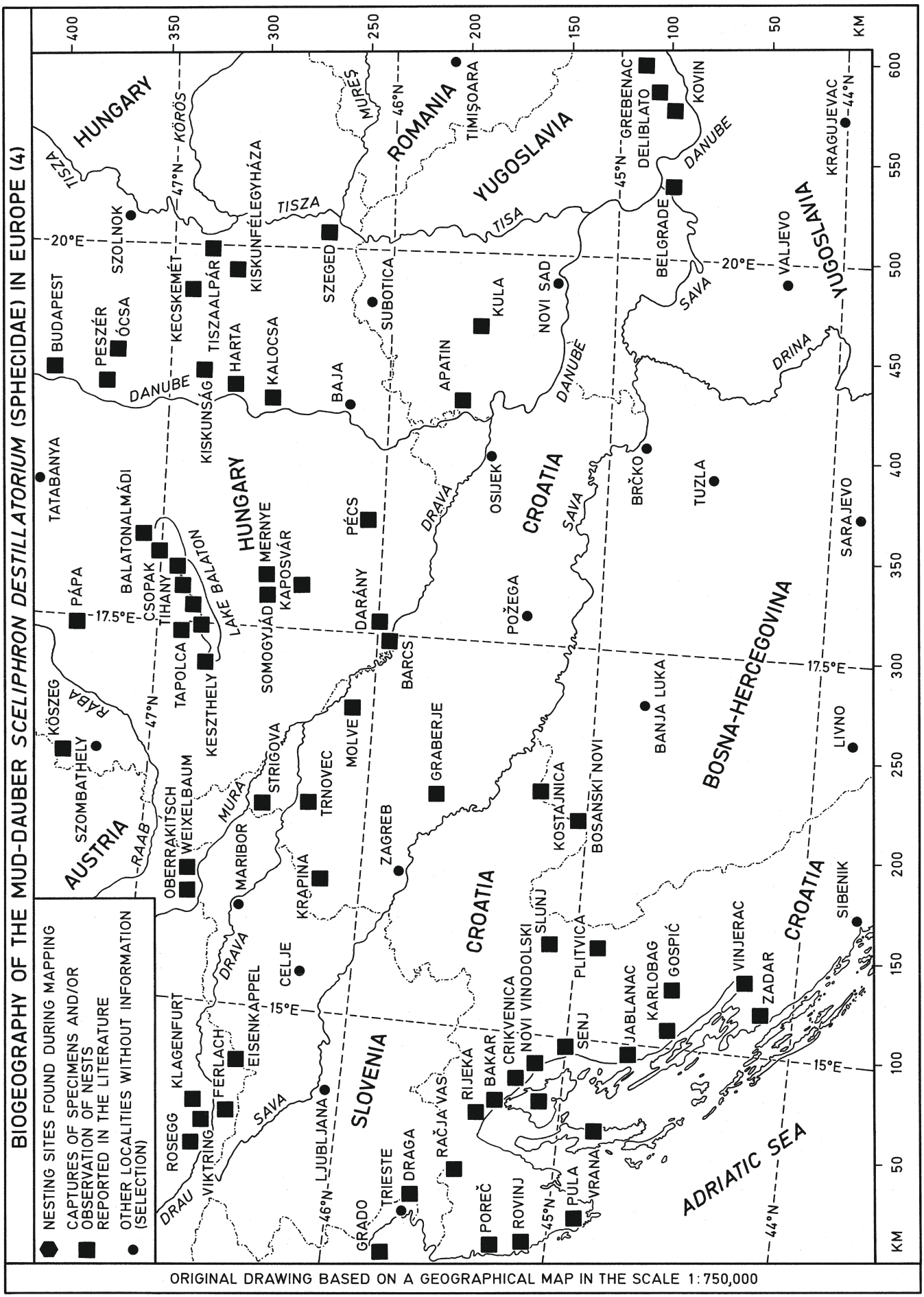

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN EUROPE (4)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS AND/OR OBSERVATION OF NESTS REPORTED IN THE LITERATURE
OTHER LOCALITIES WITHOUT INFORMATION (SELECTION)
HUNGARY
AUSTRIA
SLOVENIA
CROATIA
ROMANIA
YUGOSLAVIA
BOSNA-HERCEGOVINA
ADRIATIC SEA
BUDAPEST
PESZÉR
ÓCSA
SZOLNOK
KECSKEMÉT
TISZAALPÁR
KISKUNFÉLEGYHÁZA
HARTA
KISKUNSÁG
KALOCSA
SZEGED
SUBOTICA
TIMIŞOARA
KULA
NOVI SAD
APATIN
BAJA
PÉCS
DARÁNY
BARCS
OSIJEK
POŽEGA
BRČKO
TUZLA
SARAJEVO
BANJA LUKA
LIVNO
GREBENAC
DELIBLATO
KOVIN
BELGRADE
VALJEVO
KRAGUJEVAC
TATABÁNYA
PÁPA
BALATONALMÁDI
CSOPAK
TIHANY
TAPOLCA
KESZTHELY
MERNYE
SOMOGYJÁD
KAPOSVÁR
KŐSZEG
SZOMBATHELY
OBERRAKITSCH
WEIXELBAUM
STRIGOVA
TRNOVEC
MOLVE
GRABERJE
ZAGREB
KRAPINA
MARIBOR
CELJE
EISENKAPPEL
FERLACH
KLAGENFURT
ROSEGG
VIKTRING
LJUBLJANA
TRIESTE
GRADO
DRAGA
RAČJA VAS
RIJEKA
BAKAR
CRIKVENICA
NOVI VINODOLSKI
SLUNJ
SENJ
KOSTAJNICA
BOSANSKI NOVI
PLITVICA
JABLANAC
KARLOBAG
GOSPIĆ
VINJERAC
ZADAR
SIBENIK
PULA
VRANA
POREČ
ROVINJ
TISZA
KÖRÖS
MUREŞ
DANUBE
DRAVA
SAVA
MURA
RAAB
DRINA
LAKE BALATON
20°E
17.5°E
15°E
47°N
46°N
45°N
44°N
KM
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:750,000

Figure 14

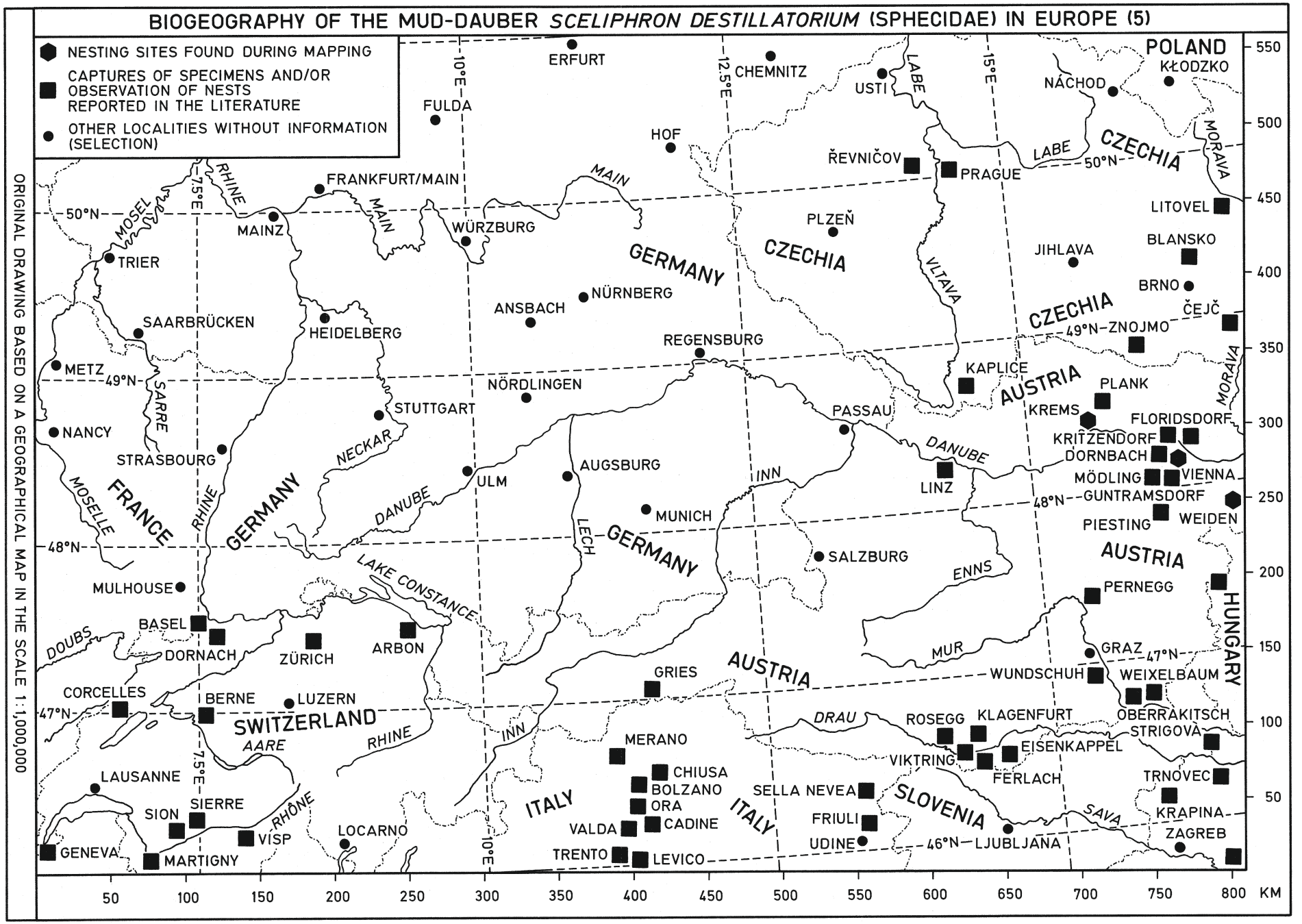

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN EUROPE (5)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS AND/OR OBSERVATION OF NESTS REPORTED IN THE LITERATURE
OTHER LOCALITIES WITHOUT INFORMATION (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:1,000,000
ERFURT
CHEMNITZ
USTI
NÁCHOD
KŁODZKO
POLAND
FULDA
HOF
ŘEVNIČOV
PRAGUE
LABE
CZECHIA
MORAVA
FRANKFURT/MAIN
MAIN
MOSEL
RHINE
MAINZ
WÜRZBURG
PLZEŇ
LITOVEL
BLANSKO
JIHLAVA
TRIER
GERMANY
CZECHIA
VLTAVA
BRNO
ČEJČ
ANSBACH
NÜRNBERG
SAARBRÜCKEN
HEIDELBERG
REGENSBURG
49°N-ZNOJMO
METZ
SARRE
KAPLICE
AUSTRIA
PLANK
NÖRDLINGEN
KREMS
FLORIDSDORF
STUTTGART
PASSAU
NANCY
KRITZENDORF
DANUBE
NECKAR
DORNBACH
STRASBOURG
AUGSBURG
INN
MÖDLING
VIENNA
ULM
LINZ
MOSELLE
FRANCE
RHINE
GERMANY
DANUBE
48°N-GUNTRAMSDORF
MUNICH
PIESTING
WEIDEN
LECH
GERMANY
SALZBURG
AUSTRIA
LAKE CONSTANCE
ENNS
MULHOUSE
PERNEGG
HUNGARY
BASEL
DOUBS
DORNACH
ZÜRICH
ARBON
MUR
GRAZ
47°N-
GRIES
AUSTRIA
WUNDSCHUH
WEIXELBAUM
CORCELLES
BERNE
LUZERN
47°N-
SWITZERLAND
DRAU
ROSEGG
KLAGENFURT
OBERRAKITSCH
AARE
RHINE
INN
MERANO
EISENKAPPEL
STRIGOVA
VIKTRING
LAUSANNE
CHIUSA
FERLACH
TRNOVEC
BOLZANO
SELLA NEVEA
SLOVENIA
SIERRE
SION
ORA
ITALY
ITALY
KRAPINA
RHÔNE
SAVA
VALDA
CADINE
FRIULI
LOCARNO
ZAGREB
GENEVA
MARTIGNY
VISP
TRENTO
LEVICO
UDINE
46°N-LJUBLJANA
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
KM

Figure 15

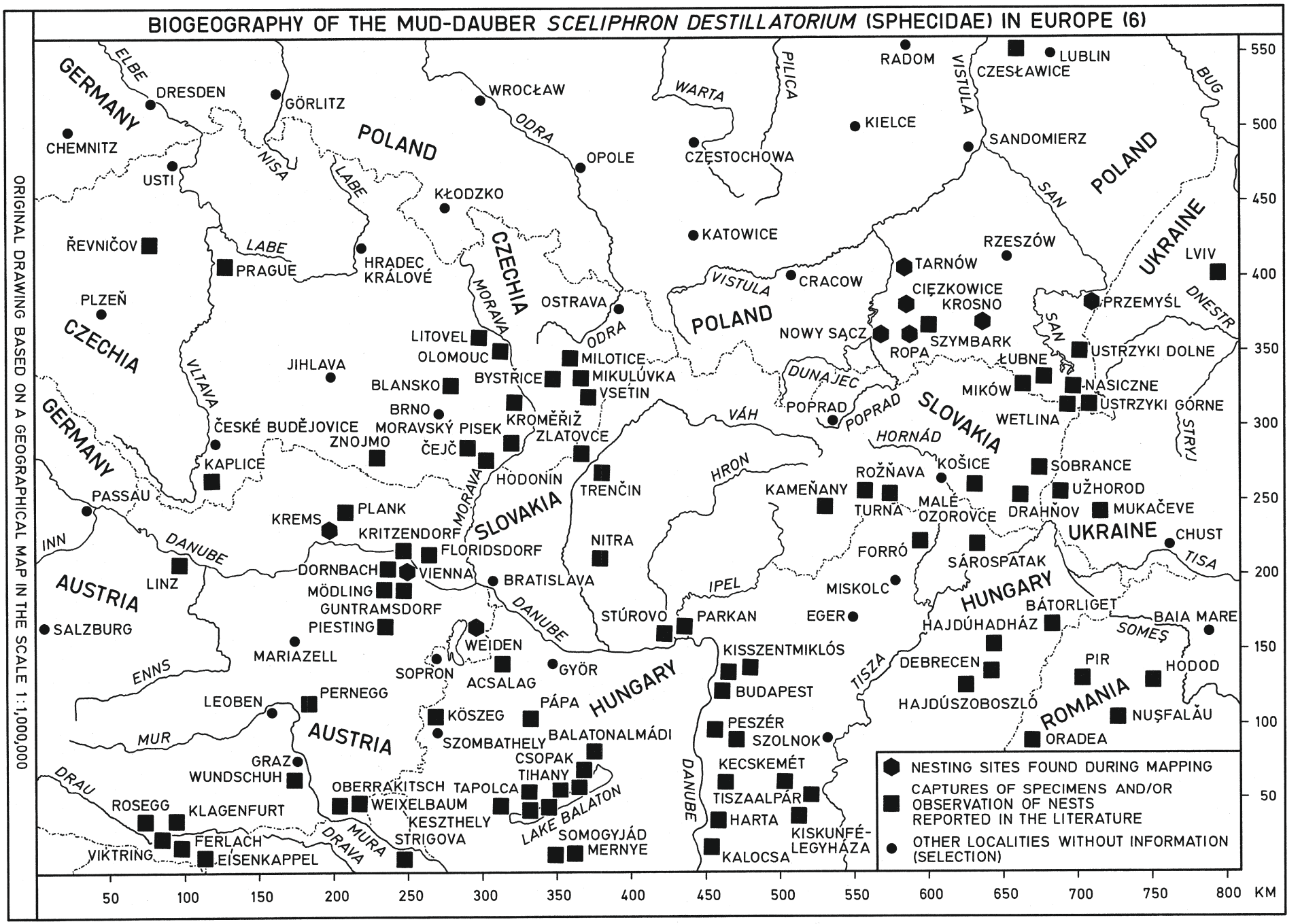

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN EUROPE (6)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:1,000,000
GERMANY
POLAND
CZECHIA
SLOVAKIA
AUSTRIA
HUNGARY
UKRAINE
ROMANIA
DRESDEN
GÖRLITZ
CHEMNITZ
USTI
ŘEVNIČOV
PRAGUE
PLZEŇ
HRADEC KRÁLOVÉ
KŁODZKO
WROCŁAW
OPOLE
KATOWICE
CZĘSTOCHOWA
KIELCE
RADOM
CZESŁAWICE
LUBLIN
SANDOMIERZ
RZESZÓW
TARNÓW
CRACOW
CIĘŻKOWICE
KROSNO
NOWY SĄCZ
SZYMBARK
ROPA
PRZEMYŚL
LVIV
ŁUBNE
USTRZYKI DOLNE
NASICZNE
USTRZYKI GÓRNE
MIKÓW
WETLINA
POPRAD
OSTRAVA
LITOVEL
OLOMOUC
MILOTICE
BYSTŘICE
MIKULÚVKA
VSETÍN
JIHLAVA
BLANSKO
BRNO
ČESKÉ BUDĚJOVICE
MORAVSKÝ PÍSEK
KROMĚŘÍŽ
ZLATOVCE
ZNOJMO
ČEJČ
HODONÍN
TRENČÍN
KAPLICE
PASSAU
KREMS
PLANK
KRITZENDORF
FLORIDSDORF
DORNBACH
VIENNA
MÖDLING
GUNTRAMSDORF
PIESTING
LINZ
SALZBURG
MARIAZELL
ENNS
LEOBEN
PERNEGG
MUR
GRAZ
WUNDSCHUH
DRAU
ROSEGG
KLAGENFURT
FERLACH
VIKTRING
EISENKAPPEL
DRAVA
MURA
OBERRAKITSCH
WEIXELBAUM
KESZTHELY
STRIGOVA
TAPOLCA
CSOPAK
TIHANY
BALATONALMÁDI
LAKE BALATON
SOMOGYJÁD
MERNYE
SZOMBATHELY
KÖSZEG
PÁPA
SOPRON
ACSALAG
WEIDEN
GYÖR
BRATISLAVA
NITRA
STÚROVO
PARKAN
IPEL
MISKOLC
EGER
KISSZENTMIKLÓS
BUDAPEST
PESZÉR
SZOLNOK
KECSKEMÉT
TISZAALPÁR
HARTA
KISKUNFÉLEGYHÁZA
KALOCSA
DEBRECEN
HAJDÚSZOBOSZLÓ
FORRÓ
SÁROSPATAK
BÁTORLIGET
HAJDÚHADHÁZ
ORADEA
BAIA MARE
PIR
HODOD
NUŞFALĂU
SOBRANCE
UŽHOROD
MUKAČEVE
CHUST
DRAHŇOV
KAMEŇANY
TURNÁ
MALÉ OZOROVCE
ROŽŇAVA
KOŠICE
DUNAJEC
POPRAD
HORNÁD
HRON
VÁH
VLTAVA
MORAVA
ODRA
WARTA
PILICA
VISTULA
SAN
BUG
DNESTR
STRYJ
TISZA
SOMEŞ
DANUBE
INN
NISA
LABE
ELBE
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS AND/OR OBSERVATION OF NESTS REPORTED IN THE LITERATURE
OTHER LOCALITIES WITHOUT INFORMATION (SELECTION)
50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 KM
550 500 450 400 350 300 250 200 150 100 50

Figure 16

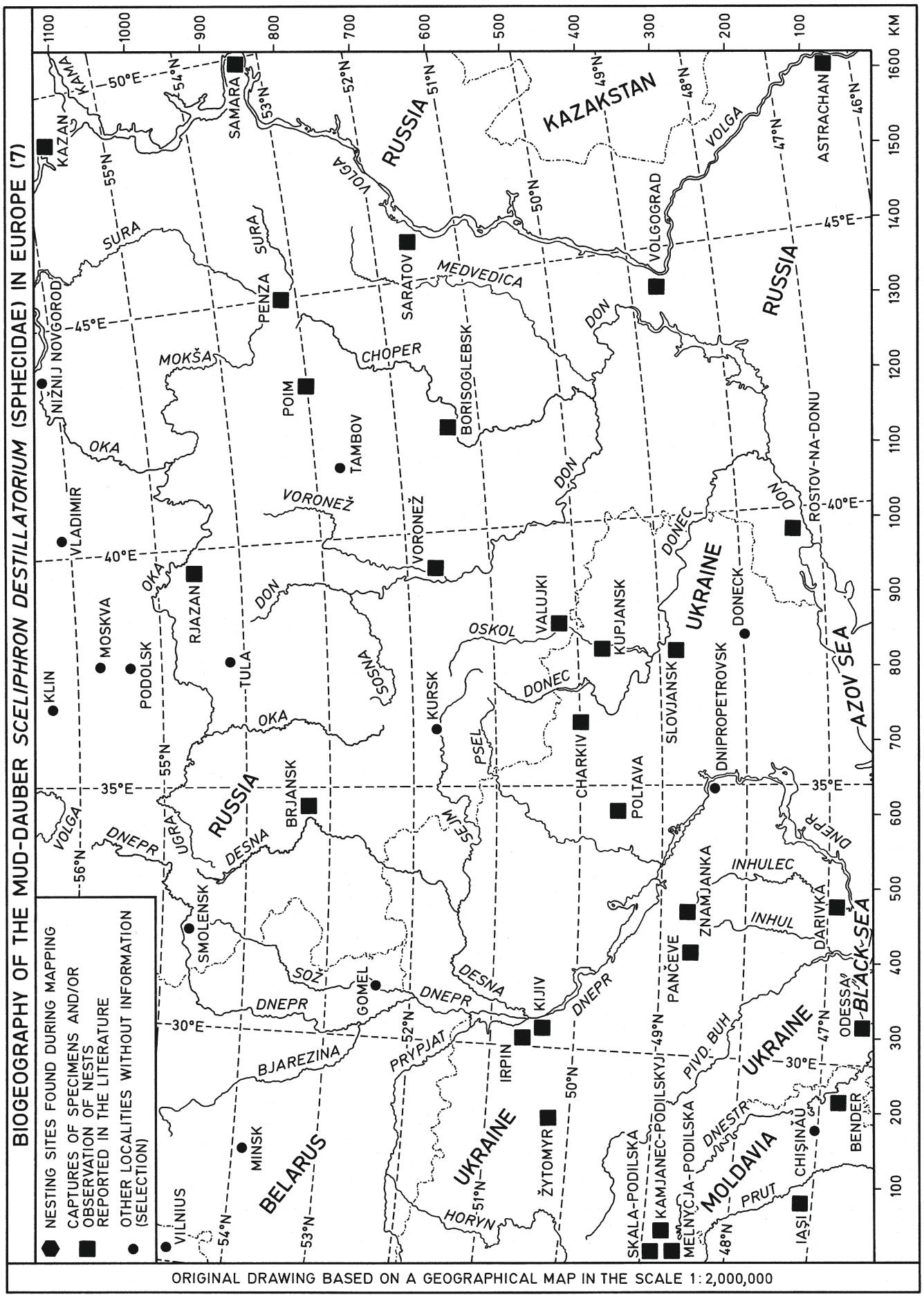

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN EUROPE (7)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS AND/OR OBSERVATION OF NESTS REPORTED IN THE LITERATURE
OTHER LOCALITIES WITHOUT INFORMATION (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:2,000,000
RUSSIA
KAZAKSTAN
UKRAINE
BELARUS
MOLDAVIA
AZOV SEA
BLACK SEA
KAZAN
SAMARA
ASTRACHAN
VOLGOGRAD
SARATOV
PENZA
NIŽNIJ NOVGOROD
VLADIMIR
MOSKVA
KLIN
PODOLSK
RJAZAN
TULA
BRJANSK
SMOLENSK
VORONEŽ
POIM
TAMBOV
BORISOGLEBSK
ROSTOV-NA-DONU
VALUJKI
KUPJANSK
SLOVJANSK
DONECK
DNIPROPETROVSK
KURSK
CHARKIV
POLTAVA
GOMEL
KIJIV
IRPIN
ŽYTOMYR
MINSK
VILNIUS
PANČEVE
ZNAMJANKA
DARIVKA
ODESSA
KAMJANEC-PODILSKYJI
MELNYCJA-PODILSKA
SKALA-PODILSKA
BENDER
CHIŞINĂU
IAŞI
VOLGA
KAMA
SURA
MOKŠA
OKA
DON
MEDVEDICA
CHOPER
VORONEŽ
OSKOL
SOSNA
DONEC
PSEL
SEJM
DESNA
SOŽ
DNEPR
UGRA
PRYPJAT
BJAREZINA
INHULEC
INHUL
PIVD. BUH
DNESTR
PRUT
HORYN
50°E
45°E
40°E
35°E
30°E
56°N
55°N
54°N
53°N
52°N
51°N
50°N
49°N
48°N
47°N
46°N
KM
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 17

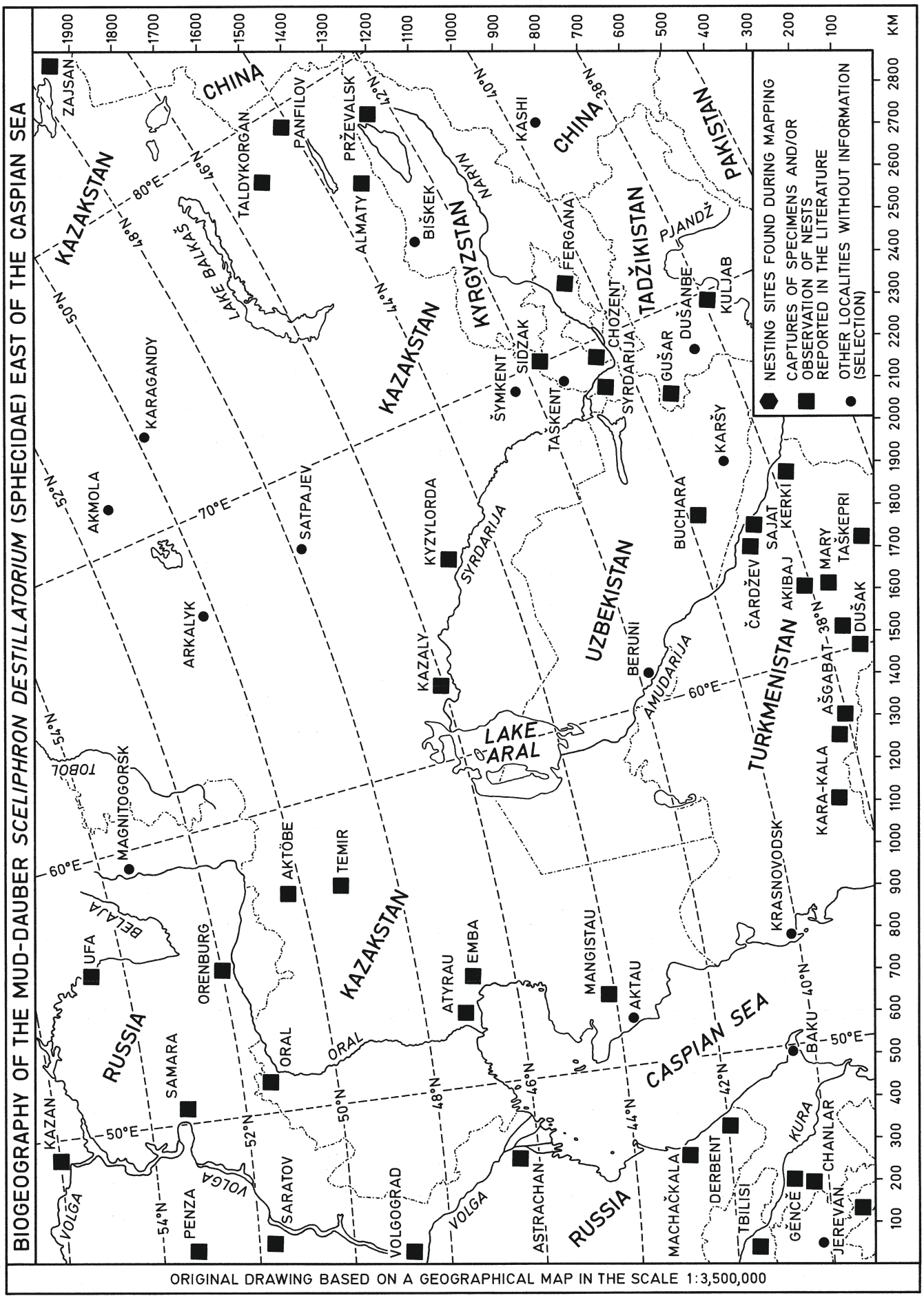

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) EAST OF THE CASPIAN SEA
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS AND/OR OBSERVATION OF NESTS REPORTED IN THE LITERATURE
OTHER LOCALITIES WITHOUT INFORMATION (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:3,500,000
KM
RUSSIA
KAZAKSTAN
CHINA
KYRGYZSTAN
TADŽIKISTAN
UZBEKISTAN
TURKMENISTAN
PAKISTAN
CASPIAN SEA
LAKE ARAL
LAKE BALKAŠ
ZAJSAN
PANFILOV
TALDYKORGAN
PRŽEVALSK
ALMATY
BIŠKEK
KASHI
NARYN
FERGANA
PJANDŽ
KULJAB
DUŠANBE
GUŠAR
CHOŽENT
SIDŽAK
ŠYMKENT
TAŠKENT
SYRDARIJA
KARŠY
BUCHARA
KYZYLORDA
SATPAJEV
AKMOLA
KARAGANDY
ARKALYK
KAZALY
BERUNI
AMUDARIJA
ČARDŽEV
SAJAT
KERKI
AKIBAJ
MARY
TAŠKEPRI
AŠGABAT
DUŠAK
KARA-KALA
KRASNOVODSK
MANGISTAU
AKTAU
ATYRAU
EMBA
AKTÖBE
TEMIR
ORAL
ORENBURG
MAGNITOGORSK
TOBOL
UFA
BELAJA
SAMARA
KAZAN
PENZA
SARATOV
VOLGOGRAD
ASTRACHAN
VOLGA
KURA
BAKU
MACHAČKALA
DERBENT
TBILISI
GĚNČĚ
CHANLAR
JEREVAN
80°E
70°E
60°E
50°E
60°N
54°N
52°N
50°N
48°N
46°N
44°N
42°N
40°N
38°N

Figure 18

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN WESTERN UKRAINE
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS REPORTED IN THE LITERATURE
UNSUCCESSFUL SEARCH FOR NESTS DURING MAPPING
LOCALITIES NOT INVESTIGATED (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:300,000
UKRAINE
MOLDAVIA
ROMANIA
KRASYLIV
CHMELNYCKYJ
VOLOČYSK
TERNOPIL
TEREBOVLJA
CORTKIV
BUČAČ
KOZOVA
HORODOK
SMOTRYČ
SATANIV
ZBRUČ
SERET
STRYPA
ZOLOTA LIPA
PIVD. BUH
USYCJA
DUNAIVCI
KAMJANEC-PODILSKYJ
SKALA-PODILSKA
BORŠČIV
BILČE-ZOLOTE
KRYVČE
SINKIV
MELNYCJA-PODILSKA
DZVENIHOROD
HOROŠOVA
OKOPY
DNESTR
BRINCENI
PRUT
DARABANI
NOVOSELYCJA
KICMAN
ČERNIVCI
STOROŽYNEC
KALINOVCI
VYŽNYCJA
CEREMOŠ
NYRKIV
USTEČKO
ZALIŠČYKY
HORODENKA
KOLOMYJA
OTYNJA
HALIČ
VOLČYNEC
IVANO-FRANKIVSK
NADVIRNA
VOROCHTA
JASINJA
RACHIV
ČORNA TYSA
BYSTRYCJA-SOLOTVYNSKA
BYSTRYCJA-NADVIRNJANSKA
LIMNYCJA
KALUŠ
DOLYNA
DIMNYCJA
ČECVA
SVIČA
STRYJ
UST-ČORNA
27°E
26°E
25°E
24°E
49.5°N
49°N
48.5°N
48°N
KM
150
125
100
75
50
25
225
200
175
150
125
100
75
50
25

Figure 19

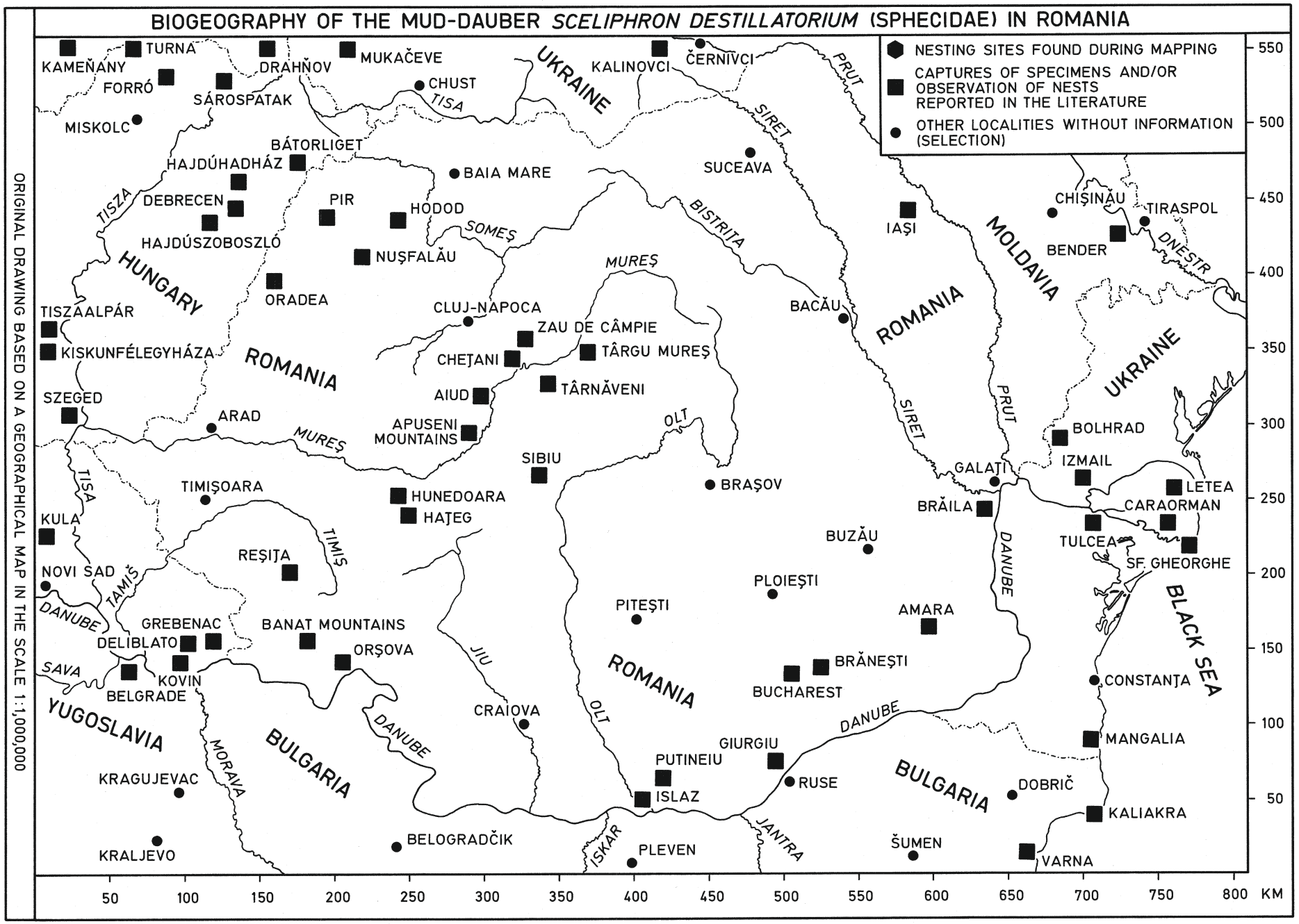

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN ROMANIA
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS AND/OR OBSERVATION OF NESTS REPORTED IN THE LITERATURE
OTHER LOCALITIES WITHOUT INFORMATION (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:1,000,000
KAMEŇANY
TURNA
FORRÓ
DRAHŇOV
MUKAČEVE
SÁROSPATAK
CHUST
TISA
UKRAINE
KALINOVCI
ČERNIVCI
PRUT
SIRET
MISKOLC
BÁTORLIGET
HAJDÚHADHÁZ
BAIA MARE
SUCEAVA
TISZA
DEBRECEN
PIR
HODOD
SOMEŞ
BISTRIŢA
IAŞI
CHIŞINĂU
TIRASPOL
BENDER
DNESTR
MOLDAVIA
HAJDÚSZOBOSZLÓ
NUŞFALĂU
MUREŞ
HUNGARY
ORADEA
CLUJ-NAPOCA
BACĂU
ROMANIA
TISZAALPÁR
ZAU DE CÂMPIE
KISKUNFÉLEGYHÁZA
CHEŢANI
TÂRGU MUREŞ
UKRAINE
SZEGED
AIUD
TÂRNĂVENI
ARAD
APUSENI MOUNTAINS
OLT
BOLHRAD
IZMAIL
SIBIU
GALAŢI
LETEA
TIMIŞOARA
BRAŞOV
HUNEDOARA
BRĂILA
CARAORMAN
KULA
HAŢEG
BUZĂU
TULCEA
REŞIŢA
SF. GHEORGHE
NOVI SAD
PLOIEŞTI
BLACK SEA
PITEŞTI
AMARA
GREBENAC
BANAT MOUNTAINS
DELIBLATO
ORŞOVA
BRĂNEŞTI
CONSTANŢA
KOVIN
BUCHAREST
SAVA
BELGRADE
CRAIOVA
GIURGIU
MANGALIA
YUGOSLAVIA
BULGARIA
PUTINEIU
RUSE
DOBRIČ
KRAGUJEVAC
ISLAZ
KALIAKRA
KRALJEVO
BELOGRADČIK
PLEVEN
ŠUMEN
VARNA
50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 KM
550 500 450 400 350 300 250 200 150 100 50

Figure 20

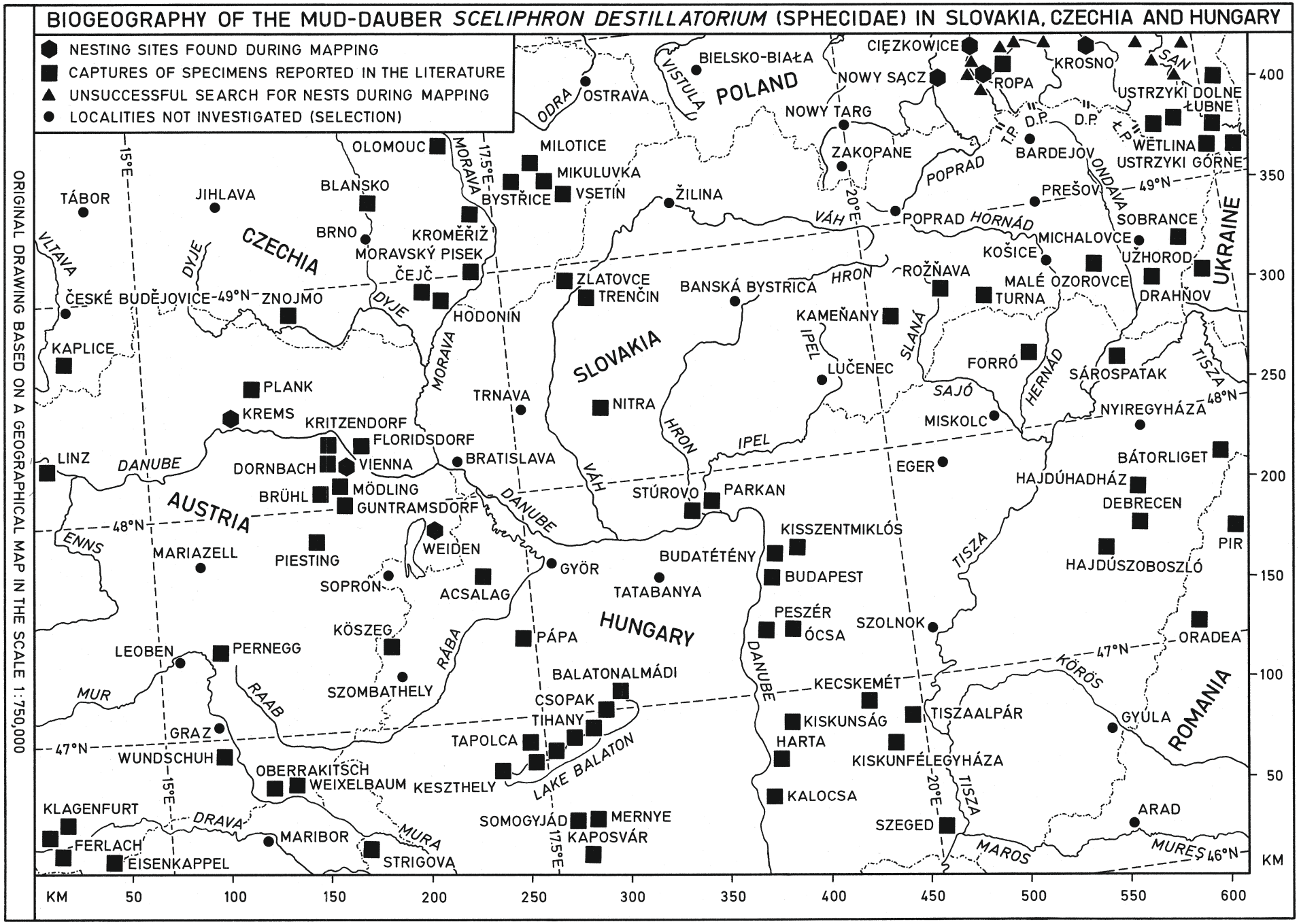

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN SLOVAKIA, CZECHIA AND HUNGARY
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS REPORTED IN THE LITERATURE
UNSUCCESSFUL SEARCH FOR NESTS DURING MAPPING
LOCALITIES NOT INVESTIGATED (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:750,000
POLAND
CZECHIA
SLOVAKIA
AUSTRIA
HUNGARY
UKRAINE
ROMANIA
OSTRAVA
BIELSKO-BIAŁA
CIĘZKOWICE
KROSNO
NOWY SĄCZ
ROPA
USTRZYKI DOLNE
ŁUBNE
NOWY TARG
ZAKOPANE
BARDEJOV
WĚTLINA
USTRZYKI GÓRNE
OLOMOUC
MILOTICE
MIKULUVKA
BYSTŘICE
VSETÍN
ŽILINA
PREŠOV
POPRAD
TÁBOR
JIHLAVA
BLANSKO
BRNO
KROMĚŘIŽ
MORAVSKÝ PISEK
ČEJČ
ZLATOVCE
TRENČIN
BANSKÁ BYSTRICA
ROŽŇAVA
MICHALOVCE
SOBRANCE
KOŠICE
UŽHOROD
MALÉ OZOROVCE
TURNA
DRAHŇOV
ČESKÉ BUDĚJOVICE
ZNOJMO
HODONÍN
KAMEŇANY
KAPLICE
PLANK
KREMS
KRITZENDORF
FLORIDSDORF
TRNAVA
NITRA
LUČENEC
FORRÓ
SÁROSPATAK
LINZ
DORNBACH
VIENNA
BRATISLAVA
MISKOLC
NYIREGYHÁZA
BÁTORLIGET
BRÜHL
MÖDLING
GUNTRAMSDORF
STÚROVO
PARKAN
EGER
HAJDÚHADHÁZ
DEBRECEN
MARIAZELL
PIESTING
WEIDEN
GYÖR
BUDATÉTÉNY
KISSZENTMIKLÓS
BUDAPEST
HAJDÚSZOBOSZLÓ
PIR
SOPRON
ACSALAG
TATABANYA
PESZÉR
SZOLNOK
ÓCSA
ORADEA
KÖSZEG
PÁPA
LEOBEN
PERNEGG
BALATONALMÁDI
KECSKEMÉT
SZOMBATHELY
CSOPAK
TIHANY
KISKUNSÁG
TISZAALPÁR
GYULA
GRAZ
TAPOLCA
HARTA
KISKUNFÉLEGYHÁZA
WUNDSCHUH
OBERRAKITSCH
WEIXELBAUM
KESZTHELY
KALOCSA
KLAGENFURT
SOMOGYJÁD
MERNYE
KAPOSVÁR
SZEGED
ARAD
FERLACH
EISENKAPPEL
MARIBOR
STRIGOVA
15°E
17.5°E
20°E
47°N
48°N
49°N
46°N
KM
50
100
150
200
250
300
350
400
450
500
550
600

Figure 21

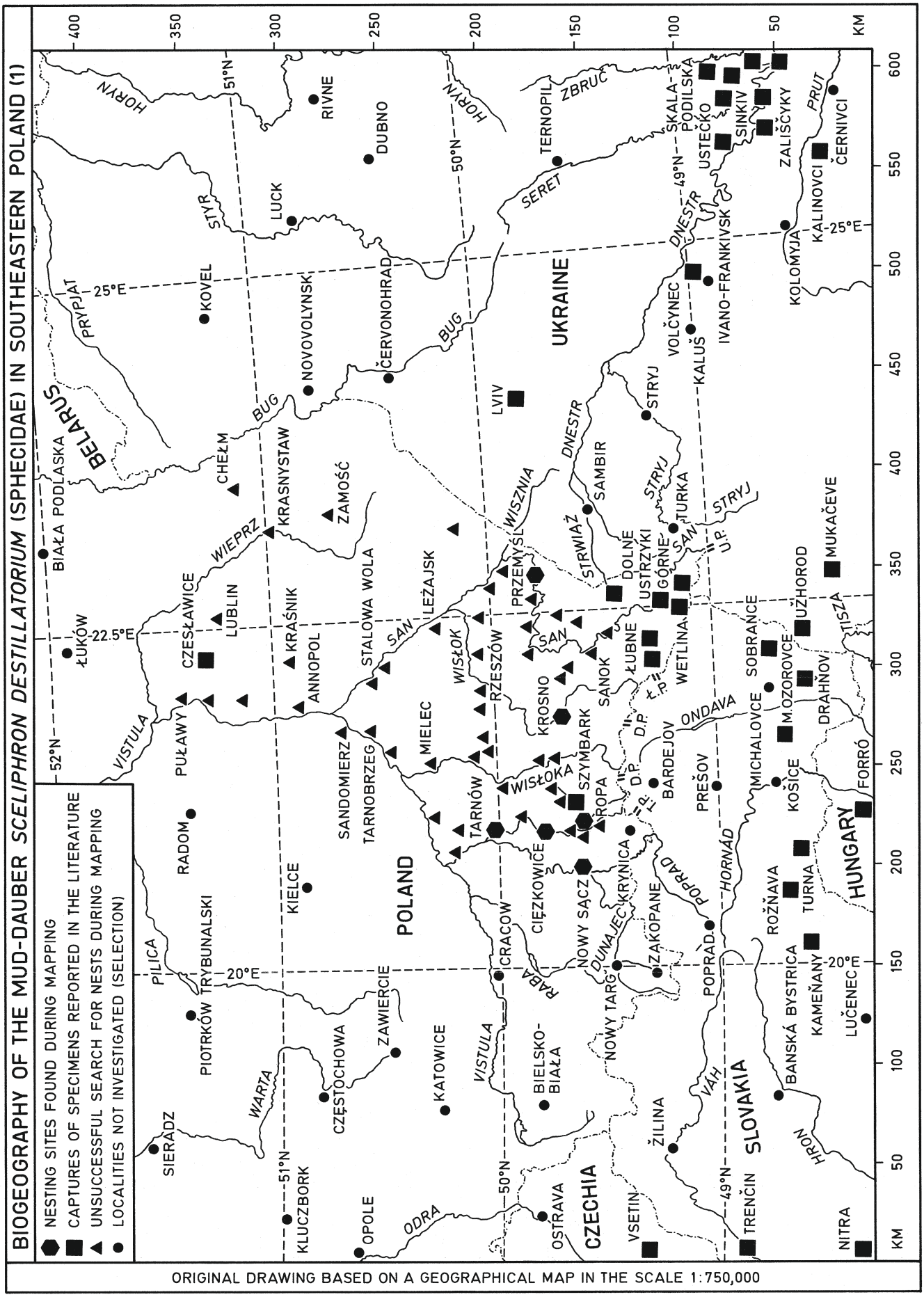

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN SOUTHEASTERN POLAND (1)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS REPORTED IN THE LITERATURE
UNSUCCESSFUL SEARCH FOR NESTS DURING MAPPING
LOCALITIES NOT INVESTIGATED (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:750,000
POLAND
UKRAINE
BELARUS
CZECHIA
SLOVAKIA
HUNGARY
BIAŁA PODLASKA
ŁUKÓW
CHEŁM
KOVEL
RIVNE
DUBNO
LUCK
NOVOVOLYNSK
ČERVONOHRAD
KRASNYSTAW
ZAMOŚĆ
LVIV
TERNOPIL
SKALA-PODILSKA
USTEČKO
SINKIV
ZALIŠČYKY
ČERNIVCI
KOLOMYJA
KALINOVCI
VOLČYNEC
IVANO-FRANKIVSK
KALUŠ
STRYJ
SAMBIR
DOLNE
STRWIĄŻ
USTRZYKI GÓRNE
TURKA
MUKAČEVE
UŽHOROD
SOBRANCE
M.OZOROVCE
MICHALOVCE
DRAHŇOV
KOŠICE
FORRÓ
PRZEMYŚL
LEŻAJSK
STALOWA WOLA
CZESŁAWICE
LUBLIN
KRAŚNIK
ANNOPOL
PUŁAWY
RADOM
KIELCE
SANDOMIERZ
TARNOBRZEG
MIELEC
RZESZÓW
KROSNO
SANOK
ŁUBNE
WETLINA
SZYMBARK
ROPA
BARDEJOV
PREŠOV
TARNÓW
CRACOW
CIĘŻKOWICE
NOWY SĄCZ
KRYNICA
ZAKOPANE
DUNAJEC
POPRAD
ROŽŇAVA
TURNA
KAMEŇANY
LUČENEC
BANSKÁ BYSTRICA
PIOTRKÓW TRYBUNALSKI
ZAWIERCIE
KATOWICE
BIELSKO-BIAŁA
NOWY TARG
ŽILINA
TRENČIN
NITRA
SIERADZ
CZĘSTOCHOWA
KLUCZBORK
OPOLE
OSTRAVA
VSETIN
PRYPJAT
STYR
HORYN
BUG
WIEPRZ
SAN
WISŁOK
WISŁOKA
DNESTR
SERET
ZBRUČ
PRUT
VISTULA
PILICA
WARTA
ODRA
RABA
VÁH
HRON
ONDAVA
POPRAD
HORNÁD
TISZA
D.P.
L.P.
U.P.
52°N
51°N
50°N
49°N
22.5°E
25°E
20°E
KM

Figure 22

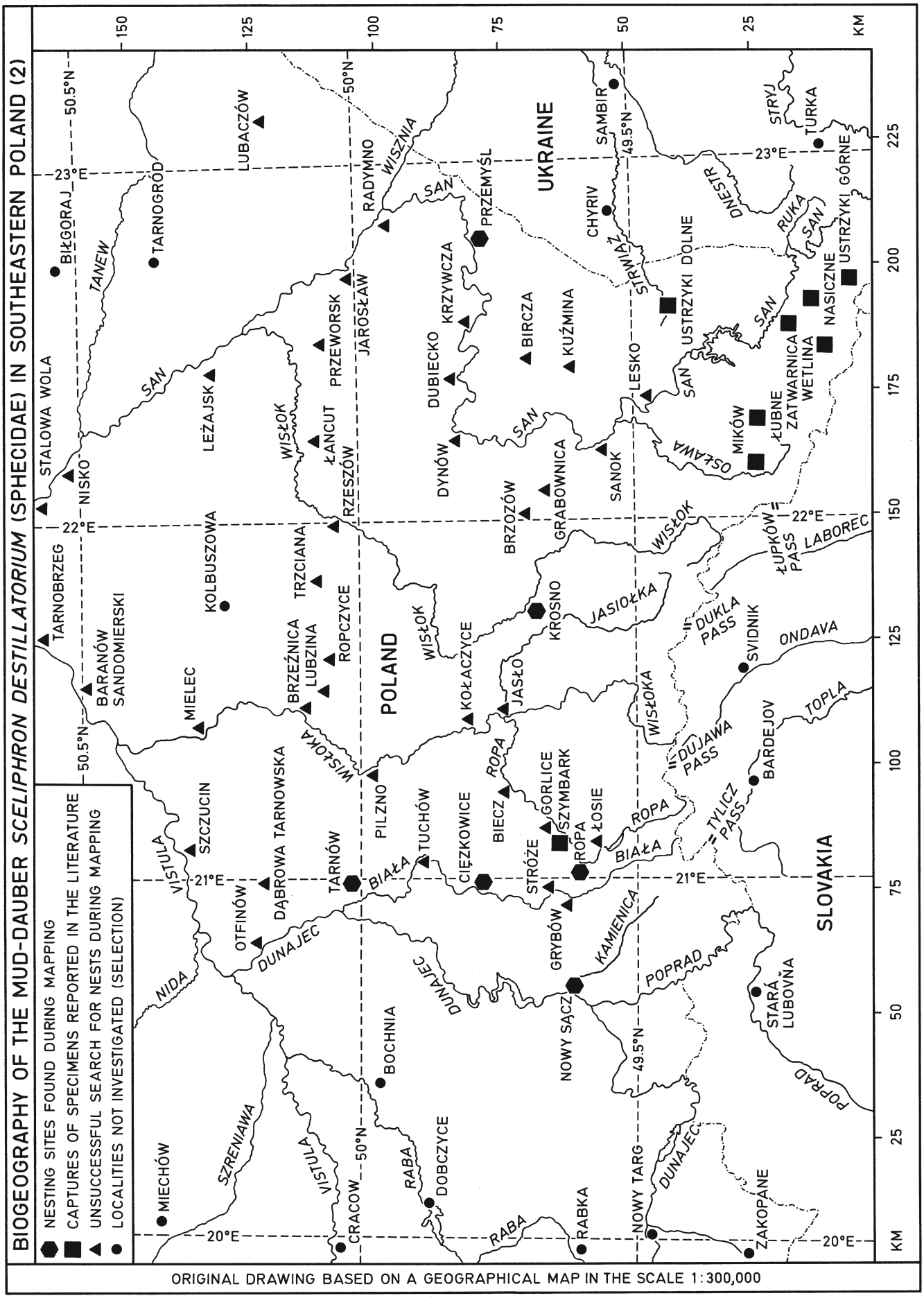

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN SOUTHEASTERN POLAND (2)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS REPORTED IN THE LITERATURE
UNSUCCESSFUL SEARCH FOR NESTS DURING MAPPING
LOCALITIES NOT INVESTIGATED (SELECTION)
POLAND
UKRAINE
SLOVAKIA
STALOWA WOLA
NISKO
BIŁGORAJ
TARNOGRÓD
LUBACZÓW
RADYMNO
PRZEMYŚL
SAMBIR
CHYRIV
STRYJ
TURKA
USTRZYKI GÓRNE
NASICZNE
USTRZYKI DOLNE
LESKO
SANOK
MIKÓW
ŁUBNE
ZATWARNICA
WETLINA
LEŻAJSK
PRZEWORSK
JAROSŁAW
KRZYWCZA
DUBIECKO
DYNÓW
BIRCZA
KUŹMINA
ŁANCUT
RZESZÓW
BRZOZÓW
GRABOWNICA
KROSNO
JASIOŁKA
ŁUPKÓW PASS
LABOREC
DUKLA PASS
SVIDNIK
ONDAVA
TOPLA
BARDEJOV
TYLICZ PASS
DUJAWA PASS
TARNOBRZEG
BARANÓW SANDOMIERSKI
KOLBUSZOWA
TRZCIANA
BRZEŹNICA
LUBZINA
ROPCZYCE
MIELEC
KOŁACZYCE
JASŁO
PILZNO
TUCHÓW
CIĘŻKOWICE
BIECZ
GORLICE
SZYMBARK
ROPA
ŁOSIE
STRÓŻE
GRYBÓW
NOWY SĄCZ
KAMIENICA
POPRAD
STARÁ LUBOVŇA
SZCZUCIN
DĄBROWA TARNOWSKA
TARNÓW
OTFINÓW
BOCHNIA
DOBCZYCE
RABKA
ZAKOPANE
NOWY TARG
MIECHÓW
CRACOW
VISTULA
WISŁOK
SAN
WISŁOKA
DUNAJEC
RABA
NIDA
SZRENIAWA
BIAŁA
ROPA
TANEW
WISŁOKA
DNIESTR
RUKA
STRWIĄŻ
OSŁAWA
22°E
23°E
21°E
20°E
50.5°N
50°N
49.5°N
150
125
100
75
50
25
KM
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:300,000

Figure 23

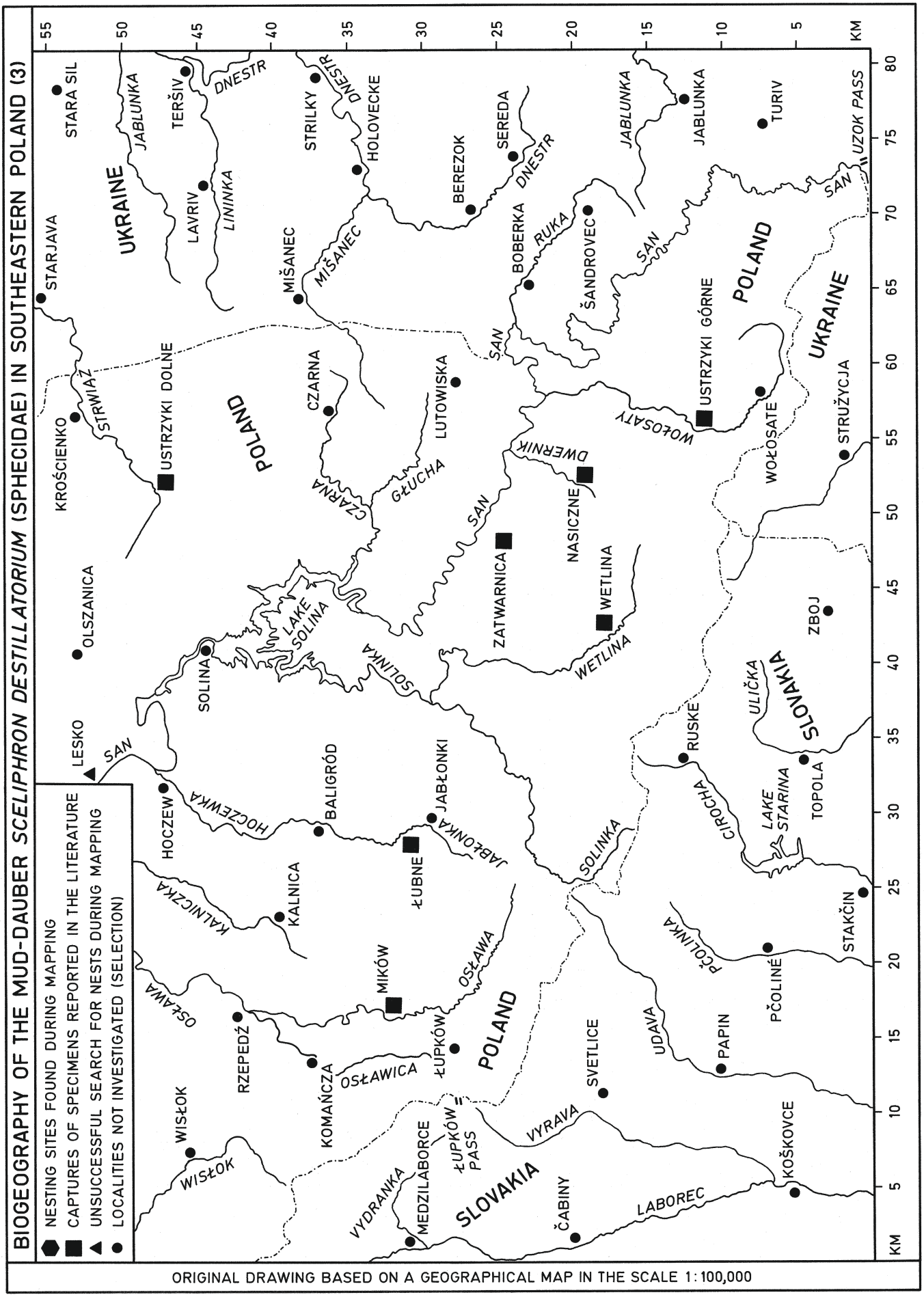

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN SOUTHEASTERN POLAND (3)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS REPORTED IN THE LITERATURE
UNSUCCESSFUL SEARCH FOR NESTS DURING MAPPING
LOCALITIES NOT INVESTIGATED (SELECTION)
UKRAINE
POLAND
SLOVAKIA
STARA SIL
TERŠIV
LAVRIV
STARJAVA
KROŚCIENKO
STRWIĄŻ
USTRZYKI DOLNE
OLSZANICA
LESKO
SOLINA
LAKE SOLINA
HOCZEW
HOCZEWKA
BALIGRÓD
JABŁONKI
JABŁONKA
KALNICA
KALNICZKA
ŁUBNE
MIKÓW
OSŁAWA
RZEPEDŹ
KOMAŃCZA
OSŁAWICA
ŁUPKÓW
WISŁOK
MEDZILABORCE
ŁUPKÓW PASS
VYDRANKA
SVETLICE
VYRAVA
ČABINY
LABOREC
KOŠKOVCE
STRILKY
HOLOVECKE
MIŠANEC
CZARNA
GŁUCHA
LUTOWISKA
ZATWARNICA
NASICZNE
DWERNIK
WETLINA
BEREZOK
SEREDA
BOBERKA
RUKA
ŠANDROVEC
USTRZYKI GÓRNE
WOŁOSATY
WOŁOSATE
STRUŻYCJA
JABLUNKA
TURIV
UZOK PASS
SAN
DNESTR
JABLUNKA
SOLINKA
RUSKE
ULIČKA
ZBOJ
CIROCHA
LAKE STARINA
TOPOLA
PČOLINÉ
STAKČIN
UDAVA
PAPIN
KM
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:100,000

Figure 24

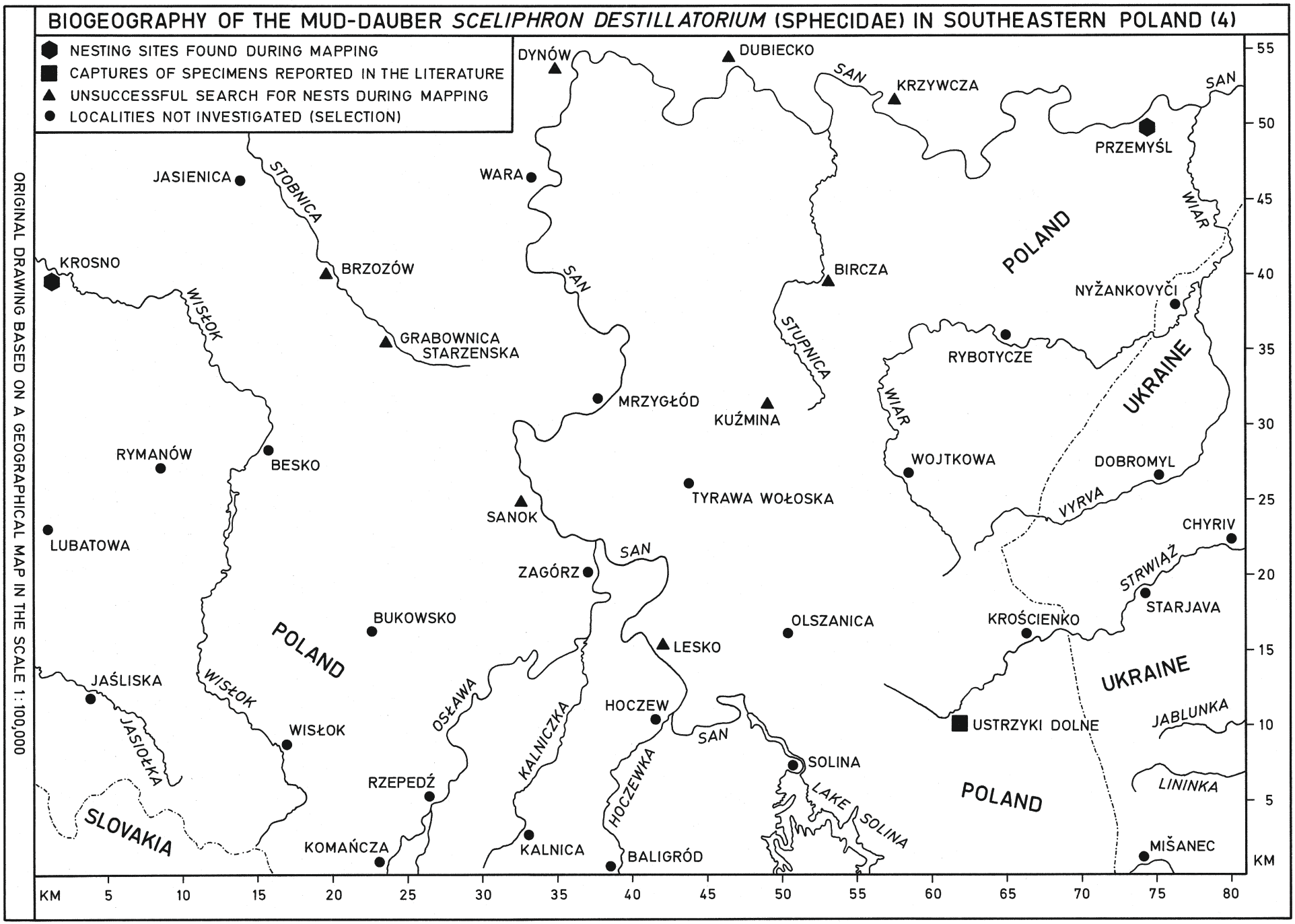

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN SOUTHEASTERN POLAND (4)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS REPORTED IN THE LITERATURE
UNSUCCESSFUL SEARCH FOR NESTS DURING MAPPING
LOCALITIES NOT INVESTIGATED (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:100,000
DYNÓW
DUBIECKO
KRZYWCZA
PRZEMYŚL
JASIENICA
WARA
KROSNO
BRZOZÓW
GRABOWNICA STARZENSKA
BIRCZA
NYŽANKOVYČI
RYBOTYCZE
MRZYGŁÓD
KUŹMINA
WOJTKOWA
DOBROMYL
RYMANÓW
BESKO
TYRAWA WOŁOSKA
SANOK
LUBATOWA
ZAGÓRZ
CHYRIV
STARJAVA
BUKOWSKO
OLSZANICA
KROŚCIENKO
LESKO
JAŚLISKA
HOCZEW
USTRZYKI DOLNE
JABLUNKA
WISŁOK
SOLINA
RZEPEDŹ
LININKA
KOMAŃCZA
KALNICA
BALIGRÓD
MIŠANEC
POLAND
UKRAINE
SLOVAKIA
STOBNICA
WISŁOK
SAN
STUPNICA
WIAR
VYRVA
STRWIĄŻ
OSŁAWA
KALNICZKA
HOCZEWKA
JASIOŁKA
LAKE SOLINA
KM
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80

Figure 25

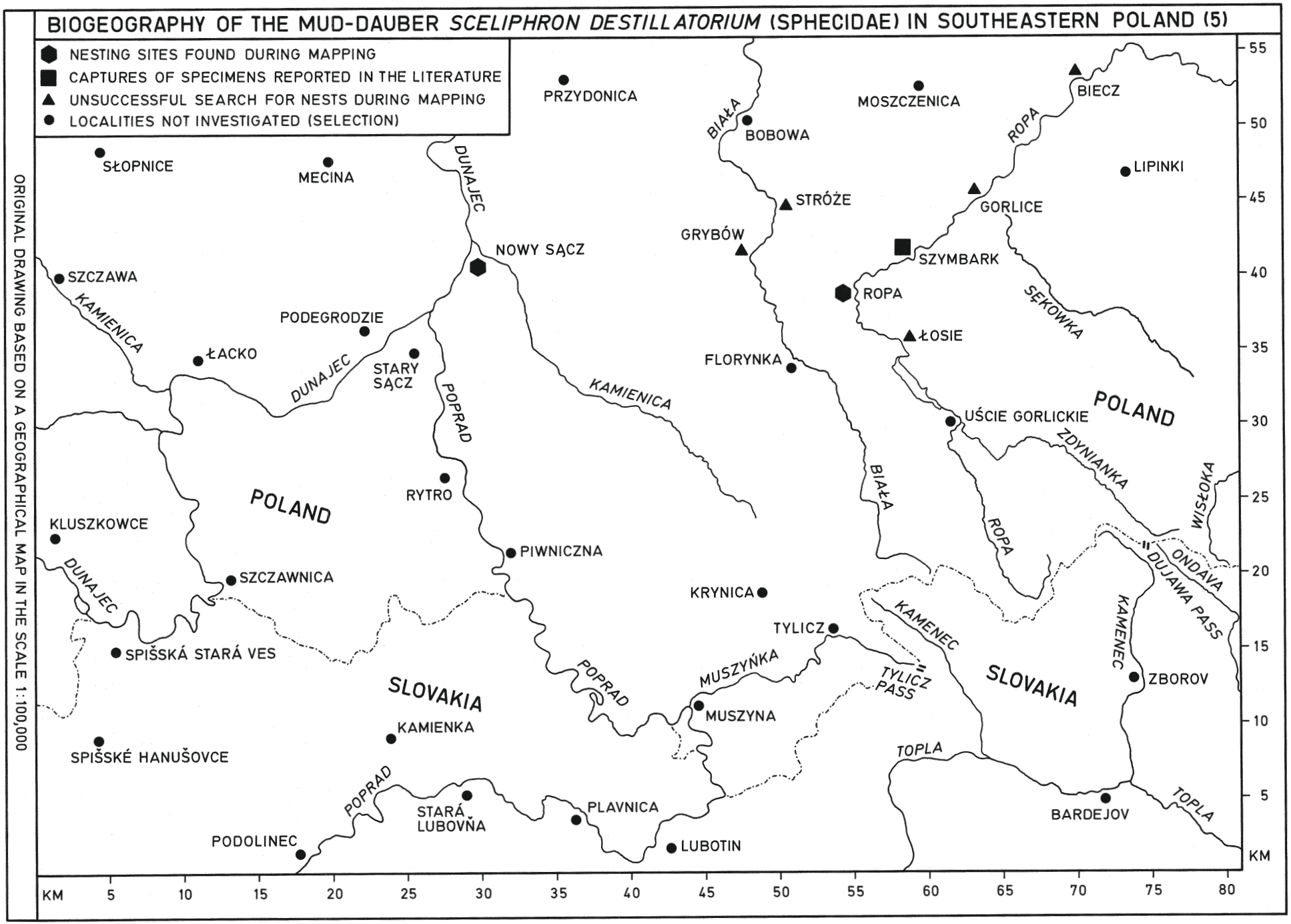

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN SOUTHEASTERN POLAND (5)
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS REPORTED IN THE LITERATURE
UNSUCCESSFUL SEARCH FOR NESTS DURING MAPPING
LOCALITIES NOT INVESTIGATED (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:100,000
PRZYDONICA
MOSZCZENICA
BIECZ
BOBOWA
BIAŁA
ROPA
SŁOPNICE
MECINA
DUNAJEC
LIPINKI
STRÓŻE
GORLICE
GRYBÓW
NOWY SĄCZ
SZYMBARK
SZCZAWA
KAMIENICA
ROPA
SĘKOWA
PODEGRODZIE
ŁOSIE
ŁACKO
STARY SĄCZ
FLORYNKA
POLAND
UŚCIE GORLICKIE
ZDYNIANKA
WISŁOKA
RYTRO
KLUSZKOWCE
PIWNICZNA
ONDAVA
DUJAWA PASS
SZCZAWNICA
KRYNICA
TYLICZ
KAMENEC
SPIŠSKÁ STARÁ VES
MUSZYŃKA
TYLICZ PASS
ZBOROV
SLOVAKIA
MUSZYNA
KAMIENKA
TOPLA
SPIŠSKÉ HANUŠOVCE
STARÁ LUBOVŇA
PLAVNICA
BARDEJOV
PODOLINEC
LUBOTIN
KM
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80

Figure 26

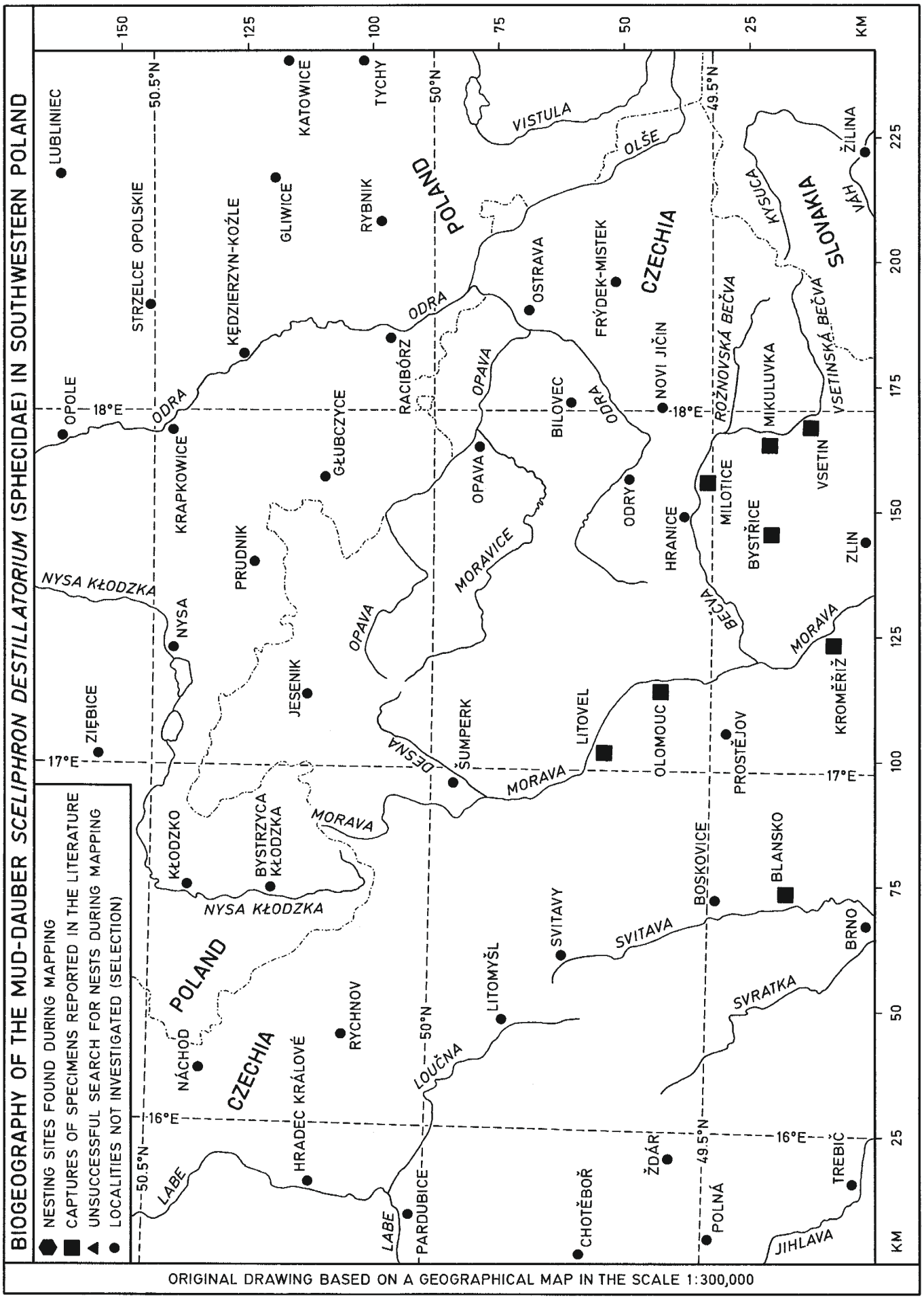

BIOGEOGRAPHY OF THE MUD-DAUBER SCELIPHRON DESTILLATORIUM (SPHECIDAE) IN SOUTHWESTERN POLAND
NESTING SITES FOUND DURING MAPPING
CAPTURES OF SPECIMENS REPORTED IN THE LITERATURE
UNSUCCESSFUL SEARCH FOR NESTS DURING MAPPING
LOCALITIES NOT INVESTIGATED (SELECTION)
ORIGINAL DRAWING BASED ON A GEOGRAPHICAL MAP IN THE SCALE 1:300,000
POLAND
CZECHIA
SLOVAKIA
LUBLINIEC
OPOLE
ZIĘBICE
STRZELCE OPOLSKIE
KĘDZIERZYN-KOŹLE
GLIWICE
KATOWICE
TYCHY
RYBNIK
RACIBÓRZ
KRAPKOWICE
GŁUBCZYCE
PRUDNIK
NYSA
JESENIK
KŁODZKO
BYSTRZYCA KŁODZKA
NÁCHOD
HRADEC KRÁLOVÉ
RYCHNOV
PARDUBICE
CHOTĚBOŘ
LITOMYŠL
ŠUMPERK
OSTRAVA
FRÝDEK-MISTEK
NOVI JIČIN
BILOVEC
ODRY
HRANICE
MILOTICE
BYSTŘICE
MIKULUVKA
VSETIN
ZLIN
LITOVEL
OLOMOUC
PROSTĚJOV
KROMĚŘÍŽ
BOSKOVICE
BLANSKO
BRNO
SVITAVY
ŽDÁR
POLNÁ
TREBIČ
JIHLAVA
ŽILINA
VISTULA
ODRA
OPAVA
MORAVICE
DESNÁ
MORAVA
BEČVA
ROŽNOVSKÁ BEČVA
VSETÍNSKÁ BEČVA
KYSUCA
VÁH
OLŠE
SVITAVA
SVRATKA
LOUČNÁ
LABE
NYSA KŁODZKA
18°E
17°E
16°E
50.5°N
50°N
49.5°N
KM

Figure 27

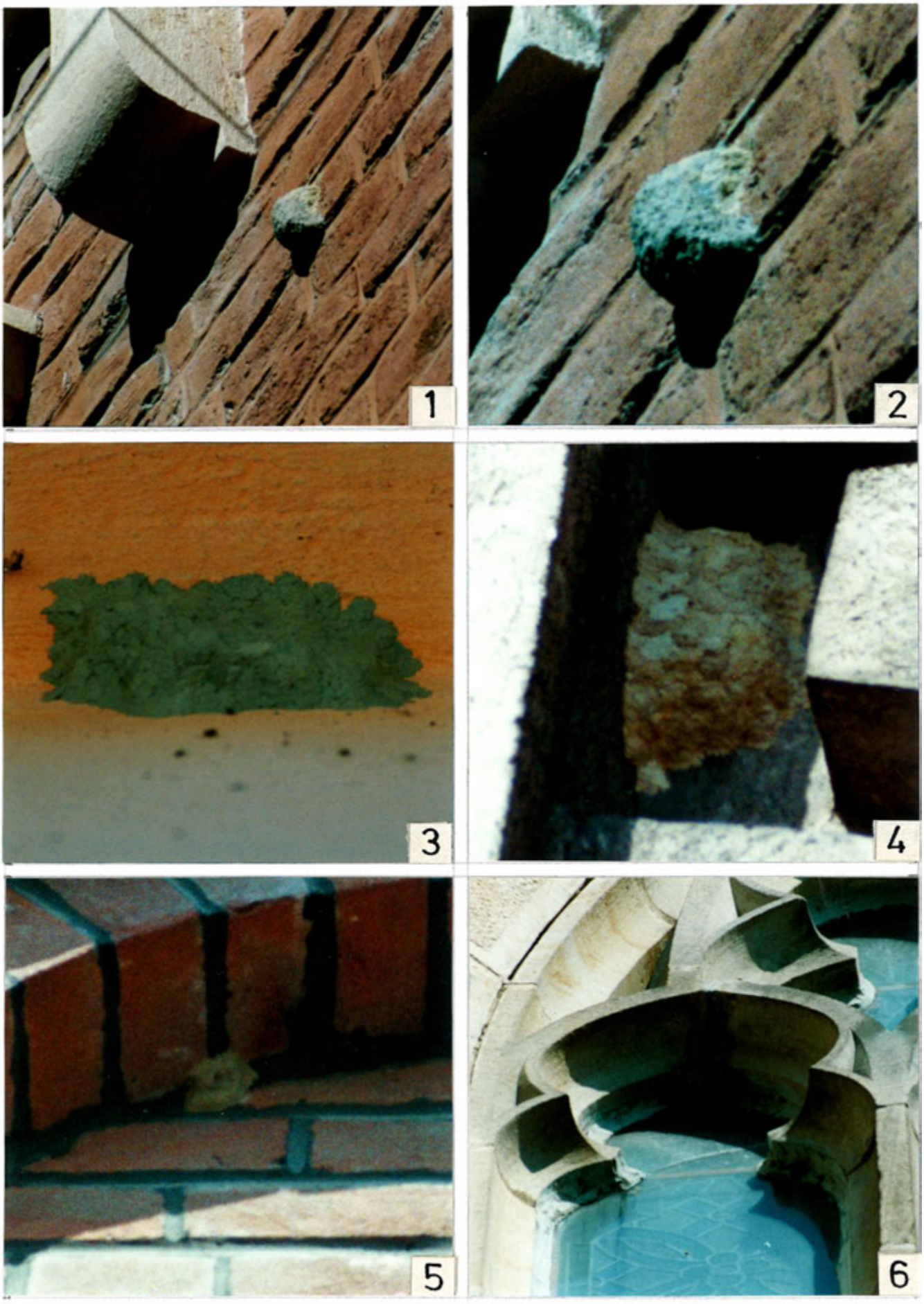


Plate 1

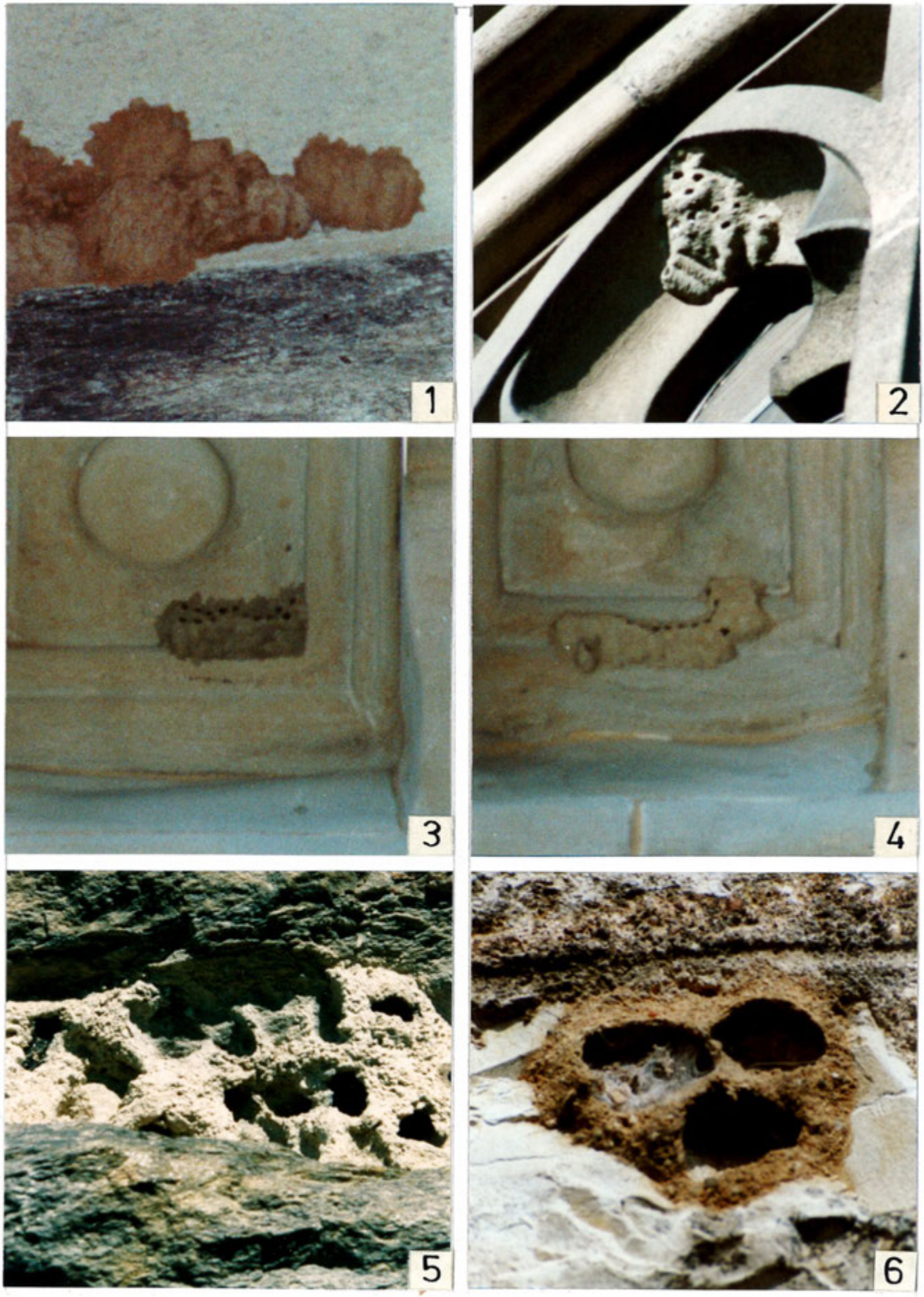


Plate 2



Plate 3



Plate 4



Plate 5



Plate 6



Plate 7

Dr. Detlef Mader

Hebelstraße 12, D-69190 Walldorf, Germany
dr.detlef.mader@web.de

Request for Contribution of Information on the Distribution of the Mud-Dauber *Sceliphron destillatorium* in Europe and Surrounding Countries

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For the Edition of an Enlarged Version of the Present Publication in the Near Future, I would be very grateful for all Contributions of Information on the Mud-Dauber *Sceliphron destillatorium* (formerly also called *Pelopaeus destillatorius*) particularly

Localities of Occurrence as Confirmed by
Observation or Capture of Specimens
Observation of Nesting Sites
Specimens in Collections
Literature Notes which are not Quoted here

Biological Observations
Flower Visits
Prey Capturing
Cleptoparasites
Renters

Construction and Provision of Nests
Nest Substrates
Nest Material
Nest Exposition
Flight Directions
Flight Distances

I am particularly interested in old specimens in collections which have been captured before 1900