# A revision of the Micrillus species of the Palaearctic region, with notes on two species from adjacent parts of the Afrotropical and Oriental regions (Coleoptera: Staphylinidae: Paederinae) 

Volker Assing


#### Abstract

The species of the paederine genus Micrillus Raffray, 1873 of the Palaearctic region, as well as of the adjacent parts of the Afrotropical and Oriental regions are revised. In the Palaearctic region, the number of valid names is significantly reduced, from 24 to 10 . Twelve species, two of them from the Afrotropical and the Oriental regions, respectively, are (re-)described, and illustrated. They are attributed to two species groups, the M. testaceus group including eight species from the Western Palaearctic region (including Middle Asia) and the M. aegyptiacus group with four species from the south of the Western Palaearctic, the north of the Afrotropical, and the Oriental regions. Two new species are described: M. tenuipennis n.sp. (Morocco) and M. sudanicus n.sp. (Sudan). The following synonymies are proposed: Micrillus testaceus (Erichson, 1840) = Scymbalium grandiceps Jacquelin du Val, 1853, resyn., $=$ S. pubipenne Fairmaire, 1860, n.syn., $=$ S. longipenne Brisout de Barneville, 1863, n.syn. (previously a synonym of S. pubipenne), = Schatzmayria tergestina Gridelli, 1914, n.syn. (previously a synonym of S. pubipenne), $=$ Scymbalium zuercheri Wanka, 1914, n.syn., = Micrillus libanicus Coiffait, 1980, n.syn., = M. hispanicus Coiffait, 1980, n.syn., $=$ M. zacinthicus Coiffait, 1980, n.syn., $=$ M. syriacus Coiffait, 1980, n.syn., $=$ M. calabricus Coiffait, 1980, n.syn., = M. turcicus Coiffait, 1980, n.syn., $=$ M. graecus Coiffait, 1980, n.syn., $=$ M. cypriacus Coiffait, 1980, n.syn., $=$ M. corcyranus Coiffait, 1980, n.syn., $=$ M. brekhovi Grebennikov, 2001, n.syn.; Micrillus pallidus Reitter, 1887 = M. caucasicus Coiffait, 1980, n.syn.; Micrillus aegyptiacus $($ Bernhauer, 1910 $)=$ Scymbalium bernhaueri Koch, 1934, n.syn.; M. torretassoi (Koch, 1934) = Scymbalium collare Scheerpeltz, 1962, n. syn.; Pseudomedon dido (Saulcy, 1865) = Scymbalium minimum Eppelsheim, 1888, n.syn. Several previously established synonymies are confirmed. The binomen Micrillus indicus (Eppelsheim, 1890), n. comb. (ex Scymbalium) is established. Lectotypes are designated for Scymbalium testaceum Erichson, S. biskrense Fauvel, S. scabrosum Fauvel, 1875, S. hypogaeum Peyerimhoff, 1907, S. bernhaueri Koch, S. torretassoi Koch, and Medon apfelbecki Bernhauer, 1899. The distributions of 12 species are mapped. A key to species and a synonymic catalogue of Micrillus are provided.


K e y words: Staphylinidae, Paederinae, Micrillus, Scymbalium, Pseudomedon, Palaearctic region, Afrotropical region, Oriental region, taxonomy, morphometry, new species, new synonymies, lectotype designations, dimorphism, bionomics, distribution, seasonal distribution, catalogue, key to species.

## Zusammenfassung

Die paläarktischen Arten der Gattung Micrillus Raffray, 1873 werden revidiert. Die Zahl der in der Paläarktis vertretenen validen Arten verringert sich von 24 auf 10. Zwölf Arten, davon zwei aus der Afrotropis bzw. der Orientalis werden beschrieben und abgebildet. Zwei Artengruppen werden unterschieden: die M. testaceus-Gruppe mit acht in der Westpaläarktis (einschließlich Mittelasien) verbreiteten Arten und die M. aegyptiacus-Gruppe mit vier Arten in der südlichen Westpaläarktis, der nördlichen Afrotropis und der Orientalis. Zwei Arten werden erstmals beschrieben: M. tenuipennis n.sp. (Marokko) und M. sudanicus n.sp. (Sudan). Die Revision ergab die folgenden Synonymien und Neukombination: Micrillus testaceus (Erichson, 1840) = Scymbalium grandiceps Jacquelin du Val, 1853, resyn., = S. pubipenne Fairmaire, 1860, n. syn., = S. longipenne Brisout de Barneville, 1863, n. syn. (bisher Synonym von S. pubipenne), Schatzmayria tergestina Gridelli, 1914, n. syn. (bisher Synonym von S. pubipenne), $=$ Scymbalium zuercheri Wanka, 1914, n.syn., = Micrillus libanicus Coiffait, 1980, n.syn., $=$ M. hispanicus Coiffait, 1980, n.syn., $=$ M. zacinthicus Coiffait, 1980, n.syn., $=$ M. syriacus Coiffait, 1980, n.syn., $=M$. calabricus Coiffait, 1980, n.syn., $=$ M. turcicus Coiffait, 1980, n.syn., $=$ M. graecus Coiffait, 1980, n.syn., $=M$. cypriacus Coiffait, 1980, n.syn., $=$ M. corcyranus Coiffait, 1980, n.syn., = M. brekhovi Grebennikov, 2001, n.syn.; Micrillus pallidus Reitter, $1887=$ M. caucasicus Coiffait, 1980, n.syn.; Micrillus aegyptiacus $($ Bernhauer, 1910 $)=$ Scymbalium bernhaueri Koch, 1934, n.syn.; M. torretassoi (Koch, 1934) = Scymbalium collare Scheerpeltz, 1962, n.syn.; Pseudomedon dido (Saulcy, 1865) = Scymbalium minimum Eppelsheim, 1888, n. syn., Micrillus indicus (Eppelsheim, 1890), n. comb. (ex Scymbalium). Für Scymbalium testaceum Erichson, S. biskrense Fauvel, S. scabrosum Fauvel, 1875, S. hypogaeum Peyerimhoff, 1907, S. bernhaueri Koch, S. torretassoi Koch und Medon apfelbecki Bernhauer, 1899 werden Lectotypen designiert. Die derzeit bekannte Verbreitung der untersuchten MicrillusArten wird anhand von Karten illustriert. Ein Katalog der Arten einschließlich aller Synonyme und eine Bestimmungstabelle werden erstellt.
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## 1 Introduction and taxonomic history

The genus Micrillus was described by Raffray (1873), who distinguished it from Achenium Leach, 1819 based on the morphology of the metatarsi and the strongly reduced eyes, but did not explicitly refer to Scymbalium Erichson, 1839, which at that time comprised all the described species later to be attributed to Micrillus. The only species originally included was the microphthalmous type species (by monotypy) M. subterraneus Raffray, 1873 from Algeria. Micrillus was subsequently synonymised with Scymbalium by Fauvel (1875), who continued to treat the name as a synonym also in later papers (e.g. Fauvel 1886, 1898, 1902). His view was widely accepted in the decades to come, e.g. by Peyerimhoff (1907), who described another microphthalmous species from Algeria, Scymbalium hypogaeum, and keyed the six Scymbalium species known from North Africa at that time, as well as in the catalogue by Bernhauer \& Schubert (1912).

In a key to the Palaearctic species of Scymbalium, which included nine names today attributed to Micrillus, Wanka (1914) described a new species, S. zuercheri from Turkey.

Gridelli (1914) described the genus Schatzmayria, suggesting close affiliations to Scymbalium and Euphonus Fauvel, 1902 (today a subgenus of Pseudomedon Mulsant \& Rey, 1878) and separating it from these taxa by the simple (undilated) protarsi in both sexes and by the shape of the palpi. He included two new species in the genus, $S$. meridionalis - which was later designated as the type species by Blackwelder (1939) - and S. tergestina, without
reference to closely related species, which were still attributed to Scymbalium. Made aware of the presence of other species with simple protarsi by A. Dodero, an Italian contemporary, he regarded Schatzmayria as a subgenus of Scymbalium a few years later, synonymised Schatzmayria meridionalis with Scymbalium testaceum Erichson, 1840 and Schatzmayria tergestina with Scymbalium pubipenne Fairmaire, 1860; also, he included three additional species, Scymbalium (Schatzmayria) pallidum Reitter, 1887, S. (S.) hypogaeum, and S. (S.) subterraneum, disregarding the priority of the senior name Micrillus (Gridelli 1921). This priority later also escaped the attention of Scheerpeltz (1933) and Blackwelder (1952).

In a synopsis of the Scymbalium species of India, Burma, and Ceylon, Cameron (1931) listed four species, one of them, S. indicum Eppelsheim, 1890, now attributed to Micrillus.

Scheerpeltz (1962) considered the separation of the subgenera Scymbalium and Schatzmayria unjustified, emphasised the isolated position of Scymbalium anale (Nordmann, 1837), and presented an updated key to 14 Palaearctic species of Scymbalium, one of them new (S. collare from Sudan). Remarkably, he - correctly - omitted $S$. minimum, but without comment.

Coiffait $(1980,1982)$ eventually recognised the synonymy of Schatzmayria with Micrillus and separated the latter from Scymbalium as a distinct genus, based on the simple undilated protarsi, the more slender and glabrous fourth joint of the maxillary palpus, the position of the aedeagus in the abdomen, as well as the almost completely reduced parameres of the aedeagus. In the same paper, he
described ten new species and a new variety (unavailable name) from the Mediterranean, and presented a key to the 24 species he considered valid. Since then, only one species has been added to the genus, $M$. brekhovi from Russia, by Grebennikov (2001), so that the genus included 25 valid nominal taxa, 24 of them from the Palaearctic region (Smetana 2004) and one from the Afrotropical region.

The present revision was stimulated especially by the repeated difficulties encountered when trying to clarify the specific identities of Micrillus from the Mediterranean. The identification results obtained using the keys by Coiffait $(1980,1982)$ were usually highly doubtful and rarely corresponded with the biogeographic data indicated in the literature, observations shared also by other colleagues. This, as well as the fact that, according to the illustrations provided by Coiffait $(1980,1982)$, the aedeagi of several species were practically indistinguishable, and, finally, new evidence suggesting that at least some of the "taxa" were wing-dimorphic and subject to pronounced intraspecific variation raised the suspicion that the taxonomic confusion in the genus was possibly the result of a high degree of synonymy.

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## 2 Material, methods, and depositories

Altogether 910 specimens of Micrillus were examined, among them the available types. The material is deposited in the following public institutions and private collections:
BMNH The Natural History Museum, London (R. Воотн)
cAnl private collection S. Anlaş, Turgutlu
cAss author's private collection
cFel private collection B. Feldmann, Münster
cGon private collection A. Gontarenko, Odessa
cSch private collection M. SchÜlke, Berlin
cTro private collection M. Tronquet, Molitg-les-Bains
cWun private collection P. Wunderle, Mönchengladbach
cZan private collection A. Zanetti, Verona
DEI Deutsches Entomologisches Institut, Müncheberg (L. Zerche)
FMNH Field Museum of Natural History, Chicago (J. Boone, A. Newton)

HNHM Hungarian Natural History Museum, Budapest (Gy. Makranczy, O. Merkl)

IRSNB Institut royal des Sciences naturelles de Belgique (Y. Gérard)
MCSNM Museo Civico di Storia Naturale di Milano (F. Rigaто)
MHNG Muséum d'Histoire naturelle, Genève (G. CuccoDORO)
MNCN Museo Nacional de Ciencias Naturales, Madrid (I. Izquierdo)

MNHNP Muséum National d'Histoire naturelle, Paris (A. Taghavian)
MNHUB Museum für Naturkunde der Humboldt-Universität zu Berlin (J. Frisch, M. Uhlig, J. Willers)
NHMW Naturhistorisches Museum Wien (H. Schillhammer)
SMF Senckenberg-Museum Frankfurt/Main (A. Hasten-pflug-Vesmanis)
SMNS Staatliches Museum für Naturkunde, Stuttgart (W. Schawaller, K. Wolf-Schwenninger)
SMTD Staatliches Museum für Tierkunde, Dresden (O. Jäger)
TAU National Museum of Natural History, Tel Aviv University (A. Freidberg, via B. Feldmann)
ZIN Zoological Institute, Russian Academy of Sciences, St. Petersburg (B. Kataev, via V. Gusarov)
The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena) with a drawing tube. For the photographs a digital camera (Nikon Coolpix 995) was used. The maps were generated using the online generic mapping tool (GMT) of the Geomar website at www.aquarius.ifm-geomar.de/ omc.

In order to assess intraspecific variation, 468 specimens were measured. The following morphological parameters were examined:
AL length of antenna
EL length of elytra along suture, from apex of scutellum to posterior margin
EyL length of eye in lateral view
HL head length from anterior margin of frons to neck
HW maximal head width
ML length of aedeagus from base to apex of ventral process
PL length of pronotum along midline
POL length of postocular region from posterior margin of eye to posterior margin of head (lateral view)
PW maximal width of pronotum
TaL length of metatarsus
TiL length of metatibia
TL body length from mandibles to posterior margin of abdominal tergite VIII
Maximum/minimum ratios are used to estimate the extent of intraspecific variation of size-related parameters and are given as the maximal value divided by the minimal value of a particular parameter. In the diagrams, size is given as the sum of the approximated surface areas of head and pronotum (HL× HW + PL $\times$ PW).

The concept of the zoogeographic regions used here is in accordance with that proposed by Löbl \& Smetana (2004).

Labels of type material are cited in their original spelling and language, except for the following adaptations according to the general format requirements of the journal: names of persons (except authors of species) in small capitals, scientific names of genera and species in italics, dates with the months always in Roman numbers.

## 3 Results

### 3.1 The genus Micrillus Raffray

### 3.1.1 Diversity, zoogeography, and systematics

The revision of the available types and non-type material from practically all the major collections revealed a taxonomic confusion of truly remarkable dimensions. In all, 17 new synonymies in Micrillus and one in Pseudomedon are proposed, one previously revalidated name is resynonymised, and only two new taxa are described. The number of valid names in Micrillus is reduced by $60 \%$, from 25 to 10 , disregarding two species - one of them new and one of them transferred from Scymbalium - whose distribution is clearly outside the Palaearctic region. Micrillus testaceus alone has as many as 19 junior synonyms.

The reasons for such a high degree of synonymy are manyfold. Even in the larger collections, material of Micrillus species is comparatively scarce, and the descriptions of almost all the names are based on only one or few specimens from usually one locality. Coiffait (1982) alone described 10 species; all of these names are now synonyms, nine of M. testaceus and one of M. pallidus. Al-
though he described more Micrillus species than anyone else, his collection at the MNHNP contains only 44 specimens, most of them types (Fig. 1). With so little material available for comparison, an adequate assessment of intraspecific variation - especially of widespread species is impossible. Some species of Micrillus, M. testaceus in particular, are subject to pronounced intraspecific variation especially of various size-related parameters, head shape and relative head size, and coloration. Two species are wing-dimorphic, this dimorphism not only involving the length of the hind wings, but also the length of the elytra, eye size, occasionally the shape of the head, as well as the coloration. Finally, as is often the case especially with wing-dimorphic species, the distribution ranges have been underestimated. This is particularly true of $M$. testaceus, whose macropterous morph is rarer than the brachypterous morph and has been collected on the wing, which proves that parts of the populations are capable of flight and long-distance dispersal. Another example is provided by M. torretassoi, whose brachypterous morph was described from northern Egypt by Косн (1934) and whose macropterous morph was later described as a distinct species, Scymbalium collare, from southern Sudan


Fig. 1. Drawer from the Coiffart collection at the MNHNP containing his material of Micrillus (highlighted by black frame).


Fig. 2. Known distribution of the Micrillus testaceus species group ( $\bullet$ ) and the M. aegyptiacus group (○).
by Scheerpeltz (1962), the respective type localities being separated by more than 2000 km .

The Micrillus species treated here can be subdivided into two species groups, based on the morphology of the aedeagus, of the valvulae of the abdominal segment IX, and the morphology of the maxillary palpi. The first group, hereafter referred to as the M. testaceus group, is characterised by a rather simple aedeagal morphology with weakly sclerotised internal structures (see e. g. Figs. 16-26, 41-46), somewhat shorter valvulae of the abdominal segment IX, and a very long and slender apical maxillary palpomere. This group includes eight species (M. testaceus, M. scabrosus, M. pallidus, M. irakensis, M. hypogaeus, M. subterraneus, M. biskrensis, M. tenuipennis) and is confined to the south of the Western Palaearctic region, from the western Mediterranean to Middle Asia (Fig. 2). The highest diversity is in Northwest Africa (Morocco and Algeria), where the group is represented by six species, three of them distinctly microphthalmous and five of them with restricted distributions.

The representatives of the M. aegyptiacus species group are separated from those of the M. testaceus group by a complex and usually more or less asymmetric mor-
phology of the aedeagus with distinctly sclerotised internal structures, remarkably long valvulae of the abdominal segment IX (except for M. torretassoi), and a shorter and somewhat conically shaped terminal maxillary palpomere. The M. aegyptiacus group currently includes four species (M. aegyptiacus, M. torretassoi, M. sudanicus, M. indicus). Two of the species (M. aegyptiacus, M. torretassoi) are distributed in the border zone between the Palaearctic and the Afrotropical regions, one (M. sudanicus) in the northeast of the Afrotropical region, and one (M. indi$c u s$ ) in the Oriental region (Fig. 2). It does not seem unlikely that at least some of the species currently attributed to Scymbalium from the Afrotropical and the Oriental regions (see e.g. Cameron 1931, Fagel 1960) may also belong to the Micrillus aegyptiacus group, but these species have not been revised. According to a catalogue excerpt by Herman (unpubl.), a total of 47 valid species of Scymbalium are currently known from the Afrotropical (21 species), Oriental (11 species), and Australian regions (15 species), in addition to the two Palaearctic species $-S$. anale (Nordmann, 1837) and S. persimilis Cameron, 1940 (holotype examined) - and the misplaced $S$. minimum Eppelsheim, 1888 (see section 3.5).

### 3.1.2 Ecology

Little is known about the ecological requirements of Micrillus. As can be inferred from the general distribution of the genus, especially from their absence from the temperate zones of the Palaearctic region, the species are apparently thermophilous. The examined material of the species of the M. testaceus group was mostly collected under stones in unforested habitats (agricultural land, grassland) at lower to intermediate altitudes. Occasionally winged specimens were collected in light traps or swept from the vegetation. The adaptive reductions of the eyes, hind wings, elytral length, and pigmentation in four North African species (M. subterraneus, M. hypogaeus, M. tenuipennis, and - to a lesser extent - M. scabrosus) suggest that they inhabit a subterranean habitat; according to the literature data and unpublished information made available by recent collectors, these species are typically found under large stones that are deeply embedded in the soil. While M. pallidus and M. irakensis are apparently fully winged, M. testaceus is wing-dimorphic, with the macropterous morph somewhat rarer than the brachypterous one. Both the rarity of records and the flat body suggest that they, too, predominantly dwell in subterranean crevices. Micrillus biskrensis, too, is apparently wingdimorphic, but little is known about its distribution and its bionomics. As far as is currently known, species of Micrillus are univoltine.

The African representatives of the M. aegyptiacus group seem to be inhabitants of river banks, as is suggested by the data indicated on their labels and by the information provided in their descriptions. No information is available regarding the habitat of $M$. indicus.

### 3.1.3 Redescription

Species of intermediate size, $3.0-7.5 \mathrm{~mm}$. Body more or less flattened.

Head of somewhat subquadrate shape, weakly oblong to weakly transverse. Antenna slender; antennomere I approximately as long as the combined length of II + III. Anterior margin of labrum incised in the middle, not dentate; maxillary and labial palpus slender, apical palpomere distinctly narrower than the preceding one, needle-shaped or weakly coniform. Neck approximately half the width of head.

Pronotum usually narrower than or approximately as wide as head and of somewhat trapezoid shape, widest near anterior angles and tapering posteriad; dorsal surface without distinct microsculpture; margins with long setae; midline impunctate.

Elytra with distinctly denser puncturation than head and pronotum; lateral margins with several long setae.

Legs slender; protarsus simple, undilated in both sexes; metatarsomere I approximately as long as the combined length of $\mathrm{II}+\mathrm{III}$.

Abdomen densely punctate. Valvulae of segment IX elongated in both sexes, distinctly projecting beyond posterior margin of tergite $X$; tergite $X$ and sternite IX very small.
$\delta^{\top}$ : sternite VII without distinct modifications; posterior margin of sternite VIII weakly to moderately excised in the middle; aedeagus without parameres.

### 3.1.4 Comparative notes

Among Palaearctic Paederinae, Micrillus is most similar to Scymbalium, which is represented in the Western Palaearctic region by only two species, $S$. anale and $S$. persimile. From this genus, Micrillus is distinguished by smaller body size, simple protarsi (in Scymbalium dilated in both sexes, in males more so than in females), a narrower neck (in Scymbalium about $2 / 3$ the width of head), the finer puncturation of head and pronotum, the much longer valvulae of abdominal segment IX, the strongly reduced size of tergite X and sternite IX, and by the completely reduced parameres of the aedeagus (in Scymbalium, short parameres are present). For separation from other paederine genera occurring in the Palaearctic region see the key in Coiffait (1982).

### 3.2 The species of Micrillus

### 3.2.1 Micrillus testaceus (Erichson, 1840)

(Figs. 3-33)
Scymbalium testaceum Erichson, 1840: 581.
Scymbalium grandiceps JacQuelin du Val, 1853: 699 f.; resyn.
Scymbalium longicolle Mulsant \& Rey, 1853: 77 ff.
Scymbalium pubipenne Fairmaire, 1860: 159; n. syn.
Scymbalium longipenne Brisout de Barneville, 1863: 35 f.; n. syn. (previously a synonym of S. pubipenne).

Achenium saintpierrei Allard, 1869: 465 f.
Lithocharis trapezicollis Uhagón, 1876: 70 ff.
Schatzmayria meridionalis Gridelli, 1914: 70 f.; synonymy confirmed.
Schatzmayria tergestina Gridelli, 1914: 71; n. syn. (previously a synonym of S. pubipenne).
Scymbalium zuercheri Wanka, 1914: 141; n.syn.
Micrillus libanicus Coiffait, 1980: 150 f.; n. syn.
Micrillus hispanicus Coiffait, 1980: 151; n.syn.
Micrillus zacinthicus Coiffart, 1980: 151 f.; n.syn.
Micrillus syriacus Coiffait, 1980: 154; n.syn.
Micrillus calabricus Coiffait, 1980: 154; n. syn.
Micrillus turcicus Coiffait, 1980: 155; n. syn.
Micrillus graecus Coiffait, 1980: 155 f.; n.syn.
Micrillus cypriacus Coiffait, 1980: 156; n. syn.
Micrillus corcyranus Coiffait, 1980: 156 f.; n. syn.
Micrillus pubipennis var. brevipennis ["pubipenne var. brevipenne"]; Coiffait (1980: 157); unavailable name.
Micrillus brekhovi Grebennikov, 2001: 446 f.; n.syn.

Type material examined
S. testaceum: Lectotype ${ }^{\lambda}$ [remounted], present designation: "6631 / testaceum Er., Sicil. Schultz / Syntypus Scymbalium testaceum Erichson, 1840, labelled by MNHUB 2006 / Lectotypus $\begin{gathered}\text { § Scymbalium testaceum Erichson desig. V. Assing } 2007 \text { / }\end{gathered}$ Micrillus testaceus (Erichson) det. V. Assing 2006" (MNHUB). - Paralectotype ㅇ: "Hist.-Coll. (Coleoptera), Nr. 6311, Scimbalium [sic] testaceum Erichs., 1840, Sicil., Schultz, Zool. Mus. Berlin / Syntypus Scymbalium testaceum Erichson, 1840, labelled by MNHUB 2006 / Paralectotypus $Q$ Scymbalium testaceum Erichson desig. V. Assing 2007 / Micrillus testaceus (Erichson) det. V. Assing 2006" (MNHUB).
S. meridionalis: Syntype [abdominal segments VIII and following missing]: "Lisbona, Schatzmayr / Typo / đ / Schatzmayria meridionalis Grid. det. Gridelli / Syntypus Schatzmayria meridionalis Gridelli rev. V. Assing 2007 / Micrillus testaceus (Erichson) det. V. Assing 2007" (MCSNM).
S. tergestina: Holotype of [macropterous]: "Noghera, 11.VI.911, Schatzmayr / S. pubipenne Fairm. / Holotypus of Schatzmayria tergestina Gridelli rev. V. Assing 2007 / Micrillus testaceus (Erichson) det. V. Assing 2007" (MCSNM).
S. zuercheri: Holotype + [macropterous]: "Adana / coll. Reitter / Holotypus Scimbalium Zürcheri Wanka, 1914 [curator label] / Scymbal. zürcheri m. / Micrillus testaceus (Erichson) det. V. Assing 2007" (HNHM).
M. calabricus: Holotype $\uparrow$ : "Gerace, Calab. Paganetti / Holotype / Micrillus calabricus H. Coiffait det. 1980 / Muséum Paris / Micrillus testaceus (Erichson) det. V. Assing 2007" (MNHNP).
M. corcyranus: Holotype ${ }^{\text {® }}$ : "Corfou / Holotype / Micrillus corcyranus H. Coiffait 1979 / Muséum Paris / Micrillus testaceus (Erichson) det. V. Assing 2007" (MNHNP). - Paratypes: 4 exs. [3 exs. macropterous]: "Paratype [curator label] / Corfu / G. C. Champion B. M. 1927-409 / Paratype / Micrillus graecus Coiff. H. Coiffait det. 1971 / Paratypus Micrillus corcyranus Coiffait rev. V. Assing 2007 / Micrillus testaceus det. V. Assing 2007" (BMNH).
M. cypriacus: Holotype ơ: "Larnaka, Chypre, P. N. / Holotype / Micrillus cypriacus H. Coiffait 1980 / Muséum Paris / Micrillus testaceus (Erichson) det. V. Assing 2007" (MNHNP).
M. graecus: Holotype +: "Attique / Holotype / Micrillus graecus H. Coiffait 1970 / Muséum Paris / Micrillus testaceus (Erichson) det. V. Assing 2007" (MNHNP). - Paratypes: 2 Qq: same data as holotype (MNHNP); 1 ¢: "Grece / 82 / Museum Paris Coll. J. Jarrige / Micrillus testaceus (Erichson) det. V. Assing 2007" (MNHNP).
M. hispanicus: Holotype $q$ [macropterous]: "Hispania, San Roque, Cadiz, J. Vives leg. / Holotype / Micrillus hispanicus H. Coiffait 1979 / Muséum Paris / Micrillus testaceus (Erichson) det. V. Assing 2007" (MNHNP).
M. libanicus: Holotype đ [macropterous]: "Liban, Joub Jannine, H. Coiffart, 16.XI. 51 / Holotype / Micrillus libanicus H. Coiffait 1979 / Muséum Paris / Micrillus testaceus (Erichson) det. V. Assing 2007" (MNHNP).
M. syriacus: Holotype ${ }^{\text {J }}$ : "Dj. Cheik [= Mt. Hermon] / Holotype / Micrillus syriacus H. Coiffait 1980 / Muséum Paris / Micrillus testaceus (Erichson) det. V. Assing 2007" (MNHNP).
M. turcicus: Holotype Q: "[Locality illegible] Turq., VI.55. G. P. / Holotype / Micrillus turcicus H. Coiffait 1979 / Muséum Paris / Micrillus testaceus (Erichson) det. V. Assing 2007" (MNHNP).
M. zacinthicus: Holotype ō [macropterous]: "Zante 1909, Kalámaki, legit O. Hilf, Coll. O. Leonhard / Holotype / Micrillus zacinthicus H. Coiffait 1980 / Muséum Paris / Micrillus testaceus (Erichson) det. V. Assing 2007" (MNHNP).
M. brekhovi:Holotype ō:"Volgogradskayaobl.Kalachevskiy
r.-n. Naydenovskaya balka, 15.-23.VI.1990, O. G. Brekhov 15-23.VI. 1990 [collection data in Cyrillic] / Achenium sp. nova? Сhatschikove det. 1998 / Holotypus Micrillus brekhovi sp. n. K. Grebennikov det. 2000 / Zoological Institute RAS St. Petersburg / Micrillus testaceus (Erichson) det. V. Assing 2007" (ZIN).

Additional material examined (total, including types: 492 exs. +4 exs. of doubtful identity)
Tunisia: 2 exs., Aïn Draham, 27.-28.III.2003, leg. Lackner (cAss); 1 ex., Aïn Draham, 2.V.2004, leg. Lackner (cAss); 1 ex., Aïn Draham, XI.1945, leg. Demoflys (cTro); 1 ex., Zaghouan, northern foot of Djebel Zaghouan, 30.XI.1994, leg. Wrase (cSch); 1 ex., Teboursouk [ $\left.36^{\circ} 28^{\prime} \mathrm{N}, 9^{\circ} 15^{\prime} \mathrm{E}\right]$ (IRSNB); 1 ex. [macropterous], NE Jendouba, Bulla Regia [ $36^{\circ} 34^{\prime} \mathrm{N}, 8^{\circ} 48^{\prime} \mathrm{E}$ ] (IRSNB); 1 ex. [macropterous], Le Kef, VI.1939, leg. Normand (cTro); 1 ex., Le Kef, X.1944, leg. Normand (cTro).

Algeria: 9 exs. [macropterous], Bône (DEI, IRSNB, cAss); 4 exs., Algier [macropterous] (BMNH, DEI); 1 ex. [macropterous], Biskra (MNHNP); 2 exs. [macropterous], locality not specified (BMNH, MNHNP).

Morocco: 1 ex. [macropterous], road Skirat to Sidi Bettache, 20 km NNW Sidi Bettache, 17.II.1999, leg. Wrase (cAss); 1 ex., Esmir [at the Mediterranean coast between Ceuta and Cabo Negro], leg. Walker ["paratype" of M. pubipennis var. brevipennis] (MNHNP); 4 exs. [macropterous], Esmir, leg. Walker (BMNH, IRSNB); 1 ex., Esmir (IRSNB, cAss); 1 ex., Moyen Atlas, Asni, 1200m, 21.I.1990, leg. Arndt (cAss); 1 ex., "Mellah", inundation, III. 1963 (MHNG); 1 ex. [macropterous], Tetuan, leg. Walker (cAss); 2 exs., Fedhala, 7.II.1935, leg. Косh (MCSNM, cAss).

Gibraltar: 2 exs., "Gibraltar", leg. Walker ["types" of $M$. pubipennis var. brevipennis] (MNHNP); 3 exs. [2 exs. macropterous], "Gibraltar", leg. Walker (BMNH).

Spain: Cataluña: 1 ex., Gerona, Palamos, 7./13.IX.1974, leg. Ullbrich (cAss). - Castilla-La Mancha: 4 exs., Pozuelo de Calatrava (NHMW, cAss). - Murcia: 1 ex., Cartagena, leg. Simon (NHMW). - Andalucía: 2 exs., Cádiz, Tarifa, I.1997, leg. Poot (cAss); 2 exs., same data, but III. 1991 (cAss, cWun); 1 ex., same data, but IV. 1994 (cWun); 1 ex. [macropterous], same data, but I. 1997 (cWun); 5 exs., Cádiz, 15 km N Jerez, Marisma de Trebujena, bank of Guadalqivir, 31.I.1998, leg. Wrase (cSch, cAss); 1 ex. [macropterous], Cádiz, Sanlúcar, 9.IV.1969, leg. Comellini (MHNG); 1 ex., Cádiz, Sierra de Luna, 350 m , stream bank, 28.III.1994, leg. Wunderle (cWun); 1 ex., Malaga, Velez de Malaga, 25.III.1998, leg. Esser (cAss); 1 ex. [macropterous], Sevilla env., Los Palacios, leg. Franz (cAss); 1 ex. [macropterous], Sevilla env., Los Palacios, 7.IV.1959, leg. Besuchet (IRSNB); 1 ex. [macropterous], Sevilla env., leg. Franz (cAss); 1 ex., Sierra de Ronda, 1800 m (NHMW); 1 ex., Algeciras, XI.-XII.1900, leg. Cameron (BMNH); 1 ex., Algeciras, III.1901, leg. Cameron (BMNH); 1 ex., San Roque, XI.-XII.1900, leg. Cameron (BMNH); 1 ex., San Roque district, leg. Cameron (BMNH); 1 ex., La Linea, III.1901, leg. Cameron (BMNH); 1 ex., locality not specified, leg. Simon (NHMW); 2 exs. [macropterous], locality not specified (DEI). - Locality not specified: 1 ex., "S. Spain", III.1901, leg. Cameron (BMNH).

France: Provence: 3 exs., Nice env., flood debris, 22.II.1946, leg. Coiffait (MNHNP); 1 ex., Nice, 22.II.1967, leg. Coiffait (IRSNB); 1 ex., Hyères, 9.IV. 1901 (MNHNP); 4 exs., Cannes (BMNH, DEI, IRSNB, MNHNP); 1 ex., Modène (IRSNB); 1 ex., Marseille (IRSNB); 1 ex., Fréjus (IRSNB); 1 ex. [macropterous], Saint-Raphael (IRSNB); 1 ex. [macropterous], Vaucluse, Angles (IRSNB); 2 exs., locality not specified (IRSNB). - Languedoc-Rousillon: 1 ex., Gard, Camargue, Pont des Tourradons $\left[43^{\circ} 37^{\prime} \mathrm{N}, 4^{\circ} 16^{\prime} \mathrm{E}\right]$, 13.XI.1976, leg. Curti (cAss); 1 ex.
[macropterous], same locality, 12.X.1994, leg. Lambelet (cTro); 1 ex., Béziers (IRSNB); 4 exs. [ 1 ex. macropterous], Lattes, leg. Lavagne (IRSNB); 1 ex. [macropterous], Lodève (IRSNB); 1 ex., Martigues, 24.IV.1934, leg. Tasso, Schatzmayr \& Koch (MCSNM). - Corse: 2 exs. [1 ex. macropterous], Porto Vecchio (IRSNB); 2 exs., Porto, 26.V.1955, leg. Fagel (IRSNB); 7 exs. [ 2 exs. macropterous], locality not specified (HNHM, NHMW, cSch); 5 exs. [2 exs. macropterous], locality not specified, leg. Bauduer, Merkl (HNHM, NHMW).

Italy: Emilia-Romagna: 1 ex., Modena, San Cataldo, 1.VII.1896, leg. Fiori (NHMW); 3 exs., San Cataldo, 19.V.1895, leg. Fiori (SMF); 2 exs., San Cataldo (DEI, NHMW); 1 ex., Modena, 4.VI.1893, leg. Fiori (NHMW); 1 ex. [macropterous], Modena, 31.III.1895, leg. Fiori (SMF); 2 exs., Modena, 27.II.1897, leg. Fiori (MNHUB); 1 ex., Modena, 22.II.1882, leg. Fiori (MNHUB); 2 exs., Modena (NHMW); 1 ex. [macropterous], Galliera, 27.X.1910, leg. Fiori (MNHUB); 1 ex., Cagliata [?; first letter illegible], 21.V.1894, leg. Fiori (MNHUB); 1 ex. [teneral], S. Massa, 25.X.1896, leg. Fiori (MNHUB); 2 exs. [1 ex. macropterous], Bazzano, leg. Sekera (HNHM, SMTD); 1 ex. [macropterous], Ravenna, 8.IV.1964, leg. Collegar (MCSNM); 4 exs. [1 ex. macropterous], Parma, Felegara, 22.II.1976, leg. Rosa (MCSNM, cAss); 2 exs., Felegara, III.1976, leg. Rosa (MCSNM); 1 ex., Felegara, 2.XI.1978, leg. Pavesi (MCSNM); 1 ex. [macropterous], locality illegible, 8.V.1907, leg. Fiori (MNHUB); 2 exs., locality not specified (NHMW, SMF). - Toscana: 4 exs., Livorno, 18.VI. 1886 (NHMW); 1 ex., Monte Argentario, leg. Moczarski (cAss); 1 ex., Follonica, IX.1962, leg. v. Breuning (MNHUB); 2 exs., locality not specified, leg. Bertolini, Stussiner (DEI, NHMW). - Umbria: 2 exs. [1 ex. macropterous], locality not specified (NHMW). - Lazio: 1 ex., Roma env. (MCSNM); 3 exs., Roma, Tolfa, 300 m , 14.II.1977, leg. Franzini (MCSNM); 1 ex. [macropterous], Latina, Cisterna, 27.X.1977, leg. Franzini (MCSNM); 1 ex., Roma env., locality illegible, 21.XII. 1946 (MCSNM); 1 ex., Cerveteri, leg. Giaquinto (MCSNM); 1 ex., Aniene, leg. Porta (MCSNM). - Basilicata: 1 ex., Foresta di Accettura (MT), 21.III.1993, leg. Montemurro (cAss); 1 ex. [macropterous], Tursi (MT), 28.XII.1997, leg. Montemurro (cZan); 1 ex. [macropterous], Lavello, 1902, leg. Fiori (MNHUB). Campania: 1 ex., Pattano (SA), 20.X. 1966 (cZan). - Calabria: 5 exs., Antonimina, 1905, leg. Paganetti (DEI, NHMW, SMF, cAss); 1 ex., Melito di Porto Salvo, 6.XII.1975, leg. Curti (cSch); 4 exs., Aspromonte, Africo (RC), road to Samo, 100 m , meadow, 8.XI.1997, leg. Angelini (cAss, cZan); 7 exs., Aspromonte, San Luca (RC), 200 m , meadow, 24.I.2003, leg. Angelini (cAss, cZan); 3 exs., same data, but 23.I. 2003 (cZan); 2 exs., San Luca, 8.XI.1997, leg. Montemurro (cZan); 1 ex., Roseto Capo Spulico (CS), 15.II.1998, leg. Montemurro (cZan); 1 ex., same data, but 28.XII. 1997 (cZan). - Puglia: 3 exs., Taranto env., meadow, 16.XI.1997, leg. Angelini (cZan); 2 exs. [macropterous], Taranto env., 20.I.1997, leg. Montemurro (cAss, cZan); 1 ex., Porto Melitol, 10.XII.1975, leg. Curti (MHNG); 1 ex., Circum Mare Piccolo (TA), 24.XI.1976, leg. Montemurro (cZan); 1 ex., Taranto, Circum Mare Piccolo, $50 \mathrm{~m}, 22 . \mathrm{II} .1976$, leg. Montemurro (MCSNM); 1 ex. [macropterous], same data, but 28.XI. 1976 (MCSNM). - Sardegna: 1 ex. [macropterous], Cagliari, leg. Lostia (NHMW); 2 exs. [1 ex. macropterous], Cagliari, III.1883, leg. Dodero (IRSNB); 1 ex., Prov. Logoduro, Mores, leg. Gebhardt (NHMW); 6 exs., Asuni, leg. Krausse (MNHUB, cAss); 1 ex., Osilo, III. 1961 (MHNG); 3 exs., Altopiano della Campeda, IV.1909, leg. Solari (MCSNM); 1 ex., Sassari, 5.XII.1975, leg. Franzini (MCSNM); 1 ex., Sassari, Marsa, 5.XII.1975, leg. Franzini (MCSNM); 1 ex., Assemini, leg. Lostia (MCSNM); 1 ex. [macropterous], Oristano, 5.V.1936, leg. Burlini (MCSNM); 5 exs. [1 ex. macropterous], locality not specified, leg. Lostia (DEI, MNHUB, NHMW); 1 ex., locality not specified (BMNH). - Sicilia: 1 ex., Ficuzza, 1906, leg. Leonhard (NHMW); 1 ex.,

Ficuzza, 15.II.1926, leg. Schatzmayr (MCSNM); 1 ex., San Vito lo Capo (TP), M. Sparagio, 2.XI.1991, leg. Sabella (cZan); 6 exs. [4 exs. macropterous], Palermo, leg. Rottenberg (DEI, cAss); 1 ex., Palermo (SMTD); 1 ex., Agrigento, Valle dei Templi, 4.III.1973, leg. Aliquò (MCSNM); 2 exs. [macropterous], locality not specified, leg. Rottenberg (DEI); 1 ex., locality not specified (IRSNB). - Locality not specified or not identified: 3 exs. (MNHUB); 1 ex., Larilo [?] Sasso, 20.XI. 1917 (MCSNM).

Croatia: 3 exs. [1 ex. macropterous], "Istrien" (MNHUB, SMF).

Bosnia-Herzegovina: 2 exs. [macropterous], "Most. bl.", XI.1895, leg. Apfelbeck (NHMW).

Yugoslavia, Montenegro: 1 ex., Herzeg-Novi, leg. Paganetti (MNHUB); 1 ex., Herzeg-Novi, 3.V.1929, leg. Liebmann (DEI).

Albania: 3 exs. [macropterous], Vlorë ["Avlona"], leg. v. Oertzen (MNHUB, cAss).

Greece: Greek mainland: 13 exs., "Attica" (DEI, HNHM, MNHUB, NHMW); 1 ex., Fthiotis, SSE Lamia, Oros Kallidromo, $38^{\circ} 45^{\prime} \mathrm{N}, 22^{\circ} 28^{\prime} \mathrm{E}, 940 \mathrm{~m}$, pasture, 2.IV.2001, leg. Wunderle (cWun); 2 exs., Aitolías-Akarnanías, Neochorion $\left[38^{\circ} 25^{\prime} \mathrm{N}\right.$, $21^{\circ} 16^{\prime}$ E], 1.V.1999, leg. Angelini (cWun); 1 ex., Nomós Évros, Évros delta, Salicornia, 22.IV.1994, leg. Bense (SMNS). Pelopónnisos: 1 ex., Patras env., Mina, $900 \mathrm{~m}, 30 . \mathrm{III} .1986$, leg. Assing (cAss); 3 exs., Patras, olive grove, 29.III.1986, leg. Assing (cAss, cWun); 1 ex., same data, but 26.III. 1986 (cWun); 1 ex., Erimanthos, Hani Panopoulou, 600 m , 5.IV.1992, leg. Frisch (cAss); 1 ex., 7 km NW Andritsena, Quercus coccifera litter, 500 m, 3.X. 2004, leg. Schawaller (SMNS); 1 ex., Nauplia (DEI); 1 ex., Kastanea, 8.IV.1981, leg. Tronquet (cTro); 1 ex., Koúmani ["Cumani"], leg. Brenske (HNHM). - Kérkira (Corfu): 15 exs. [ 6 exs. macropterous], locality not specified, leg. Reitter, SAhLberg, etc. (DEI, HNHM, IRSNB, MNHUB, NHMW, SMF, SMNS, cAss); 1 ex. [macropterous], laguna (NHMW). Zákinthos: 16 exs. [macropterous], Kalamaki, 1909, leg. Hilf (DEI, IRSNB, NHMW, SMF, SMTD, cAss); 1 ex. [macropterous], Limni Makry, 1936, leg. Hicker (NHMW); 1 ex. [macropterous], Limni Makry, 25.III. 1936 (NHMW); 2 exs., locality not specified, 1909, leg. Leonhard (MNHUB). - Kríti (Crete): 11 exs., Lasithi, Váí, palm beach, 21.III.1976, leg. Fülscher \& Meybohm (MHNG, cAss, cWun); 2 exs., same data, but 27.III. 1973 (MHNG); 1 ex., pass between Katharo and Lassithi, $1100 \mathrm{~m}, 16 . \mathrm{IV} .2000$, leg. Меувонм (cAss); 1 ex., E-Crete, Neapolis, XI.1953, leg. Brondeel (IRSNB). - Rhodos: 1 ex., Lindos, Saidouras river, 18.IV.1994, leg. Frisch (cAss); 1 ex., Rhodos env., leg. v. Oertzen (MNHUB); 1 ex., Zambica, 20.II.1931, leg. Torre Tasso (MCSNM). - Locality not specified: 8 exs. [1 ex. macropterous], "Graecia" (DEI, NHMW).

Cyprus: 1 ex., Troodos mountains, Vretsia, 600 m , 10.III.1996, leg. Frisch (MNHUB); 6 exs. [1 ex. macropterous], locality not specified (DEI, IRSNB).

Turkey: Istanbul: 1 ex. [macropterous], "Belgrader Wald", leg. v. Bodemeyer (SMF); 1 ex., Alem Dağ, leg. v. Bodemeyer (SMF); 1 ex., Beykoz ["Beikos", $\left.41^{\circ} 09^{\prime} \mathrm{N}, 29^{\circ} 05^{\prime} \mathrm{E}\right]$, IX.1903, leg. Cameron (BMNH); 1 ex., Beykoz, 1902, leg. Cameron (BMNH). - Çanakkale: 1 ex., 25 km S Kumkale, Beşik Koyu ["Besika Bay", ca. $39^{\circ} 49^{\prime} \mathrm{N}, 26^{\circ} 10^{\prime} \mathrm{E}$ ], leg. Walker (BMNH); 2 exs., "Port Baklar" [ca. $40^{\circ} 33^{\prime} \mathrm{N}, 26^{\circ} 44^{\prime} \mathrm{E}$ ], "Paratype [of $M$. corcyranus]" [leg. Walker] (MNHNP); 4 exs. [1 ex. macropterous], "Port Baklar", leg. Walker (BMNH). - Izmir: 6 exs., ca. 80 km NW Izmir, W Karaburun, $38^{\circ} 38^{\prime} \mathrm{N}, 26^{\circ} 29^{\prime} \mathrm{E}, 440 \mathrm{~m}$, 4.IV.2006, leg. Anlaş, Assing, Wunderle (cAnl, cAss, cWun); 1 ex., "Vourlah Bay" [ca. $38^{\circ} 23^{\prime} \mathrm{N}, 26^{\circ} 47^{\prime} \mathrm{E}$ ], leg. WalKer (BMNH); 1 ex., Bornova, 31.VII.1931, leg. Uvarov (BMNH). Muğla: 3 exs. [1 ex. macropterous], SE Dalaman, $36^{\circ} 47^{\prime} \mathrm{N}$, $28^{\circ} 50^{\prime} \mathrm{E}, 10 \mathrm{~m}$, floodplain forest, meadows, 28.III.2002, leg. Assing (cAss). - Antalya: 1 ex. [macropterous], road to Sak-
likent, 30 m , river bank, sweep-netting, 11.V.2000, leg. Меувонм (cAss); 1 ex. [macropterous], Manavgat env., Kızılot, 100 m , litter of oak and shrubs, 4.I.1991, leg. Assing (cAss); 1 ex. [macropterous], Manavgat, VI.1989, leg. LundBerg (cWun); 1 ex. [macropterous], Manavgat, Side, VI.1989, at light, leg. Lundberg (cWun); 1 ex., Antalya-Kemer, 4.V.1975, leg. Besuchet \& Löbl (MHNG). - Konya: 1 ex., 50 km S Beyşehir, Bakaran, 1400 m , under stones, 7.V.1978, leg. Besuchet \& Löbl (cAss); 1 ex. [macropterous], 15 km NW Ereğli, Ereğli swamps, 1000 m , steppe and flood plain, 2.VI.1993, leg. Schulz (cAss). - Mersin: 1 ex., Çamlıyayla, 10.V.-3.VI.1963, leg. Schubert (cAss); 1 ex., S Yeniköy, $1000-1200 \mathrm{~m}, 29 . \mathrm{IV} .1978$, leg. Besuchet \& Löbl (MHNG); 1 ex., locality not specified (MNHUB). - Adana: 2 exs., ca. 100 km SE Kayseri, 6 km W Küzükgezbeli, 1700 m , 10.V.1997, leg. Schulz, Vock \& Sanetra (cAss); 1 ex., Adana, 1906 (NHMW); 25 exs. [all macropterous], Adana, 4.VI.1934, leg. Neubert (MCSNM, NHMW). - Osmaniye: 4 exs. [macropterous], Osmaniye, $300 \mathrm{~m}, \mathrm{VI} .1968$, leg. Schubert (cAss). - Antakya: 1 ex., Akbez (SMTD); 1 ex., ca. 10 km ENE Yayladağ1, Güveççi, 29.IV. 2007 (cAnl). - Kahramanmaraş: 2 exs., 50 km W Kahramanmaraş, 8 km SE Andırın, $37^{\circ} 35^{\prime} \mathrm{N}, 36^{\circ} 25^{\prime} \mathrm{E}, 1180 \mathrm{~m}$, field margin, under stone, 19.III.2005, leg. Assing, Wunderle (cAss, cWun); 1 ex., Elbistan, 26.V.-6.VI.1965, leg. Schubert (cAss); 4 exs. [ 1 ex. macropterous], S Tekir, $900-1400 \mathrm{~m}$, 5.V.1978, leg. Besuchet \& Löbl (MHNG). - Adıyaman: 1 ex., Nemrut Dağ1, 1800 m, 13.-15.V.1997, leg. SAMA (SMNS). - Bitlis: 1 ex., Tatvan, $1800 \mathrm{~m}, 1971$, leg. Schubert (NHMW). - Locality not specified: 1 ex. [macropterous], "Taurus Lyciae" (NHMW); 1 ex., "Turcia" (HNHM); 2 exs. [macropterous], "Asia min.", "Asia minor" (NHMW, SMF).

Lebanon: 1 ex., Laklouk [ $34^{\circ} 10^{\prime} \mathrm{N}, 5^{\circ} 53^{\prime} \mathrm{E}$ ], $1500-1800 \mathrm{~m}$, V.1964, leg. Fagel (IRSNB); 2 exs. [macropterous], Nahr el Kelb, V.1964, leg. Fagel (IRSNB).

Israel: 5 exs. [macropterous], Haifa, leg. Simon (NHMW, cAss); 1 ex., Tel Aviv, 1.II.1978, leg. Kaplan (TAU); 1 ex. [macropterous], 1 km W Hasolelim, 31.VII.2001, leg. Orbach (TAU); 1 ex. [macropterous], N Oren, light trap, 4.VI.1999, leg. Chikatunov \& Pavliček (cAss); 1 ex. [macropterous], Tel Kazir, 6.VIII.1956, leg. Wahrman (TAU); 1 ex. [macropterous], Nizzanim, 27.VII.1959, leg. Ginzburg (TAU); 2 exs. [macropterous], same data, but 24.VII. 1959 (TAU); 1 ex. [macropterous], Nizzanim, 9.VI.1998, leg. Friedman (TAU); 1 ex. [macropterous], Ne'ot-HaKikkar, light trap, 16.VII.1999, leg. Yarom \& Kravchenко (TAU); 1 ex. [macropterous], Kokhav Ha Yarden, 29.VII.2002, leg. Kravchenko \& Chikatunov (TAU); 1 ex. [macropterous], Hare Desle [?], 30.VI.1974, leg. Kaplan (TAU); 1 ex. [macropterous], Merom Golan, Bental reservoir, $33^{\circ} 08^{\prime} \mathrm{N}, 35^{\circ} 47^{\prime} \mathrm{E}$, 9.V.2006, leg. Friedman (TAU); 2 exs. [macropterous], Golan Heights, W Merom Golan, Bental reservoir, 1000 m , stony wetland near shore, 30.IV.2006, leg. Wrase (cSch, cAss); 1 ex. [macropterous], "Palaestina", leg. Reitter (HNHM).

Ukraine: 7 exs. [1 ex. macropterous], Odessa env., 8 km SSE Iljinka, right bank of Kuyalnik liman, opposite Protopopovka, under stones, 5.X.2001, leg. Gontarenko (cGon, cAss); 2 exs. [ 1 ex. teneral], same data, but 6.X. 2002 (cGon); 1 ex. [macropterous], same data, but 18.IV. 2004 (cGon); 4 exs. [1 ex. macropterous], same data, but 17.VI. 2004 (cGon, cAss); 1 ex. [macropterous], same data, but 15.VI. 2004 (cAss).

Locality illegible or not indicated: 5 exs. [2 exs. macropterous] (IRSNB, MNHUB).

Identification doubtful [possibly referring to M. pallidus]: 1 f [macropterous], Armenia, Verin Dzhrashen ["Aresch", $\left.40^{\circ} 03^{\prime} \mathrm{N}, 44^{\circ} 30^{\prime} \mathrm{E}\right]$, leg. Schelkownikov (NHMW); 1 甲 [macropterous], Verin Dzhrashen (IRSNB); 1 \& [macropterous], Azerbaijan, Geok Tapa (IRSNB); 1 \& [teneral], Turkmenistan, "Dortkuju" [ca. $\left.37^{\circ} 37^{\prime} \mathrm{N}, 61^{\circ} 14^{\prime} \mathrm{E}\right]$, V.1900, leg. Hauser (NHMW).

## Comments

All the examined type specimens were measured and the primary sexual characters of male holotypes were studied.

Erichson (1840) based the original description of Scymbalium testaceum on an unspecified number of syntypes collected in "Sicilia" by "Dom. Dr. Schultz". Two syntypes - a male and a female, both brachypterous and of rufous coloration - were found in the historical collection at the MNHUB. The male is here designated as the lectotype.

The original description of Scymbalium grandiceps is based on two syntypes from the surroundings of Montpellier, southwestern France (Jacquelin Du val 1853). The types were looked for, but not found at the MNHNP, where the collection of Jacquelin Du val is deposited (Horn et al. 1990). However, the original description gives no evidence that it should not refer to a species of Micrillus and, since $M$. testaceus is the only species of the genus occurring in southern France, from where numerous specimens were examined, there is no doubt that the types are conspecific with M. testaceus. Scymbalium grandiceps was listed as a synonym of M. testaceus already by Bernhauer \& Schubert (1912), but was later revalidated (Coiffait 1980, 1982; Smetana 2004).

Mulsant \& Rey (1853) described Scymbalium longicolle based on an unspecified number of syntypes collected in "Hyères. Mars, Avril; sous les pierres, au bord des salines". The name was previously listed as a synonym of either M. testaceus or M. grandiceps (Bernhauer \& Schubert 1912; Coiffait 1980, 1982; Smetana 2004). The type material was not examined, but the original description leaves no doubt that it refers to M. testaceus, the only representative of the genus occurring in southern France.

Scymbalium pubipenne was originally described from an unspecified number of syntypes from "Bone", Algeria (Fairmaire 1860). The type material was not found at the MNHNP, where the Fairmaire collection is deposited (Horn et al. 1990). However, the original description leaves no doubt that it refers to $M$. testaceus, one of the two species of the genus with functioning eyes occurring in Algeria. Also, several specimens of $M$. testaceus collected in or near Bône were examined (see the following section).

The original description of Scymbalium longipenne is based on an unspecified number of syntypes from "Béziers", southern France (Brisout de Barneville 1863). The type material was not found at the MNHNP, but it is doubtlessly conspecific with $M$. testaceus, as can be inferred from the original description and the fact that $M$. testaceus is the only species of the genus present in southern France. Previously, S. longipenne was regarded as a synonym of M. pubipennis (Bernhauer \& Schubert 1912; Smetana 2004).

The syntype material of Achenium saintpierrei, which was collected in "Oran" (Allard 1869), was not found in the collections of the MNHNP. The name has been regarded as a junior synonym of $M$. testaceus since the $19^{\text {th }}$ century (Fauvel 1886; Bernhauer \& Schubert 1912; Coiffait 1980, 1982; Smetana 2004). The original description gives no evidence that it should not refer to $M$. testaceus, whose distribution also includes Algeria, so that there is little doubt that the previously established synonymy is correct.

The original description of Lithocharis trapezicollis is based on four syntypes from the surroundings of Badajoz and Olivenza, Estremadura, Spain (Uhagón 1876). The type material was not found at the MNHNP, where, according to Horn et al. (1990), it should be deposited. The name was already treated as a synonym of $M$. testaceus by Bernhauer \& Schubert (1912) and subsequent authors. Micrillus testaceus is the only representative of the genus present in Spain and the original description provides no evidence suggesting that the type specimens should not be conspecific with this species.

The original description of Schatzmayria meridionalis is based on two damaged syntypes, a male and a female, from "Lissabon (Portugal)" and an undamaged male syntype from "Gimino (Calabrien)" "in der Sammlung des Herrn Franz Tax in Graz" (Gridelli 1914). One of the damaged syntypes was found in the collections of the MCSNM; it is conspecific with M. testaceus. Since the abdominal apex including the aedeagus is missing and there is a chance that the syntype from the TAX collection may eventually become available, a lectotype designation is here refrained from.

Schatzmayria tergestina, whose original description is based on a single specimen from "Noghera bei Triest" (Gridelli 1914), was subsequently synonymised with $M$. pubipennis by Gridell (1921). The holotype, a macropterous female of $M$. testaceus, was discovered among the non-type material from the MCSNM. Apparently, after becoming aware of the synonymy of S. tergestina, Gridelli removed the type label and replaced it with an identification label giving "S. pubipenne Fairm.".

Based on a single specimen ("Ein einzelnes Exemplar") from "Kleinasien (Adana)", Wanka (1914) described Scymbalium zuercheri ("Scimbalium Zürcheri"). The specimen is a macropterous female and conspecific with M. testaceus.

The original description of M. calabricus is based on a single female from "Italie, Calabre, Gerace, Paganetti leg." (Coiffait 1980). The specimen is a reddish coloured brachypterous specimen of $M$. testaceus.

The original description of M. corcyranus is based on a male holotype, as well as on four male and one female paratypes from "Corfou" (Coiffait 1980). Based on their external morphology and on the similar male sexual char-
acters, the examined type specimens, including the holotype, are conspecific with M. testaceus. All of them are of dark coloration; three paratypes are macropterous. According to Coiffait (1980), the type material is deposited in his collection and in the collection of the British museum. Remarkably, the paratypes in the British museum were originally identified by Coiffait as $M$. graecus. It seems that he decided to describe M. corcyranus only after he had returned the specimens to London.

The original description of M. cypriacus is based on a single male from "Chypre, Larnaka" (Coiffart 1980). The brachypterous specimen was examined and both its external and its sexual characters leave no doubt that it is conspecific with M. testaceus.

Coiffait (1980) described M. graecus based on the female holotype and two female paratypes from "Grèce, Attique", as well as on one female paratype from "Grèce sans autre précision". In every respect, the type material is within the range of intraspecific variation of $M$. testaceus.

The female holotype of M. hispanicus is a darkcoloured macropterous specimen of M. testaceus.

The holotype of M. libanicus is a rather large dark macropterous male and doubtlessly conspecific with $M$. testaceus.

Micrillus syriacus was described from a single male from "Syrie, Hermon, Djebel Cheik" (Coiffart 1980). The holotype is a brachypterous specimen of M. testaceus.

The original description of M. turcicus is based on a single female from "Anatolie septentrionale: Trabzon" (Coiffait 1980). The locality written on the label, however, is illegible. The holotype doubtlessly refers to $M$. testaceus.

The holotype of M. zacinthicus is a macropterous male of $M$. testaceus.

According to Article 45.6.3 of the ICZN (1999), M. pubipennis var. brevipennis Coiffait, 1980 is not available. The "types" were studied and proved to refer to M. testaceus; the specimens are listed below as additional material (see Morocco and Gibraltar).

The original description of $M$. brekhovi is based on a single male from Volgograd province, Kalachevskiy district, south of Bolshaya Bolubaya river, Naydenova ravine [ca. $50^{\circ} 32^{\prime} \mathrm{N}, 42^{\circ} 59^{\prime} \mathrm{E}$ ]. The brachypterous specimen is in every respect an average example of $M$. testaceus.

## Redescription

Measurements (inmm) and ratios (range, arithmetic mean; $\mathrm{n}=330$ ): AL: 1.68-2.68, 2.16; EyL (brachypterous morph): 0.10-0.20, 0.16; EyL (macropterous morph): $0.15-0.23,0.19$; POL (brachypterous morph): 0.36-0.60, 0.46 ; POL (macropterous morph): 0.33-0.56, 0.43 ; HL: $0.70-1.09,0.88$; HW: 0.69-1.09, 0.87; PW: 0.68-1.01, 0.81; PL: 0.74-1.09, 0.91; EL (brachypterous morph): 0.63-0.91,


Figs. 3-15. Micrillus testaceus (Erichson). - 3. Habitus. 4-9. Forebody of brachypterous (4-7) and macropterous (8-9) specimens from Spain (4), Crete (5), Turkey (6-8), and Ukraine (9). 10. Antenna. 11. Abdomen. 12. Male sternite VII. 13. Male sternite VIII. 14. Female sternite VIII. 15. Internal structures of aedeagus. - Scale bars: $1.0 \mathrm{~mm}(3-11), 0.5 \mathrm{~mm}(12-14), 0.1 \mathrm{~mm}(15)$.
0.76; EL (macropterous morph): 0.76-1.03, 0.89; TiL: $0.65-1.03,0.81$; TaL: $0.54-0.88,0.71$; ML: 0.76-0.97, 0.84; TL: 4.2-6.9, 5.4; EyL/POL (brachypterous morph): $0.23-0.44,0.34 ; \mathrm{EyL} / \mathrm{POL}$ (macropterous morph): 0.35-0.55, 0.44; HL/HW: 0.95-1.09, 1.01; PW/HW: 0.87-1.01, 0.94; PL/PW: 1.07-1.18, 1.12; EL/PL (brachypterous morph): 0.68-0.93, 0.83; EL/PL (macropterous morph): 0.91-1.06, 0.99; TiL/TaL: 1.02-1.33, 1.15.

Habitus as in Fig. 3. Highly variable species. Coloration variable, ranging from almost uniformly reddish or reddish brown to almost black with (usually) somewhat paler (dark reddish to brown) elytra and appendages; tarsomeres V almost always somewhat paler than I-IV.

Head of variable shape, weakly oblong to weakly transverse (see ratio HL/HW); posterior margin not distinctly concave in the middle; dorsal surface with usually


Figs. 16-26. Micrillus testaceus (Erichson). - 16-22. Aedeagus of males from Spain (16-17), Italy (18-20), Turkey (21), and Greece (22) in lateral view. 23-25. Aedeagus of males from Italy (23-24) and Greece (25) in ventral view. 26. Apex of aedeagus in lateral view. - Scale bars: $0.2 \mathrm{~mm}(16-25), 0.1 \mathrm{~mm}(26)$.
distinct transverse microsculpture and with rather sparse punctures of variable size; interstices much wider than diameter of punctures (Figs. 4-9); eyes of variable size, larger in relation to postgenae and to body size in macropterous than in brachypterous specimens (see ratios EyL/POL). Antenna as in Fig. 10. Maxillary palpus slender, apical joint very long and slender, more than half the length of preapical joint and weakly conical.

Pronotum of variable shape and relative width, mostly somewhat narrower than head, but occasionally as wide as
or even slightly wider than head (see ratio PW/HW); weakly to moderately oblong (see ratio PL/PW) and moderately tapering posteriad; posterior margin usually weakly concave, occasionally truncate; puncturation similar to that of head, but denser; along midline without punctures; microsculpture absent (Figs. 4-9).

Elytra of variable length, longer and more convex (cross-section) in macropterous (Figs. 8-9) than in brachypterous specimens (see measurements and ratio EL/ PL), in brachypterous specimens usually more or less flat-
tened (Figs. 4-7) or even weakly impressed; humeral angles well marked, also in brachypterous specimens; puncturation dense, shallow, and irregular, sometimes weakly granulose; surface with weak shine; microsculpture present or absent. Hind wings dimorphic, either almost completely reduced or fully developed.

Legs of rather variable length (see measurements and ratio $\mathrm{TiL} / \mathrm{TaL}$ ); metatarsomere I approximately as long as the combined length of II + III or slightly shorter. Protarsi without sexual dimorphism.

Abdomen slightly wider than (brachypterous morph) to approximately as wide as elytra (macropterous morph), widest at segments V-VI; puncturation fine and very dense on tergites III-VI, slightly to distinctly less dense on tergites VII-VIII; interstices with shallow transverse microsculpture; posterior margin of tergite VII with palisade fringe (Fig. 11).
$\delta^{\text {J }}$ : sternite VII not distinctly modified, its posterior margin weakly concave (Fig. 12); sternite VIII posteriorly triangularly excised (Fig. 13); segments IX and X similar to those of M. scabrosus (cf. Fig. 40), valvulae of segment IX more than twice as long as tergite X ; aedeagus of somewhat variable size (see measurements), weakly sclerotised, apically slender, acute (ventral view), and almost hook-shaped (lateral view) (Figs. 15-26).

+ : posterior margin of sternite VIII truncate (Fig. 14); segments IX and X similar to those of male.

Intraspecific variation
Maximum/minimum ratios: AL: 1.60; EyL (total): 2.38; EyL (brachypterous morph): 2.00; EyL (macropterous morph): 1.55; POL (total): 1.82; POL (brachypterous morph): 1.67; POL (macropterous morph): 1.68; HL: 1.55; HW: 1.57; PW: 1.49; PL: 1.44; EL (brachypterous morph): 1.43; EL (macropterous morph): 1.36; TiL: 1.58; TaL: 1.65; ML: 1.28; TL: 1.65; EyL/POL (brachypterous morph): 1.88; EyL/POL (macropterous morph): 1.57 ; HL/HW: 1.15; PW/ HW: 1.17; PL/PW: 1.10; EL/PL (brachypterous morph): 1.36 ; EL/PL (macropterous morph): 1.17; TiL/TaL: 1.30 .

Virtually all characters are subject to enormous intraspecific variation; this particularly applies to the coloration, all size-related parameters (see maximum/minimum ratios), and puncturation.

Specimens of predominantly reddish brown coloration were observed especially in material from southern Italy (including Sicilia) and Crete, whereas beetles from southern France, northern Italy, Greece (except Crete), and most parts of Turkey is mostly of dark coloration. Both colour morphs were observed in material from North Africa, certain regions of Italy (Emilia, Calabria, Sardinia), Spain, eastern Turkey (Adiyaman), and Israel. Macropterous specimens are usually of dark coloration.

In the material examined, $64.6 \%$ (312 exs.) of the specimens are brachypterous and $35.4 \%$ ( 171 exs.) are macropterous. The latter morph is present in the whole


Fig. 27. Micrillus testaceus (Erichson). Relative eye size (EyL/POL) in relation to body size.


Fig. 28. Micrillus testaceus (Erichson). Relative elytral length (EL/PL) in relation to body size.
range of distribution, but was usually found less frequently than the brachypterous morph; the lowest proportion was observed in the material from Crete (all 18 specimens brachypterous). On the other hand, there are exceptions: the macropterous morph was predominant in the material from Algeria ( 16 macropterous/ 0 brachypterous), Morocco (6/4), Zakinthos (18/2), Turkey (41/34), Lebanon (2/1), and Israel (19/1). However, the possibility that these figures are - at least partly - due to a bias resulting from the application of certain sampling methods (e.g. light traps) cannot be ruled out.

Apart from the darker average coloration and the fully developed hind wings, the macropterous morph is distinguished from the brachypterous morph by smaller eyes (little overlap), as well as by less flattened and longer elytra (Figs. 4-8); both relative eye size and relative elytral length are independent of body size (Figs. 27-28).

Body size is extremely variable, but independent of wing development (Figs. 27-28). The largest specimens were observed in the material from Spain, whereas specimens from the Balkans are mostly closer to the lower end of the size range (Fig. 29).

Pronounced intraspecific variation was observed regarding the relative size of the head, which explains why this character is emphasised in the original descriptions of several of the junior synonyms of $M$. testaceus. The heads of specimens from the Balkans, southern France, and Italy
are - on average - larger (in relation to body size), whereas those of material from Spain and North Africa tend to be smaller (Fig. 29).

Another character repeatedly referred to in the original descriptions is the shape of the head. As can be inferred from Fig. 30, however, no significant clinal trends can be observed, apart from the observation that heads of the specimens from Ukraine tend to be less slender than average. Generally, this character is highly variable in all parts of the range of the distribution.

Differences in the size of the aedeagus are mainly an expression of allometric variation (Fig. 31). The variability of the shape of the aedeagus is illustrated in Figs. 16-25.

## Comparative notes

The species is distinguished from all its congeners especially by the morphology of the aedeagus, from the externally similar M. pallidus, M. irakensis, and M. scabrosus also by the usually darker coloration. A separation of pale-coloured macropterous females from M. pallidus, which is always macropterous, is generally difficult. From M. irakensis, however, M. testaceus is readily distinguished especially by the more or less truncate posterior margin of the head (in M. irakensis distinctly concave in the middle). For additional characters separating M. testaceus and M. scabrosus from northern Morocco, whose


Fig. 29. Micrillus testaceus (Erichson). Relative head size in relation to body size (Spain: including Gibraltar; Middle East: including Turkey, Cyprus, Lebanon, Syria, Israel).


Fig. 30. Micrillus testaceus (Erichson). Head shape (HL/HW) in relation to body size (Spain: including Gibraltar; Middle East: including Turkey, Cyprus, Lebanon, Syria, Israel).


Fig. 31. Micrillus testaceus (Erichson). Length of aedeagus (ML) in relation to body size (Spain: including Gibraltar; Middle East: including Turkey, Cyprus, Lebanon, Syria, Israel).
aedeagus is somewhat similar, see the comparative notes in the following section.

## Distribution and bionomics

M. testaceus is widespread in practically all of the Mediterranean region, its distribution extending to the northeast into Ukraine and the Russian South European territory (Fig. 32). According to Smetana (2004), the species (including all its synonyms) was previously unknown from Croatia, Bosnia-Herzegovina, Yugoslavia (Montenegro), and Israel.

Little is known about the habitat requirements. Most of the material either collected by the author or with specified data on the labels was found in unforested habitats such as pastures, meadows, field margins, floodplains, river banks (occasionally also in flood debris), partly also in saline habitats (beaches, Salicornia vegetation), and in habitats with scattered tree and shrub vegetation (olive and oak groves). The vast majority of specimens was found under stones. This, as well as the rarity of records and the flattened body suggest that the species primarily inhabits subterranean crevices. The altitudes range from $0-1800 \mathrm{~m}$, but most of the records are apparently from lower and intermediate altitudes.

Adult beetles have been collected throughout the year, with the lowest number of records during summer (JulySeptember) and a maximum in late winter and spring
(Fig. 33). Teneral specimens were observed in October, suggesting that pre-imaginal development takes place in spring and summer. Based on the evidence available, dispersal by flight occurs in late spring and early summer. On several occasions, beetles were collected with light traps in June and July, and one macropterous specimen was swept from vegetation in May.

### 3.2.2 Micrillus scabrosus (Fauvel, 1875)

(Figs. 34-47, 56-57)
Scymbalium scabrosum Fauvel, 1875: XXIII.
Type material examined
Lectotype ${ }^{\lambda}$, here designated: "Tanger, inond. / scabrosum Fvl. / R. I. Sc. N. B. 17479 Coll. et det. A. Fauvel / Ex-Typis / Lectotypus ơ Scymbalium scabrosum Fauvel desig. V. Assing 2007 / Micrillus scabrosus (Fauvel) det. V. Assing 2007" (IRSNB). - Paralectotypes: 2 ㅇq: same data as lectotype [on same pin as lectotype] (IRSNB); $1+$ : same data as lectotype (IRSNB).

Additional material examined (total, including types: 89 exs.)
Morocco: 11 exs., Tanger, Al-Hakkama, $35^{\circ} 38^{\prime} \mathrm{N}, 05^{\circ} 41^{\prime} \mathrm{W}$, 100 m , arable land, 26.II.2004, leg. Assmann, Starke, Wrase (cAss, cFel, cSch); 1 ex., 35 km NW Meknès, Barrage d'ElKansera, fallow land, 16.II.1999, leg. Wrase (cSch); 1 ex., Tétouan, ca. 4 km E Tétouan, debouchure of Oued Hajera, fields


Fig. 32. Micrillus testaceus (Erichson). Distribution based on examined records; doubtful records are omitted.
and fallows, 15.II.2003, leg. Wrase (cSch); 1 ex., Tétouan (IRSNB); 4 exs., Cap Malabata, 28.XII.1977, leg. Minet (cTro); 1 ex., Arsila [ $35^{\circ} 28^{\prime} \mathrm{N}, 6^{\circ} 02^{\prime} \mathrm{W}$ ] (HNHM); 22 exs., Tanger, leg. Escalera, Kraatz, Lewis, Quedenfeldt, Walker (BMNH, IRSNB, MNCN, MNHUB, NHMW); 30 exs., Tanger (BMNH, HNHM, IRSNB, MCSNM, MNCN, MNHUB, NHMW); 1 ex., Esmir (IRSNB); 12 exs., locality not specified (BMNH, IRSNB, NHMW).

Locality not indicated: 1 ex. (IRSNB).

## Comments

The original description is based on an unspecified number of syntypes from "Tanger (Olcese)" (Fauvel 1875). Four syntypes, a male and three females were found in the Fauvel collection. The male is here designated as the lectotype.

## Redescription

Measurements (inmm) and ratios (range, arithmetic mean; $\mathrm{n}=33$ ): AL: 1.92-2.90, 2.67; EyL: 0.12-0.18, 0.15; POL: 0.47-0.68, 0.58; HL: 0.86-1.16, 1.05; HW: 0.85-1.18, 1.04; PW: 0.83-1.03, 0.96; PL: 0.90-1.14, 1.07; EL: 0.76-0.91, 0.83; TiL: 0.80-1.12, 1.02; TaL: 0.82-0.97, 0.90;

ML: 0.76-0.83, 0.80; TL: 5.4-7.5, 6.5; EyL/POL: 0.21-0.33, 0.27; HL/HW: 0.97-1.05, 1.01; PW/HW: 0.87-1.00, 0.93; PL/PW: 1.07-1.16, 1.11; EL/PL: 0.72-0.89, 0.78; TiL/TaL: 1.08-1.19, 1.14.

Habitus as in Fig. 34. Coloration reddish to reddish brown, often with abdominal segments III-V or III-VI slightly infuscate; legs dark yellowish to yellowish brown, tarsomeres V usually pale yellowish; antennae rufous.

Head of somewhat variable shape, weakly oblong to weakly transverse (see ratio $\mathrm{HL} / \mathrm{HW}$ ); puncturation in lateral and posterior dorsal area rather coarse and dense, on average distinctly more so than in M. testaceus; middle of dorsal area with sparse and finer punctures, often almost impunctate (Fig. 35); whole surface with distinct microsculpture composed predominantly of transverse meshes; eyes on average smaller than in brachypterous $M$. testaceus (Fig. 38), weakly protruding from lateral contours of head in dorsal view. Antenna similar to that of $M$. testaceus, but longer (Fig. 36). Maxillary palpus of similar morphology as in M. testaceus, apical joint very long and slender, more than half the length of preapical joint and weakly conical (Fig. 39).


Fig. 33. Micrillus testaceus (Erichson). Seasonal distribution of the examined specimens (black bars) and samples/records (grey bars).

Pronotum as wide as head or slightly narrower, rather weakly oblong (see ratios PW/HW and PL/PW), and moderately tapering caudad; posterior margin truncate or weakly concave; puncturation rather dense and fine, much finer than that of head (Fig. 35); interstices on average approximately 1.5-2.0 times as wide as punctures; midline impunctate; microsculpture absent.

Elytra at suture distinctly shorter than pronotum (see ratio EL/PL and Fig. 35); dorsal surface somewhat depressed; puncturation conspicuously dense and moderately coarse, more so than that of pronotum, but finer than that of head; interstices on average as wide as punctures or narrower; microsculpture absent. Hind wings reduced.

Legs slender; metatarsomere I usually somewhat longer than the combined length of II $+I I I$, but shorter than the combined length of II-IV.

Abdomen approximately 1.2 times as wide as elytra, widest at segments V-VI; puncturation on tergites III-VI rather coarse, coarser than in M. testaceus, and somewhat granulose (Fig. 37); puncturation on tergites VII-VIII finer; interstices with microsculpture; posterior margin of tergite VII with narrow rudiment of a palisade fringe.
$\delta^{\text {n }}$ : sternite VII as in M. testaceus; posterior margin of sternite VIII shallowly triangularly excised (Fig. 56); segments IX and X similar to those of $M$. testaceus, valvulae
of segment IX more than twice as long as tergite X (Fig. 40); aedeagus of similar morphology as in M. testaceus, but broader in ventral view, with more strongly sclerotised apex, and internal structures of slightly different shape (Figs. 41-46, 57).

## Intraspecific variation

Maximum/minimum ratios: AL: 1.51; EyL: 1.50; POL: 1.45; HL: 1.35; HW: 1.39; PW: 1.24; PL: 1.27; EL: 1.20; TiL: 1.40; TaL: 1.19; ML: 1.10; TL: 1.40; EyL/POL: 1.57; HL/HW: 1.08; PW/HW: 1.15; PL/PW: 1.08; EL/PL: 1.23; TiL/TaL: 1.11.

Especially the absolute and relative size of the eyes, the length of the antennae, and the length of the metatibiae are subject to pronounced intraspecific variation.

## Comparative notes

Based on the highly similar morphology of the male primary and secondary sexual characters, as well as on external characters, there is little doubt that M. scabrosus is closely related to the variable $M$. testaceus, from which it is distinguished by larger average size, longer antennae, on average smaller eyes, coarser and - except for the elytra - denser puncturation of head, elytra, and abdomen, the


Figs. 34-46. Micrillus scabrosus (Fauvel). - 34. Habitus. 35. Forebody. 36. Antenna. 37. Abdomen. 38. Head in lateral view. 39. Apical palpomeres of maxillary palpus. 40. Male abdominal segments IX-X. 41-44. Aedeagus in lateral and ventral view. 45-46. Apex of aedeagus in lateral view. - Scale bars: $1.0 \mathrm{~mm}(34-37), 0.5 \mathrm{~mm}(38,40-44), 0.2 \mathrm{~mm}(39), 0.1 \mathrm{~mm}(45-46)$.
absence of a dimorphism of the elytra and the hind wings, the finer palisade fringe at the posterior margin of tergite VII, the less deep posterior incision of the male sternite VIII, as well as by the broader (ventral view) and apically more distinctly sclerotised aedeagus. From M. tenuipennis, the only other Micrillus species occurring in Morocco, it is readily distinguished by the presence of larger eyes with distinct ommatidia.

Distribution and bionomics
The species is endemic to northern Morocco (Fig. 47). The specimens with labels specifying ecological data were collected in arable land (fallows, fields) under stones. All the localities are situated at rather low elevations. The recently collected material was found in February and December. Fauvel (1902) also reports a record from January.


Fig. 47. Distributions of Micrillus scabrosus (Fauvel) (©), M. subterraneus Raffray (O), M. hypogaeus (Peyerimhoff) ( $\square$ ), M. tenuipennis n.sp. (■), and M. biskrensis (Fauvel) (■) in Northwest Africa, based on examined records.

### 3.2.3 Micrillus pallidus (Reitter, 1887)

(Figs. 48-55, 58)

Scymbalium pallidum Reitter, 1887: 262.
Scymbalium rufotestaceum CAMERON, 1939: 162; synonymy confirmed.
Micrillus caucasicus Coiffait, 1980: 152 ff.; n. syn.
Type material examined
S. pallidum: Holotype $\begin{gathered}\lambda \\ \text { [dissected prior to present study]: }\end{gathered}$ "coll. Reitter / Monotypus [sic] Scymbalium pallidum Reitter, 1887 [curator label] / Scimbalium pallidum m. n.sp. Turcm. / Holotypus Scimbalium pallidum Reitter V. Gusarov rev. 1996 / Micrillus pallidus (Reitter) V. I. Gusarov det. 1995 / Micrillus pallidus (Reitter) det. V. Assing 2007" (HNHM).
S. rufotestaceum: Syntype $\circ$ : "Cotype / Kiva [in Cyrillic] Pasar, 3.V. [collector in Cyrillic], C. Asia Khiva / Scimbalium rufotestaceum Cam. Cotype / = pallidus Reitt. comparé au type de pallidus H. Coiffait det. 1970 / Micrillus pallidus (Reitter) det. V. Assing 2007" (BMNH).
M. caucasicus: Holotype ơ: "Aresch, Caucasus, ex Schelkownikow / Holotype / Micrillus caucasicus H. Coiffait 1979 / Muséum Paris / Micrillus pallidus (Reitter) det. V. Assing 2007" (MNHNP). - Paratypes: 1 §', 1 ㅇ: "Aresch Caucase / Museum Paris Coll. J. Jarrige / Allotype [sic] / Micrillus caucasicus H. Coiffait 1979 / Micrillus pallidus (Reitter) det. V. Assing 2007" (MNHNP); 1 万: "Caucase Mesmm / Scimbalium pallidum / Paratype / Micrillus caucasicus H. Coiffait 1979 / Micrillus pallidus (Reitter) det. V. Assing 2007" (MNHNP).

Additional material examined (total, including types: 131 exs.)
Armenia: 12 exs., Verin Dzhrashen ["Aresch"], leg. Schelkownikov (IRSNB, NHMW, cAss); 14 exs., Verin Dzhrashen (DEI, IRSNB, SMF, SMTD, cAss).

Azerbaijan: 1 ex., Geoktepe ["Gök-Tepe", $\left.40^{\circ} 05^{\prime} \mathrm{N}, 46^{\circ} 58^{\prime} \mathrm{E}\right]$ (DEI); 1 ex., Geok Tapa [ $\left.39^{\circ} 11^{\prime} \mathrm{N}, 48^{\circ} 41^{\prime} \mathrm{E}\right]$, leg. Schelkownikow (IRSNB); 6 exs., Geok Tapa (IRSNB); 3 exs., Gyandzha (= Kirovabad) ["Elisabethpol"] (NHMW).

Russian Federation: 1 q, Krasnodar, Uch-Dere ["UtschDere", $\left.43^{\circ} 40^{\prime} \mathrm{N}, 39^{\circ} 37^{\prime} \mathrm{E}\right]$ (NHMW).

Turkmenistan: 1 ex., Baïram-Ali [= Bayramaly], 11.-24.V. 1959 (IRSNB); 3 exs., Mary ["Merw"], IV.1900, leg. Hauser (NHMW, cAss); 9 exs., "Dortkuju" [ca. $37^{\circ} 37^{\prime} \mathrm{N}$, $\left.61^{\circ} 14^{\prime} \mathrm{E}\right]$, IV.1900, leg. Hauser (DEI, MNHUB, NHMW, cAss); 3 exs., same data, but V. 1900 (MNHUB, NHMW); 45 exs., Tedshen (IRSNB, MNHUB, cAss); 2 exs., Ashchabad, leg. Hauser (DEI, NHMW).

Uzbekistan: 1 ex., Buchara, leg. Hauser (NHMW).
Locality not specified or not identified: 16 exs., "Caucasus", "Caucas." etc. (DEI, IRSNB, SMF); 1 ex., "Tetschler, Transcasp." (SMF); 4 exs., "Transcaspia", leg. Aris (DEI); 2 exs. (IRSNB).

## Comments

Some of the material of $S$. pallidum in the Fauvel collection at the IRSNB is labelled "Ex-Typis". However, since the original description of $S$. pallidum is based on a
single specimen ("ein einzelnes Exemplar") from "Turcmenien" (Reitter 1887), they do not have type status.

CAMERON (1939) based the original description of Scymbalium rufotestaceum on an unspecified number of syntypes from "Khiva (Zimin)", only one of which was found in the Cameron collection. Since it is a female, it is not designated as the lectotype. The synonymy of S. rufotestaceum with Micrillus pallidus is here confirmed.

The original description of M. caucasicus is based on a male holotype and two female paratypes from "Caucase, Aresh", a male paratype from "Caucase (sans autre précision)", and a female paratype from "Transcaucasie, Geok Tapa" (Coiffait 1980). An examination of the holotype and three paratypes yielded no evidence whatsoever that they should be specifically distinct from M. pallidus. On the contrary, they represent rather average examples of the species. Consequently, M. caucasicus Coiffait is here placed in the synonymy of the senior name M. pallidus.

## Redescription

Measurements (in mm) and ratios (range, arithmetic mean; $\mathrm{n}=17$ ): AL: 1.77-2.04, 1.91; EyL: $0.13-0.20,0.17$; POL: $0.33-0.45,0.39$; HL: $0.71-0.85,0.79$; HW: $0.65-0.82$, 0.75 ; PW: $0.63-0.76,0.70$; PL: $0.77-0.89,0.84$; EL: $0.72-0.85,0.78$; TiL: $0.66-0.79,0.72$; TaL: $0.59-0.68,0.63$; ML: 0.60-0.68, 0.63; TL: 4.2-5.3, 4.7; EyL/POL: 0.37-0.55, 0.44; HL/HW: 1.01-1.09, 1.05; PW/HW: 0.91-1.00, 0.94; PL/PW: 1.15-1.22, 1.19; EL/PL: 0.91-0.98, 0.94; TiL/TaL: 1.09-1.17, 1.13.

Coloration almost uniformly yellowish to reddish yellow, with the appendages and the elytra pale yellowish.

Head weakly oblong (see ratio HL/HW and Figs. 4849), of similar shape, puncturation, and microsculpture as in M. testaceus; posterior margin not distinctly concave; eyes approximately of similar relative size as in the macropterous morph of M. testaceus. Antenna and maxillary palpus as in M. testaceus.

Pronotum slightly narrower than head and distinctly oblong (see ratios PW/HW and PL/PW), weakly tapering posteriad (Figs. 48-49); posterior margin truncate or weakly concave in the middle; puncturation finer and distinctly denser than that of head; microsculpture absent.

Elytra at suture slightly shorter than pronotum (see ratio EL/PL); humeral angles pronounced; puncturation fine and dense (Figs. 48-49). Hind wings fully developed.

Legs of similar morphology as in M. testaceus.
Abdomen approximately as wide as or slightly wider than elytra, widest at segments V-VI; puncturation very fine and extremely dense, slightly less dense on tergites VII and VIII than on anterior tergites; interstices with microsculpture; posterior margin of tergite VII with palisade fringe.
$\sigma^{\top}$ : sternite VII as in M. testaceus; posterior margin of
sternite VIII broadly and shallowly concave (Fig. 50); aedeagus of distinctive shape and with two sets of sclerotised internal structures of characteristic morphology (Figs. 51-55).

## Intraspecific variation

Maximum/minimum ratios: AL: 1.16; EyL: 1.53; POL: 1.36; HL: 1.19; HW: 1.27; PW: 1.19; PL: 1.16; EL: 1.17; TiL: 1.18; TaL: 1.15; ML: 1.13; TL: 1.26; EyL/POL: 1.49; HL/ HW: 1.08; PW/HW: 1.10; PL/PW: 1.06; EL/PL: 1.08; TiL/ TaL: 1.07.

Except for the highly variable relative and absolute eye size, morphological characters are subject to moderate intraspecific variation.

## Comparative notes

Micrillus pallidus is readily separated from its congeners based on the distinctive morphology of the aedeagus, whose ventral process is not bent dorsad in lateral view. From other species of the M. testaceus group with fully developed hind wings and eyes of normal size, it is additionally distinguished as follows:
from M. testaceus by smaller average size, paler coloration, and the shallow excision of the posterior margin of the male sternite VIII;
from M. irakensis by the truncate or - at most - weakly concave posterior margin of the head (in M. irakensis distinctly concave).

A reliable separation from teneral macropterous females of M. testaceus based on morphogical characters may prove difficult.

## Distribution and bionomics

The currently known distribution includes the Caucasus region (Russian South European territory, Armenia, Azerbaijan) and Middle Asia (Turkmenistan, Uzbekistan) (Fig. 58). According to Smetana (2004), the species was previously unknown from the Russian Federation and Azerbaijan. Gusarov (1989) reports it (as M. caucasicus) from Ukraine (Crimea) - a record omitted in Smetana (2004) - , but in view of the frequent confusion of Micrillus species, this record should be considered doubtful until males from this region become available for revision.

Most of the material examined was collected a long time ago, so that hardly any bionomic information is provided on the labels, apart from the fact that some specimens were taken in April and May.

### 3.2.4 Micrillus irakensis (Cameron, 1940)

(Figs. 58-74)
Scimbalium (Schatzmayria) irakense Cameron, 1940: 251.


Figs. 48-57. Micrillus pallidus (Reitter) (48-55) and M. scabrosus (Fauvel) (56-57). -48-49. Forebody of specimens from Armenia (48) and Turkmenistan (49). 50, 56. Male sternite VIII. 51-52. Aedeagus in lateral and ventral view. 53-54. Apex of aedeagus in lateral and ventral view. 55, 57. Internal structures of aedeagus. - Scale bars: $1.0 \mathrm{~mm}(48-49), 0.5 \mathrm{~mm}(50,56), 0.2 \mathrm{~mm}(51-52)$, $0.1 \mathrm{~mm}(53-54,55,57)$.

Type material examined
Holotype $q$ : "Bag [reverse side of mounting label] / Holotype [curator label] / S. irakense Cam. Type / M. Cameron. Bequest B. M. 1955-147 / Holotype Scimbalium irakense Cameron, 1940 det. R. G. Bоoth 2007 / Holotypus Scymbalium irakense Cameron rev. V. Assing 2007 / Micrillus irakensis (Cameron) det. V. Assing 2007" (BMNH).

> Additional material examined (total, including type: 10 exs.)

Iraq: 1 ex., Baghdad env., VI.1932, leg. Vanderiist (NHMW); 3 exs., Baghdad (IRSNB, cAss); 1 ex., NE Basra, At Tannūmah ["Tanooma"] (BMNH); 1 ex., "Mesopot."(MNHUB); 1 ex., "Mesopotamia" (MNHNP).

Israel: 1 ex., Jericho, at light source, 8.VII.1929, leg. Tapukhi (BMNH); 1 ex., "Palestine, Jordan", 17.VIII.1939, leg. "Bytins-KI-SALZ" (TAU).

## Comment

The original description is explicitly based on a single type specimen from "Baghdad" (Cameron 1940).

## Redescription

Measurements (inmm) and ratios (range, arithmetic mean; $\mathrm{n}=7$ ): AL: 1.92-2.14, 2.03; EyL: 0.21-0.23, 0.22; POL: 0.33-0.38, 0.35; HL: 0.72-0.77, 0.74; HW: 0.74-0.80,


Fig. 58. Distributions of Micrillus pallidus (Reitter) ( $\bullet$ ) and M. irakensis (Cameron) ( $\bigcirc$ ), based on examined records.
0.76; PW: 0.71-0.79, 0.74; PL: 0.79-0.88, 0.84; EL: 0.76-0.91, 0.84; TiL: 0.60-0.74, 0.71; TaL: 0.62-0.66, 0.64; ML: 0.62; TL: 4.7-5.6, 5.1; EyL/POL: 0.58-0.68, 0.63; HL/ HW: 0.95-0.98, 0.97; PW/HW: 0.95-0.98, 0.97; PL/PW: 1.11-1.17, 1.14; EL/PL: 0.96-1.04, 1.00; TiL/TaL: 1.10-1.15, 1.12.

Habitus as in Fig. 59. Coloration: head and pronotum yellowish to brown; elytra yellowish to yellowish brown; legs and antennae yellowish to yellowish brown.

Head weakly transverse (see ratio HL/HW); posterior margin conspicuously concave (Figs. 60-61); puncturation moderately fine and sparse, interstices distinctly wider than diameter of punctures; surface glossy, with very shallow transverse microsculpture; eyes large (see measurements, ratio EyL/POL, and Fig. 62) and distinctly projecting from lateral contours of head. Antenna similar to that of M. testaceus (Fig. 63); maxillary palpus slender, apical palpomere approximately half the length of preapical palpomere or slightly longer.

Pronotum slightly narrower than head, distinctly oblong (see ratios PW/HW and PL/PW), and weakly tapering caudad; puncturation finer and denser than that of head; midline impunctate (Figs. 60-61).

Elytra approximately 1.25 times as wide and at suture approximately as long as pronotum (see ratio EL/PL); hu-
meral angles pronounced; puncturation very fine and dense; interstices with shallow microsculpture (Fig. 60). Hind wings fully developed.

Legs of similar morphology as in M. testaceus; metatarsomere I approximately as long as the combined length of II +III .

Abdomen approximately as wide as elytra or slightly narrower, widest at segment VI; puncturation very fine and dense; posterior margin of tergite VII with palisade fringe.
${ }^{\top}$ : posterior excision of sternite VIII moderately deep, less so than in M. testaceus (Fig. 64); segments IX and X similar to those of $M$. testaceus, valvulae of segment IX more than twice as long as tergite X (Fig. 65); aedeagus of similar general morphology as in $M$. testaceus, but smaller (see measurements), less slender, apically distinctly broader, shorter, and more strongly sclerotised (Figs. 66-74).

## Intraspecific variation

Maximum/minimum ratios: AL: 1.11; EyL: 1.07; POL: 1.14; HL: 1.07; HW: 1.08; PW: 1.11; PL: 1.12; EL: 1.20; TiL: 1.07; TaL: 1.07; ML: 1.00; TL: 1.19; EyL/POL: 1.18; HL/ HW: 1.03; PW/HW: 1.03; PL/PW: 1.06; EL/PL: 1.09; TiL/ TaL: 1.05.


Figs. 59-74. Micrillus irakensis (Cameron) from Israel (59-60, 62-67, 70-71, 74) and from Irak (61: holotype; 68-69, 72-73). 59. Habitus. 60. Forebody. 61. Head and pronotum. 62. Head in lateral view. 63. Antenna. 64. Male sternite VIII. 65. Male abdominal segments IX-X. 66-69. Aedeagus in lateral and ventral view. 70-73. Apex of aedeagus in lateral and ventral view. 74. Internal structures of aedeagus. - Scale bars: $1.0 \mathrm{~mm}(59-61,63), 0.5 \mathrm{~mm}(62,64-65), 0.2 \mathrm{~mm}(66-69), 0.1 \mathrm{~mm}(70-74)$.

In the few specimens available, intraspecific variation was low in comparison to other species of the genus.

## Comparative notes

The species is readily distinguished from all other species of the M. testaceus group especially by the concave posterior margin of the head and by the male sexual characters.

## Distribution and bionomics

The species was previously known from the surroundings of Baghdad, Iraq. It is here recorded from Israel for the first time (Fig. 58). The material with labels indicating dates was collected during the period from June through August. One of the specimens from Israel was taken at a light source.

### 3.2.5 Micrillus hypogaeus (Peyerimhoff, 1907)

(Figs. 47, 75-85)
Scymbalium hypogaeum Peyerimhoff, 1907: 248 f.
Type material examined
Lectotype $\widehat{\sigma}^{\lambda}$, here designated: "Bou Zagza [sic] Algérie, 10.IV. 07 / Lectotypus H. Coiffait 1970 / Micrillus hypogaeus Peyer / Lectotypus ô Scymbalium hypogaeum Peyerimhoff desig. V. Assing 2007 / Micrillus hypogaeus (Peyerimhoff) det. V. Assing 2007" (MNHNP). - Paralectotypes: 2 우: "Bou Zegza, 11.V. 1907 / hypogaeum types" (MNHNP); 1 ס": "dj. Bou Zegza pr. Alger / Scymbalium hypogaeum m. / Cotypus Scimbalium hypogaeum Peyerimhoff" (NHMW); 1 ㅇ: Djebel Bou Zegza 4 / subterraneum Raffr. var. / Scimbalium hypogaeum m.typ. / R.I.Sc.N.B. 17479 Coll. et det. A. Fauvel (IRSNB).

Additional material examined (total, including types: 7 exs.)
Algeria: 2 exs., Djebel Bou Zegza (NHMW, cAss).

## Comments

The original description is based on an unspecified number of syntypes found "au djebel bou-Zegza" near the grotte Rhar-Ifri (Peyerimhoff 1907). Three syntypes, a male and two females, were found in the Peyerimhoff collection at the MNHNP and two syntypes, a male and a female, were located in the collections of the NHMW and the IRSNB, respectively. The male from the Peyerimhoff collection was labelled as the lectotype by Coiffait, but the designation was never published. It is here designated as the lectotype.

## Redescription

Measurements (in mm) and ratios (range, arithmetic mean; $\mathrm{n}=6$ ): AL: 2.17-2.50, 2.29; EyL: 0.05; POL: 0.53-0.63, 0.58; HL: 0.90-1.06, 0.97; HW: 0.88-1.03, 0.93; PW: 0.82-0.92, 0.87; PL: 0.91-1.02, 0.96; EL: 0.57-0.62,
0.61; TiL: $0.89-1.04,0.98$; TaL: 0.82-0.91, 0.87; ML: $0.76-0.79,0.77$; TL: $5.3-5.8,5.5$; EyL/POL: $0.08-0.10$, 0.09 ; HL/HW: 1.03-1.08, 1.04; PW/HW: 0.90-0.97, 0.93; PL/PW: 1.10-1.13, 1.11; EL/PL: 0.61-0.66, 0.63; TiL/TaL: 1.09-1.15, 1.13.

Habitus as in Fig. 75. Coloration of body including appendages usually uniformly reddish, with tarsomeres V pale yellowish.

Head of similar shape as in M. scabrosus; puncturation coarse, approximately as coarse as in M. scabrosus, moderately dense in lateral dorsal areas and sparse in median dorsal area; interstices in lateral dorsal area on average 1.5-2 times as wide as diameter of punctures (Fig. 76); microsculpture present, but very shallow. Eye rudiments minute, without ommatidia (Fig. 77). Antenna and maxillary palpus similar to those of M. scabrosus, but the former on average slightly shorter (Fig. 78).

Pronotum of similar relative size as in M. scabrosus, but somewhat more distinctly tapering posteriad (Fig. 76); puncturation as in $M$. scabrosus; microsculpture absent.

Elytra very short (see ratio EL/PL and Fig. 76); humeral angles almost obsolete; surface depressed, laterally usually with shallow oblong impression on either side; puncturation dense, but ill-defined and shallow; microsculpture absent. Hind wings completely reduced.

Metatarsomere I somewhat longer than II, but shorter than the combined length of II + III.

Abdomen approximately 1.3 times as wide as elytra; maximal width at segment V ; puncturation somewhat rugose, resembling that of M. scabrosus (Fig. 79); microsculpture shallow; posterior margin of tergite VII without palisade fringe.
$\delta^{\top}$ : sternite VII unmodified; posterior margin of sternite VIII shallowly triangularly excised (Fig. 80); segments IX and X on the whole similar to those of M. scabrosus, but valvulae of segment IX shorter; aedeagus with apex of ventral process bifid and strongly bent dorsad (Figs. 81-85).

## Intraspecific variation

Maximum/minimum ratios: AL: 1.15; EyL: 1.17; POL: 1.20; HL: 1.18; HW: 1.17; PW: 1.13; PL: 1.13; EL: 1.08; TiL: 1.17; TaL: 1.11; ML: 1.04; TL: 1.09; EyL/POL: 1.33; HL/ HW: 1.05; PW/HW: 1.08; PL/PW: 1.03; EL/PL: 1.09; TiL/ TaL: 1.05 .

In the few specimens available, intraspecific variation was comparatively low.

## Comparative notes

From the similar M. scabrosus, M. hypogaeus is readily distinguished by the much smaller eye rudiments, the much shorter elytra, and various other characters (see description above). It is separated from all its congeners by the distinctive morphology of the aedeagus, from most species also by the strongly reduced eyes, the short elytra,


Figs. 75-85. Micrillus hypogaeus (Peyerimhoff). - 75. Habitus. 76. Forebody. 77. Head in lateral view. 78. Antenna. 79. Abdominal segments III-VII. 80. Male sternite VIII. 81-83. Aedeagus in lateral and ventral view. 84-85. Apex of aedeagus in lateral and ventral view. - Scale bars: $1.0 \mathrm{~mm}(75-79), 0.5 \mathrm{~mm}(80), 0.2 \mathrm{~mm}(81-83), 0.1 \mathrm{~mm}(84-85)$.
and the absence of a palisade fringe at the posterior margin of tergite VII. For characters separating it from $M$. subterraneus and M. tenuipennis, which have similarly small eye rudiments and short elytra, see the comparative notes in the following sections.

## Distribution and bionomics

The species has become known only from the type locality and its vicinity near Algier (Fig. 47). The type specimens were discovered under large stones at an altitude of approximately 800 m in April and May (Peyerimhoff 1907).
3.2.6 Micrillus subterraneus Raffray, 1873
(Figs. 47, 86-96)
Micrillus subterraneus Raffray, 1873: 362 f.

Type material examined
Syntype o: "Raffray / Coll. P. Boppe, Le Moult vendit / Syntypus $q$ Micrillus subterraneus Raffray rev. V. Assing 2007" (IRSNB).

Additional material examined
(total, including type: 44 exs.)
Algeria: 7 exs., Mouzaïa (DEI, HNHM, NHMW, cAss); 4 exs., Mouzaïa-Mines (NHMW, SMTD); 8 exs., Massif de Mouzaïa (BMNH, IRSNB, NHMW); 7 exs., Zaoria de Mouzaïa (HNHM, cAss, cTro); 3 exs., Mouzaïa, Dritka [Dvitka?], leg. Peyerimhoff (NHMW); 1 ex., Mouzaïa (IRSNB); 3 exs., Algier (SMF); 1 ex., Blida (SMF); 1 ㅇ, Algier, Mizrana, M. Tizzirt (MCSNM); 1 ¢, Medeah (IRSNB); 1 ¢, Medeah env., Mt. Nador (IRSNB); 1 ¢, Medeah, leg. Sicard (BMNH); 1 of, Djebel Ouarsenis [ $\left.35^{\circ} 53^{\prime} \mathrm{N}, 1^{\circ} 37^{\prime} \mathrm{E}\right]$ (IRSNB).

Locality not indicated: 4 exs. (IRSNB).

## Comments

The original description is based on an unspecified
number of syntypes from the "environs d'Alger" (Raffray 1873). Only one type specimen was found in the collections of the IRSNB. Since it is a female and there is at least some hope that a male may eventually be located, it is not designated as the lectotype.

## Redescription

Measurements (in mm) and ratios (range, arithmetic mean; $\mathrm{n}=14$ ): AL: 1.68-2.01, 1.91; EyL: 0.03-0.05, 0.04; POL: 0.41-0.45, 0.43; HL: 0.71-0.79, 0.75; HW: 0.71-0.79, 0.76; PW: 0.71-0.79, 0.76; PL: 0.82-0.92, 0.87; EL: 0.53-0.57, 0.55; TiL: 0.77-0.85, 0.81; TaL: 0.66-0.74, 0.70; ML: 0.79-0.80, 0.79; TL: 4.2-5.9, 4.7; EyL/POL: 0.07-0.13, 0.10; HL/HW: 0.97-1.02, 0.99; PW/HW: 0.97-1.02, 1.00; PL/PW: 1.12-1.17, 1.15; EL/PL: 0.59-0.65, 0.63; TiL/TaL: 1.10-1.20, 1.15.

Habitus as in Fig. 86. Coloration of body including appendages usually uniformly reddish, with tarsomeres V pale yellowish.

Head approximately as wide as long or weakly transverse, of similar shape as in M. scabrosus and M. hypogaeus, but on average smaller in relation to pronotum, approximately as wide as or slightly narrower than pronotum (see ratio PW/HW and Fig. 87); puncturation on average coarser and denser than in M. hypogaeus, interstices in lateral dorsal area on average approximately as wide as diameter of punctures or only slightly wider; surface with distinct microsculpture and subdued shine. Eye rudiments minute, without ommatidia (Fig. 88). Antenna slightly shorter and less slender than in M. hypogaeus (Fig. 89). Maxillary palpus similar to that of M. scabrosus.

Pronotum of similar shape and puncturation as in $M$. hypogaeus (Fig. 87); microsculpture absent.


Figs. 86-96. Micrillus subterraneus Raffray. - 86. Habitus. 87. Forebody. 88. Head in lateral view. 89. Antenna. 90. Abdominal segments III-VIII. 91. Male sternite VIII. 92. Male abdominal segments IX-X. 93-94. Aedeagus in lateral and ventral view. 95-96. Apex of aedeagus in lateral and ventral view. - Scale bars: $1.0 \mathrm{~mm}(86-87,89-90), 0.5 \mathrm{~mm}(88,91-92), 0.2 \mathrm{~mm}(93-94)$, $0.1 \mathrm{~mm}(95-96)$.

Elytra very short (see ratio EL/PL and Fig. 87); humeral angles almost obsolete; surface depressed, laterally with or without shallow oblong impression on either side; puncturation dense, irregular, and ill-defined; microsculpture absent. Hind wings completely reduced.

Metatarsomere I approximately as long as the combined length of II +III .

Abdomen approximately $1.20-1.25$ times as wide as elytra; maximal width at segment V; puncturation somewhat rugose to granulose, similar to that of M. scabrosus, but usually denser (Fig. 90); microsculpture distinct; posterior margin of tergite VII without palisade fringe.
$\delta^{\lambda}$ : sternite VII unmodified; posterior margin of sternite VIII shallowly triangularly excised (Fig. 91); segments IX and X on the whole similar to those of $M$. scabrosus, but valvulae of segment IX shorter, approximately twice as long as tergite X (Fig. 92); general morphology of aedeagus similar to that of M. hypogaeus, but apex less distinctly bifid and less strongly bent dorsad (Figs. 93-96).

## Intraspecific variation

Maximum/minimum ratios: AL: 1.20; EyL: 1.75; POL: 1.11; HL: 1.11; HW: 1.11; PW: 1.12; PL: 1.13; EL: 1.09; TiL: 1.10; TaL: 1.11; ML: 1.02; TL: 1.40; EyL/POL: 1.75; HL/ HW: 1.05; PW/HW: 1.05; PL/PW: 1.05; EL/PL: 1.11; TiL/ TaL: 1.09.

As is shown by the above ratios, intraspecific variation is about as low as that of M. hypogaeus.

## Comparative notes

From M. hypogaeus, the only other microphthalmous congener from Algeria, M. subterraneus is readily distinguished by smaller size (little or no overlap, see measurements), a less oblong and smaller head (in relation to pronotum), shorter antennae, a more oblong pronotum (little overlap), coarser and denser puncturation of the head, more pronounced microsculpture of the head, a longer metatarsomere I, and by the morphology of the aedeagus. For additional characters see the redescription above.

## Distribution and bionomics

The species has become known only from the type locality and its vicinity near Algier (Fig. 47). The type specimens were discovered under large stones on clay soil in December (Raffray 1873).

### 3.2.7 Micrillus tenuipennis n.sp.

(Figs. 47, 97-103)

## Type material

Holotype ${ }^{7}$ : "Morocco (Taza) [08], ca. 30km SE Tissa, $34^{\circ} 14^{\prime} \mathrm{N}, 4^{\circ} 27^{\prime} \mathrm{W}$, field margins, loam, clay, under stones,
25.II.2004, leg. D. W. Wrase / Holotypus ơ Micrillus tenuipennis sp. n. det. V. Assing 2007" (cAss).

Paratype : "Morocco - 30 km NW Taza, Sebt-des-Beni-Frassen, $34^{\circ} 20 \mathrm{~N}, 04^{\circ} 22 \mathrm{~W}$, fallow land, 22.II.2004, leg. Assmann" (cSch).

## Etymology

The name (Lat., adj.: with narrow wings) refers to the conspicuously slender elytra, a character separating the new species from all other Micrillus species.

## Description

Measurements (in mm) and ratios (holotype, paratype): AL: 2.56, 2.32; EyL: 0.06, 0.07; POL: 0.51, 0.47; HL: 0.94, 0.85; HW: 0.93, 0.82; PW: 0.84, 0.76; PL: 0.99, 0.89; EL: $0.65,0.63$; TiL: 0.97, 0.86; TaL: 0.82, 0.76; ML: 0.83 , - ; TL: 6.0, 5.4; EyL/POL: 0.12, 0.15; HL/HW: 1.01, 1.05 ; PW/ HW: 0.90, 0.93; PL/PW: 1.18, 1.18; EL/PL: 0.67, 0.71; TiL/ TaL: 1.19, 1.14.

Habitus as in Fig. 97. Coloration of body uniformly pale to dark reddish; legs dark yellowish to yellowish brown, with tarsomeres V pale yellowish.

Head with shape, puncturation, microsculpture, antennae, and maxillary palpi as in M. scabrosus (Fig. 98). Eyes reduced to minute rudiments, without ommatidia (Fig. 99).

Pronotum of similar shape and puncturation as in $M$. scabrosus; microsculpture absent (Fig. 98).

Elytra very short (see ratio EL/PL and Fig. 98) and slender, in both type specimens approximately 0.95 times as wide as pronotum; humeral angles almost obsolete; surface depressed, laterally with shallow oblong impression on either side; puncturation dense, irregular, and rather ill-defined; microsculpture absent. Hind wings completely reduced.

Metatarsomere I approximately as long as the combined length of II +III .

Abdomen approximately 1.3 times as wide as elytra; maximal width at segments $\mathrm{V}-\mathrm{VI}$; puncturation rather coarse, somewhat irregular, and weakly delimited (Fig. 100); microsculpture shallow; posterior margin of tergite VII without palisade fringe.
§: sternite VII unmodified; posterior margin of sternite VIII concavely excised (Fig. 101); segments IX and X on the whole similar to those of $M$. scabrosus, valvulae of segment IX slightly more than twice as long as tergite X; aedeagus in ventral view apically pointed, in lateral view slightly bent dorsad (Figs. 102-103).

## Intraspecific variation

Maximum/minimum ratios: AL: 1.11; EyL: 1.13; POL: 1.10; HL: 1.10; HW: 1.11; PW: 1.12; PL: 1.11; EL: 1.02; TiL: 1.12; TaL: 1.08; ML: 1.02; TL: 1.11; EyL/POL: 1.23; HL/ HW: 1.04; PW/HW: 1.03; PL/PW: 1.00; EL/PL: 1.08; TiL/ TaL: 1.04.


Figs. 97-103. Micrillus tenuipennis n. sp. - 97. Habitus. 98. Forebody. 99. Head in lateral view. 100. Abdominal segments III-VIII. 101. Male sternite VIII. 102-103. Aedeagus in lateral and ventral view. - Scale bars: $1.0 \mathrm{~mm}(97-98,100), 0.5 \mathrm{~mm}(99,101), 0.2 \mathrm{~mm}$ (102-103).

The holotype is somewhat larger than the paratype (see measurements), but this variation is within the usual range of other microphthalmous species from North Africa.

## Comparative notes

From all its congeners, M. tenuipennis is distinguished by the male primary and secondary sexual characters. The only other Micrillus species known from Morocco are M. testaceus and M. scabrosus, both of which have distinctly larger eyes composed of ommatidia and broader elytra (elytra wider than pronotum). From the Algerian M. hypogaeus and M. subterraneus, which, too, have minute eye rudiments without ommatidia, $M$. tenuipennis is additionally separated by larger eye rudiments and by more slender elytra (in M. hypogaeus and M. subterraneus approximately as wide as pronotum).

## Distribution and bionomics

The type specimens were collected in two localities in the surroundings of Taza, northern Morocco (Fig. 47). They were found under stones on arable land and fallows in February.

### 3.2.8 Micrillus biskrensis (Fauvel, 1898)

(Figs. 47, 104-110)
Scymbalium biskrense Fauvel, 1898: 98.
Type material examined
Lectotype $P$, here designated: "Biskra, Algérie / biskrense Fvl. / R. I. Sc. N. B. Coll. et det. A. Fauvel / Ex-Typis / Lectotypus $\uparrow$ Scymbalium biskrense Fauvel desig. V. Assing 2007 / Micrillus biskrensis (Fauvel) det. V. Assing 2007" (IRSNB).

Additional material examined
(total, including type: 3 exs.)
Algeria: 1 ex., Biskra (IRSNB); 1 ex., Biskra, 9.V. 1886 (MNHNP).

## Comments

In the original description of Scymbalium biskrense, Fauvel (1898) states that he did not see a male. Since he does not state the number of females, the specimen from Biskra in his collection has syntype status. It is here designated as the lectotype.

The non-type male, on which the diagnosis of this species is primarily based, is somewhat larger than the lecto-


Figs. 104-110. Micrillus biskrensis (Fauvel). - 104. Forebody. 105. Antenna. 106. Outline of aedeagus in ventral view. 107-108. Aedeagus in ventral and lateral view. 109. Internal structures of aedeagus in ventral view. 110. Apex of aedeagus in lateral view. Scale bars: $1.0 \mathrm{~mm}(104-105), 0.2 \mathrm{~mm}(106-110)$.
type and has completely reduced hind wings, whereas the lectotype is macropterous. More material is needed to confirm that they are indeed conspecific. The lectotype is practically indistinguishable from small pale macropterous specimens of $M$. testaceus, which have been seen from Israel, for instance.

The illustrations of the aedeagus provided by Coiffait ( 1980 , 1982) - figures 3G-H and 52G-H, respectively are highly misleading. An examination of the male on which these illustrations are based revealed that what he figures as the ventral process in fact refers to the - somewhat extruded - internal structures.

## Redescription

Measurements (in mm) and ratios (lectotype, non-type male): AL: $1.74,2.07$; EyL: $0.13,0.14$; POL: $0.34,0.41$; HL: $0.71,0.84$; HW: $0.69,0.85$; PW: $0.67,0.79$; PL: $0.80,0.92$; EL: $0.68,0.70$; TiL: $0.68,0.77$; TaL: 0.54 , - ; ML: - , 0.66 ; TL: 4.7, 5.6; EyL/POL: 0.38, 0.33; HL/HW: 1.02, 0.99; PW/ HW: 0.97, 0.93; PL/PW: 1.19, 1.17; EL/PL: 0.85, 0.76; TiL/ TaL: $1.25,-$.

Coloration of body uniformly yellowish brown to reddish brown, with the appendages slightly paler.

Head approximately as wide as long, of similar shape as in M. testaceus (Fig. 104); puncturation and micro-
sculpture as in M. testaceus. Eyes of similar size as in M. testaceus. Antenna (Fig. 105) as in small specimens of $M$. testaceus. Maxillary palpus with palpomeres III and IV slightly shorter and less slender than in M. testaceus.

Pronotum of similar shape and puncturation as in $M$. testaceus (Fig. 104); microsculpture absent.

Elytra of variable length (see ratio EL/PL); puncturation dense and ill-defined; microsculpture absent or very shallow. Hind wings completely reduced or present.

Metatarsomere I approximately as long as the combined length of II+III or slightly shorter.

Abdomen 1.10-1.18 times as wide as elytra; maximal width at segments $\mathrm{V}-\mathrm{VI}$; puncturation fine, less dense than in M. testaceus; microsculpture shallow; posterior margin of tergite VII with palisade fringe.
$\delta^{\prime}$ : sternite VII unmodified; posterior margin of sternite VIII with moderately deep triangular excision; segments IX and X as in M. testaceus; general morphology of aedeagus similar to that of M. scabrosus (Figs. 106-110).

## Intraspecific variation

The lectotype and the non-type male considerably differ in size. Also, the male has completely reduced hind wings, relatively short and depressed elytra, and relatively smaller eyes, whereas the lectotype has (fully?) developed
hind wings, relatively longer and - in cross-section slightly convex elytra, and relatively larger and more bulging eyes.

## Comparative notes

From pale coloured specimens of M. testaceus, M. biskrensis is reliably distinguished only by the smaller, broader, and apically more distinctly sclerotised aedeagus, as well as by the shape of the internal structures of the aedeagus. From M. scabrosus, it is separated by smaller body size, finer puncturation of the elytra and the abdomen, the deeper posterior excision of the male sternite VIII, and by the shape of the internal structures of the aedeagus. From the two microphthalmous species occurring in Algeria, M. hypogaeus and M. subterraneus, it conspicuously differs by the distinctly larger eyes with ommatidia, the longer and broader elytra, the presence of a palisade fringe at the posterior margin of the abdominal tergite VII, as well as by the shape of the aedeagus.

Distribution and bionomics
Micrillus biskrensis has become known only from the surroundings of Biskra (Fig. 47). Bionomic data are not available.

### 3.2.9 Micrillus aegyptiacus (Bernhauer, 1910)

(Figs. 111-126)
Scymbalium aegyptiacum Bernhauer, 1910: 256.
Scymbalium (Schatzmayria) bernhaueri Косн, 1934: 87 ff.; n. syn.

## Type material examined

Scymbalium aegyptiacum: Holotype $q$ [somewhat damaged, without antennae, head and pronotum separated from remainder of body]: "Aegypten Bоенм / aegyptiacum Brh. Typus / Chicago NHMus, M. Bernhauer Collection / Holotypus $甲$ Scymbalium aegyptiacum Bernhauer rev. V. Assing 2007 / Micrillus aegyptiacus (Bernhauer) det. V. Assing 2007" (FMNH).

Scymbalium bernhaueri: Lectotype $\widehat{ }$, here designated: "Barrage Eg., 10.IX.1933, W. Wittmer / Cotypus / Lectotypus ठ Scymbalium bernhaueri Koch desig. V. Assing 2007 / Micrillus aegyptiacus (Bernhauer) det. V. Assing 2007" (MCSNM). - Paralectotypes: 23 exs.: same data as lectotype (MCSNM); 2 exs.: same labels as lectotype, but "Typus" (MCSNM); 1 ex.: "Barrage Eg., 10.IX.1933, W. Wittmer / Cotypus / Coll. Museo ent. 'Pietro Rossi' Duino / Scymbalium Bernhaueri nov. spec. i. litt. det. C. Kocн / Syntypus Scymbalium bernhaueri Koch, 1934, labelled by MNHUB 2006" (MNHUB); 1 ex.: "Barrage Eg., 10.IX.1933, W. Wittmer / Cotype / Cotypus / Coll. Museo ent. 'Pietro Rossi' Duino / Egypt B. M. 1934-135." (BMNH); 1 ex.: "Eg. Cairo, Pyramidi, 2.X.1933, W. Wittmer/ Typus" (MCSNM); 4 exs.: same labels, but "Cotypus" (MCSNM).

Additional material examined (total, including types: 52 exs.)
Egypt: 3 exs., Barrage, 10.IX.1933, leg. Wittmer (NHMW); 1 ex., Barrage, 21.IX.1933, leg. Wittmer (BMNH); 3 exs., Cairo, leg. Schatzmayr \& Koch (NHMW, cAss); 1 ex., "Barrage Eg.,
12.IX.33, W Wittmer / Coll. Museo ent. 'Pietro Rossi' Duino / Cotypus / Emmerich Reitter vend. III. 1943 / Cotypus Scimbalium Bernhaueri C. Koch / ex coll. Scheerpeltz" (NHMW); 6 exs., "Barrage Eg., 12.IX.33, W Wittmer / Coll. Museo ent. 'Pietro Rossi’ Duino / Cotypus" (SMF); 2 exs., "Barrage Eg., 12.IX.33, W Wittmer / Coll. Museo ent. 'Pietro Rossi' Duino / Cotypus" (BMNH); 1 ex., Barrage, 31.VIII.1933, leg. Wittmer (cTro); 1 ex., Fayoum (IRSNB).

## Comments

The original description of S. aegyptiacum is explicitly based on a single specimen ("ein einzelnes Exemplar") from "Aegypten" (Bernhauer 1910). According to Косн (1934), S. bernhaueri is distinguished from S. aegyptiacum by the width of the head in relation to the pronotum, eye size, the shape of the temples, the length and width of the elytra, as well as by the puncturation of the pronotum and the abdomen. A comparison and dissection of the type material of both taxa and an examination of additional material, some of which had evidently been identified as $S$. aegyptiacum or $S$. bernhaueri by Косн himself, revealed that they are all conspecific and that the characters believed by Косн (1934) to be distinguishing characters are all highly variable (see measurements below and Figs. 124125). Consequently, Micrillus bernhaueri is here placed in the synonymy of the senior name M. aegyptiacus.

The original description of Scymbalium bernhaueri is based on an unspecified number of syntypes collected "am 10.9.1933 bei Barrage bei Cairo in Anzahl und am 2.10 .1933 bei den Pyramiden von Ghizeh in wenigen Exemplaren" (Косн 1934). One of the numerous syntypes in the collection of the MCSNM is here designated as the lectotype. Some of the specimens from the NHMW, BMNH, and SMF are labelled as "Cotypus", but their type status must be considered doubtful, since either the localities and dates indicated on the labels, or the identification ("S. aegyptiacum") do not match the details given in the original description.

## Redescription

Measurements (inmm) and ratios (range, arithmetic mean; $\mathrm{n}=17$ ): AL: 2.59-3.05, 2.79; EyL: $0.20-0.29,0.23$; POL: $0.33-0.41,0.38$; HL: 0.88-0.94, 0.90; HW: 0.82-0.94, 0.88 ; PW: $0.82-0.95,0.86$; PL: $0.94-1.09,1.00$; EL: $0.85-1.10,0.93$; TiL: $0.92-0.98,0.95$; TaL: $0.80-0.89,0.85$; ML: $0.63-0.69,0.66$; TL: $5.6-6.6, ~ 5.9$; EyL/POL: $0.48-0.86,0.60$; HL/HW: 0.99-1.09, 1.02; PW/HW: 0.94-1.03, 0.97; PL/PW: 1.12-1.20, 1.17; EL/PL: 0.86-1.04, 0.93 ; TiL/TaL: 1.09-1.17, 1.12.

Habitus as in Fig. 111. Head, pronotum, abdomen, and antennae reddish, occasionally partly and diffusely infuscated; elytra and legs dark yellowish to reddish yellow.

Head approximately as wide as long or weakly oblong (see ratio $\mathrm{HL} / \mathrm{HW}$ and Fig. 112); puncturation in lateral and in posterior dorsal area moderately coarse and moderately dense, with interstices on average approximately as


Figs. 111-123. Micrillus aegyptiacus (Bernhauer). - 111. Habitus. 112. Forebody. 113. Head in lateral view. 114. Antenna. 115. Abdominal segments III-VIII. 116. Male sternite VIII. 117. Male abdominal segments IX-X. 118-120. Aedeagus in lateral and ventral view. 121-123. Apex of aedeagus in lateral and ventral view. - Scale bars: $1.0 \mathrm{~mm}(111-112,114-115), 0.5 \mathrm{~mm}(113,116-117), 0.2 \mathrm{~mm}$ (118-120), $0.1 \mathrm{~mm}(121-123)$.


Fig. 124. Micrillus aegyptiacus (Bernhauer). Relative eye size (EyL/POL) in relation to body size.
wide as or somewhat wider than diameter of punctures; median dorsal area impunctate or with scattered punctures; microsculpture extremely shallow, in median dorsal area barely noticeable. Eyes relatively large (see ratio EyL/ POL and Fig. 113) and distinctly projecting from lateral contours of head in dorsal view. Antenna long and slender (Fig. 114). Maxillary palpus with the terminal joint distinctly shorter than in the species of the M. testaceus group, less than half as long as preapical joint, distinctly coniform, and often somewhat flattened.

Pronotum usually narrower than, but occasionally as wide as head, and distinctly oblong (see ratios PW/HW and PL/PW); posterior margin distinctly concave; predominant puncturation extremely fine and rather dense, much finer and denser than in species of the $M$. testaceus group; disc with some scattered interspersed and usually setiferous coarser punctures (Fig. 112).

Elytra relatively long (see ratio EL/PL and Fig. 112), with parallel lateral margins, and with well-developed humeral angles; puncturation fine and very dense; microsculpture very shallow or indistinct. Hind wings fully developed.

Legs slender; metatarsomere I at least slightly longer than the combined length of II + III, but shorter than the combined length of II-IV.

Abdomen approximately as wide as elytra, widest at segments V-VI; tergites with fine puncturation (Fig. 115); posterior margin of tergite VII with palisade fringe.
$\delta^{\lambda}$ : sternite VII unmodified; posterior margin of ster-
nite VIII deeply triangularly excised (Fig. 116); valvulae of segment IX conspicuously long, more than 3 times as long as tergite X (Fig. 117); aedeagus distinctly asymmetric (Figs. 118-123).

## Intraspecific variation

Maximum/minimum ratios: AL: 1.18; EyL: 1.46; POL: 1.23; HL: 1.07; HW: 1.15; PW: 1.17; PL: 1.17; EL: 1.30; TiL: 1.07; TaL: 1.11; ML: 1.10; TL: 1.19; EyL/POL: 1.79; HL/ HW: 1.10; PW/HW: 1.10; PL/PW: 1.08; EL/PL: 1.21; TiL/ TaL: 1.08.

Relative and absolute eye size and elytral length are subject to considerable intraspecific variation (Figs. 124-125).

## Comparative notes

From all its congeners, M. aegyptiacus is separated by the highly distinctive shape of the aedeagus. From the species of the M. testaceus group, it is additionally distinguished by the very weak microsculpture on the head, the distinctly shorter and more conical terminal joint of the maxillary palpus, the much finer ground puncturation of the pronotum, and by the much longer valvulae of the abdominal segment IX. The only other congener reported from Egypt is M. torretassoi, which is readily distinguished from M. aegyptiacus by distinctly smaller size alone.


Fig. 125. Micrillus aegyptiacus (Bernhauer). Relative elytral length (EL/PL) in relation to body size.


Fig. 126. Distributions of Micrillus aegyptiacus (Bernhauer) (•), M. sudanicus n.sp. (O), and M. indicus (Eppelsheim) (■), based on examined records.

## Distribution and bionomics

The species has become known only from some localities near Cairo and from Al Faiyūm in Egypt (Fig. 126). The type specimens of M. bernhaueri were found on the bank of the Nile river (Косн 1934). Most of the material examined was collected in September, some specimens also in August and October.

### 3.2.10 Micrillus torretassoi (Koch, 1934)

(Figs. 127-143)
Scymbalium (Schatzmayria) torretassoi Косн, 1934: 89 f. Scymbalium collare Scheerpeltz, 1962: 580 ff.; n. syn.

Type material examined
S. torretassoi: Lectotype $\widehat{ }$ T, here designated: "Kirdassah Eg., 28.IX.1933, W. Wittmer / Typus / Lectotypus ơ Scymbalium torretassoi Koch desig. V. Assing 2007 / Micrillus torretassoi (Koch) det. V. Assing 2007" (NHMW). - Paralectotypes: 3 exs.: same labels as lectotype, but "Cotypus" (MCSNM); 11 exs.: "Kirdassah Eg., 28.IX.1933, W. Wittmer" (MCSNM); 1 ex.: "Kirdassah Eg., 28.IX.1933, W. Wittmer / Coll. Museo ent. 'Pietro Rossi' Duino / Cotypus / Scymbalium Torre-Tassoi nov. i. litt. det. C. Koch / C. Косн Museo Duino donavit 1934 / Cotypus Scimbalium Torre-Tassoi C. Koch / ex coll. Scheerpeltz" (NHMW); 1 ex.: "Kirdassah Eg., 28.IX.1933, W. Wittmer / Cotype / Coll. Museo ent. 'Pietro Rossi’ Duino / Cotypus / Scymbalium Torre-Tassoi nov. i. litt. det. C. Коch / M. Cameron. Bequest B. M. 1955-147" (BMNH); 1 ex.: "Kirdassah Eg., 28.IX.1933, W. Wittmer / Coll. Museo ent. 'Pietro Rossi’ Duino / Scimbalium Torre Tassoi Koch" (cTro).
S. collare: Holotype Q: "Aegypt. Sudan, Bahr el Ghazal b. Bahr el Arab, 4.III. 1913 / Bernhauer det. / Holotypus / Dtsch. Entomol. Institut Berlin / ex coll. Scheerpeltz / Typus Scimbalium collare O. Scheerpeltz / Scimbalium collare m. det. Scheerpeltz 1962 / Micrillus torretassoi (Koch) det. V. Assing 2007". - Paratype Q: "Aegypt. Sudan, Bahr el Ghazal b. Bahr el Arab, 4.III. 1913 / Bernhauer det. / Paratypus / Dtsch. Entomol. Institut Berlin / ex coll. Scheerpeltz / Cotypus Scimbalium collare O. Scheerpeltz" (NHMW).

> Additional material examined (total, including types: 56 exs.)

Egypt: 28 exs. [brachypterous], Cairo, Pyramidi, 2.X.1933, leg. Wittmer (BMNH, IRSNB, MCSNM, MNHUB, NHMW, SMF, SMNS, cAss, cTro); 1 ex. [brachypterous], Cairo, Pyramidi, leg. Koch \& Schatzmayr (NHMW); 1 ex., "Pyramides", 8.X.1933, leg. Rabinovitch (HNHM).

Sudan: 1 ex. [macropterous], Wad Medani, Blue Nile, light, 18.X.1979, leg. Königsmann (MNHUB); 1 ex. [macropterous], same data, but 24.X.1979, leg. Hieke (MNHUB); 1 ex. [macropterous], same data, but 23.X.1979, leg. Hieke (MNHUB); 1 ex. [macropterous], same data, but 15.X.1979, leg. Нieke (MNHUB); 2 exs. [macropterous], same data, but 20.X.1979, leg. Hieke (MNHUB, cAss).

## Comments

The original description of $S$. torretassoi is based on an unspecified number of syntypes from "Kirdassah, 28.9.1933" (Косн 1934). Numerous syntypes matching these data were found in the collections of the MCSNM,
the NHMW and the BMNH. The male syntype from the MCSNM labelled as "Typus" is here designated as the lectotype. Some additional specimens deposited in the NHMW and BMNH, too, are labelled as types and apparently a gift from the collection of the Museum in Duino, but cannot be attributed type status, since they were not collected in the locality indicated in the original description.

The original description of $S$. collare is based on the holotype and a paratype, both females, from "Ägypt. Sudan, Bahr el Ghazahl [sic]", which is in southern Sudan today. The macropterous and relatively large-eyed type specimens are externally identical to the non-type material from Wad Medani, Sudan (see material examined), whose aedeagus and secondary sexual characters are identical to those of the brachypterous and small-eyed types of S. torretassoi and the additional material seen from Egypt. These observations suggest that the species is dimorphic regarding eye size, length of the elytra, and length of the hind wings, and that the types of $S$. torretassoi and S. collare are conspecific, so that $S$. collare is a junior synonym of $S$. torretassoi.

## Redescription

Measurements (inmm) and ratios (range, arithmetic mean; $\mathrm{n}=24$ ): AL: 1.22-1.62, 1.49; EyL (brachypterous morph): 0.06-0.08, 0.07; EyL (macropterous morph): $0.11-0.15,0.13$; POL (brachypterous morph): 0.25-0.30, 0.27; POL (macropterous morph): $0.23-0.26,0.25$; HL: $0.50-0.56,0.52$; HW: $0.53-0.58,0.55$; PW: 0.48-0.54, 0.51 ; PL: 0.55-0.62, 0.58; EL (brachypterous morph): $0.44-0.48,0.47$; EL (macropterous morph): 0.50-0.63, 0.55 ; TiL: $0.45-0.54,0.47$; TaL: 0.36-0.45, 0.40; ML: 0.35-0.38, 0.36; TL: 3.1-3.7, 3.4; EyL/POL (brachypterous morph): 0.22-0.29, 0.26; EyL/POL (macropterous morph): $0.41-0.59, ~ 0.51 ; ~ H L / H W: ~ 0.88-1.04, ~ 0.94 ; ~ P W / H W:$ 0.88-0.99, 0.94; PL/PW: 1.10-1.16, 1.13; EL/PL (brachypterous morph): 0.74-0.86, 0.80; EL/PL (macropterous morph): 0.87-1.02, 0.94; TiL/TaL: 1.11-1.29, 1.19.

Habitus as in Fig. 127. Coloration uniformly reddish yellow, with the elytra and the terminal tarsomeres usually even paler yellowish.

Head slightly transverse and wider than pronotum (see ratios $\mathrm{HL} / \mathrm{HW}$ and $\mathrm{PW} / \mathrm{HW}$ ); puncturation coarse and moderately sparse on frons, composed of predominantly finer punctures and some scattered coarse punctures in lateral and posterior dorsal area; median dorsal area without puncturation; microsculpture shallow, but distinct. Eye size dimorphic: either small, with 7-10 distinct ommatidia (Fig. 130), weakly protruding from lateral contours of head (Fig. 128), or larger, with approximately 30 ommatidia (Fig. 131), distinctly convex and protruding from lateral contours of head (Fig. 129). Antenna as in Fig. 132. Maxillary palpus rather short, preapical joint


Figs. 127-141. Micrillus torretassoi (Koch) from Egypt (lectotype: 127-128, 130, 132, 137; paralectotypes: 135, 138-139, 141) and Sudan (129, 131, 133-134, 136, 140). - 127. Habitus. 128-129. Forebody. 130-131. Head in lateral view. 132. Antenna. 133. Male tergite VIII. 134. Male sternite VIII. 135. Posterior part of male sternite VIII. 136. Male abdominal segments IX-X. 137-141. Aedeagus in lateral and ventral view. - Scale bars: $1.0 \mathrm{~mm}(127-129), 0.5 \mathrm{~mm}(130-132), 0.2 \mathrm{~mm}(133-134,136-141), 0.1 \mathrm{~mm}(135)$.
little more than twice as long as wide, apical joint slightly less than half the length of preapical joint and of distinctly conical shape.

Pronotum moderately oblong (see ratio PL/PW) and moderately tapering caudad (Figs. 128-129); posterior
margin weakly concave; puncturation moderately sparse and extremely fine, sometimes barely noticeable; microsculpture absent.

Elytra dimorphic, in brachypterous morph approximately 1.1 times as wide as and at suture distinctly shorter


Fig. 142. Micrillus torretassoi (Koch). Relative eye size (EyL/POL) in relation to body size.
than pronotum (see Fig. 128 and ratio EL/PL), in macropterous morph approximately 1.2 times as wide and almost as long as pronotum (see Fig. 129 and ratio EL/PL); puncturation fine, dense and shallow. Hind wings either of reduced length or fully developed.

Legs rather short; metatarsomere I approximately as long as the combined length of II + III, sometimes slightly longer.

Abdomen in brachypterous morph as wide as or slightly wider than elytra, in macropterous morph as wide as or slightly narrower than elytra; widest at segments V-VI; puncturation moderately dense and moderately fine, somewhat sparser on posterior than on anterior tergites; posterior margin of tergite VII in brachypterous morph with narrow rudiment of palisade fringe, in macropterous morph with fully developed palisade fringe; posterior margin of tergite VIII strongly convex (Fig. 133).
$\delta^{\top}$ : sternite VII unmodified; shape of sternite VIII distinctive, posterior margin in the middle deeply and very narrowly incised, this incision almost reaching middle of sternite (Figs. 134-135); valvulae of segment IX much shorter than in M. aegyptiacus (Fig. 136); aedeagus asymmetric and with internal structures of distinctive morphology (Figs. 137-141).

Intraspecific variation
Maximum/minimum ratios: AL: 1.33; EyL (total): 2.50; EyL (brachypterous morph): 1.38; EyL (macropterous morph): 1.43; POL (total): 1.33; POL (brachypterous morph): 1.21; POL (macropterous morph): 1.17; HL: 1.12; HW: 1.10; PW: 1.11; PL: 1.12; EL (brachypterous morph): 1.10; EL (macropterous morph): 1.27; TiL: 1.20; TaL: 1.25; ML: 1.09; TL: 1.19; EyL/POL (brachypterous morph): 1.36; EyL/POL (macropterous morph): 1.43; HL/HW: 1.18; PW/HW: 1.12; PL/PW: 1.05; EL/PL (brachypterous morph): 1.16; EL/PL (macropterous morph): 1.18; TiL/ TaL: 1.17.

The species is characterised by a pronounced dimorphism of eye size, head shape, the length of the elytra, and the length of the hind wings. In the macropterous morph, the eyes are distinctly larger, composed of numerous ommatidia, and distinctly protruding from the lateral contours of the head (Figs. 129, 131), the head is approximately as long as wide, and the elytra are larger and approximately as long as the pronotum or slightly shorter. In the brachypterous morph, in contrast, the eyes are much smaller (Figs. 128, 130), composed of only few ommatidia, and not distinctly visible in dorsal view, the head is more or less transverse, and the elytra are narrower and dis-


Fig. 143. Distribution of Micrillus torretassoi (Koch), based on examined records.
tinctly shorter than the pronotum. The macropterous morph has become known only from Sudan, whereas the distribution of brachypterous populations seems to be confined to Egypt.

## Comparative notes

From all other Micrillus species occurring in the Palaearctic region, M. torretassoi is distinguished by its distinctly smaller size and by the distinctive morphology of the male primary and secondary sexual characters, especially the deeply and narrowly incised sternite VIII and the complex morphology of the aedeagus. Micrillus aegyptiacus, the only other congener recorded from Egypt, is much larger, and has much longer antennae, larger eyes, longer elytra, fully developed hind wings, and longer legs; for comparison, see the measurements in the section on $M$. aegyptiacus.

## Distribution and bionomics

The species is currently known from Egypt and Sudan (Fig. 143). The material was collected in the surroundings of Cairo in September and October and in Sudan in March and October. The specimens from Wad Medani were found at a light source, suggesting that the species may be capable of long-distance dispersal by flight.
3.2.11 Micrillus indicus (Eppelsheim, 1890)
(Figs. 126, 144-153)
Scymbalium indicum Eppelsheim, 1890: 277 f.
Type material examined Syntypes?: 3 exs.: "India or., Nagpore" (MNHUB).

## Comments

The original description is based on numerous syntypes ("a D. Dr. Bomford ... pluries captum") from "India centrali ... prope Nagpore" (Eppelsheim 1890). The above specimens are from the type locality, but their type status is uncertain.

## Diagnosis

Similar in external appearance (size, proportions, coloration) to M. irakensis, but distinguished as follows:

Posterior margin of head truncate, not concave (Fig. 144); eyes slightly smaller (see measurements and Fig. 145). Antenna as in Fig. 146. Pronotum with distinctly less dense puncturation (Fig. 144). Tarsi more slender; metatarsomere I slightly longer than the combined length of II+III.
$\delta^{\top}$ : tergite VIII as in Fig. 147; posterior margin of ster-


Figs. 144-153. Micrillus indicus (Eppelsheim). - 144. Forebody. 145. Head in lateral view. 146. Antenna. 147. Male tergite VIII. 148. Male sternite VIII. 149. Male abdominal segments IX-X. 150-153. Aedeagus in lateral (150), ventral (151-152) and dorsal view (153). - Scale bars: $1.0 \mathrm{~mm}(144), 0.5 \mathrm{~mm}(145-148), 0.2 \mathrm{~mm}(149), 0.1 \mathrm{~mm}(150-153)$.
nite VIII with deep and narrow incision (Fig. 148); valvulae of segment IX very long (Fig. 149); aedeagus small and of distinctive complex morphology (Figs. 150-153).

## Distribution

The species is known only from India (Fig. 126).

### 3.2.12 Micrillus sudanicus n. sp. <br> (Figs. 126, 154-163)

Type material
Holotype ${ }^{\lambda}$ : "Sudan, Wad Medani, a. Bl. Nil, 18.X.1979, lux, leg. F. Hieke / Holotypus Micrillus sudanicus sp.n. det. V. Assing 2007" (MNHUB).

Paratypes : 2 우: same data as holotype, but 12.X. 1979
 same data, but 15.X. 1979 (MNHUB); 1 §, 2 우우: same data, but 20.X. 1979 (MNHUB, cAss); 1 甲: same data, but 22.X. 1979
(MNHUB); 1 sex?: same data, but 24.X. 1979 (MNHUB); 3 §̂ ${ }^{\text {® }}$ : same data, but 26.X. 1979 (MNHUB, cAss); 1 §, 1 ¢: same data, but 30.-31.X. 1979 (MNHUB, cAss); 1 Q: "Sudan, Wad Medani, a. Bl. Nil, 18.X.1979, lux, leg. Königsmann" (MNHUB); 1 ㅇ: "Sudan, Senaar a. Bl. Nil, lux, 21.X.1979, leg. Hieke" (MNHUB).

## Etymology

The name (adj.) is derived from Sudan, where all the localities are situated.

## Description

Measurements (inmm) and ratios (range, arithmetic mean; $\mathrm{n}=17$ ): AL: 2.50-2.81, 2.64; EyL: 0.21-0.29, 0.26; POL: 0.27-0.35, 0.30; HL: 0.79-0.85, 0.82; HW: 0.76-0.85, 0.81 ; PW: 0.75-0.87, 0.81; PL: 0.88-0.99, 0.94; EL: $0.86-1.00,0.93$; TiL: 0.79-0.86, 0.83; TaL: 0.66-0.77, 0.70; ML: 0.68-0.74, 0.71; TL: 4.9-5.7, 5.3; EyL/POL: 0.70-1.06, 0.86 ; HL/HW: $0.98-1.05,1.02$; PW/HW: 0.96-1.05, 1.01;


Figs. 154-163. Micrillus sudanicus n. sp. - 154. Forebody. 155. Head and pronotum. 156. Head in lateral view. 157. Antenna. 158. Male tergite VIII. 159. Male sternite VIII. 160. Male abdominal segments IX-X. 161-162. Aedeagus in lateral and ventral view. 163. Apex of ventral process of aedeagus in lateral view. - Scale bars: $1.0 \mathrm{~mm}(154-155,157), 0.5 \mathrm{~mm}(156,158-160), 0.2 \mathrm{~mm}$ (161-162), $0.1 \mathrm{~mm}(163)$.

PL/PW: 1.13-1.18, 1.16; EL/PL: 0.95-1.05, 1.00; TiL/TaL: 1.10-1.24, 1.18 .

Habitus of forebody as in Fig. 154. Head reddish brown to blackish brown; pronotum reddish to castaneous brown; elytra reddish to reddish yellow; abdomen reddish brown; legs yellowish brown; antennae reddish.

Head approximately as wide as long (see ratio HL/HW and Fig. 155); puncturation fine and moderately dense; median dorsal area impunctate or with very sparse puncturation; microsculpture transverse, extremely shallow and fine. Eyes relatively large (see ratio EyL/POL and Fig. 156) and distinctly projecting from lateral contours of
head in dorsal view (Fig. 155). Antenna long and slender (Fig. 157). Maxillary palpus with the terminal joint approximately half as long as preapical joint, distinctly coniform, sometimes somewhat flattened.

Pronotum approximately as wide as head, and distinctly oblong (see ratios PW/HW and PL/PW); posterior margin weakly concave; predominant puncturation fine and rather dense, interstices on average approximately as wide as punctures or narrower (Fig. 155); median impunctate area very narrow or indistinct; on either side of midline with row of approximately five coarse punctures.

Elytra relatively long (see ratio EL/PL), with parallel
lateral margins, and with well-developed humeral angles; puncturation fine, very dense, shallow, and ill-defined; microsculpture very shallow or indistinct. Hind wings fully developed.

Legs slender; metatarsomere I usually slightly longer than the combined length of II + III.

Abdomen slightly ( $0.90-0.95 \times$ ) narrower than elytra, widest at segment V; puncturation very dense; surface with distinct microsculpture; posterior margin of tergite VII with palisade fringe; posterior margin of tergite VIII strongly convex (Fig. 158).
$\delta^{\lambda}$ : sternite VII unmodified; sternite VIII along middle with modified short stout dark setae, posterior margin deeply and rather narrowly incised (Fig. 159); valvulae of segment IX conspicuously long, more than 3 times as long as tergite X (Fig. 160); aedeagus moderately asymmetric, of distinctive morphology (Figs. 161-163).

## Intraspecific variation

Maximum/minimum ratios: AL: 1.12; EyL: 1.36; POL: 1.28; HL: 1.09; HW: 1.12; PW: 1.16; PL: 1.13; EL: 1.16; TiL: 1.10; TaL: 1.16; ML: 1.09; TL: 1.16; EyL/POL: 1.51; HL/ HW: 1.07; PW/HW: 1.09; PL/PW: 1.04; EL/PL: 1.11; TiL/ TaL: 1.13.

Except for the highly variable relative and absolute eye size, morphological characters are subject to moderate intraspecific variation.

## Comparative notes

Based on external and the male sexual characters, $M$. sudanicus is closely related to M. aegyptiacus. From this species, M. sudanicus is readily distinguished by the darker and relatively smaller head, by larger and more bulging eyes, the denser puncturation of pronotum and abdomen, the completely different shape and chaetotaxy of the male sternite VIII, as well as by the distinctive morphology of the aedeagus. From Scymbalium usagarae Bernhauer, the new species is separated by the darker head, the much denser puncturation of the pronotum and by the different shape of the aedeagus. For illustrations of the primary sexual characters of S. usagarae and other species of Scymbalium described from the Ethiopian region and possibly referring to Micrillus see Fagel (1960).

## Distribution and bionomics

The species was discovered in two localities near Wad Medani near or on the bank of the Blue Nile (Fig. 126). The specimens were collected at a light source in October.

### 3.3 Key to the species of Micrillus

1 Apical joint of maxillary palpus long and slender, at least half the length of preapical palpomere (Fig. 39). Aedeagus of
simple morphology, usually slender with ventral process apically more or less bent dorsad; internal structures amorphous and weakly sclerotised. - Western Palaearctic (including Middle Asia); absent from Egypt (Fig. 2). Micrillus testaceus group.
Apical joint of maxillary palpus of conical shape and shorter than half the length of preapical palpomere. Aedeagus of complex morphology, usually asymmetric and with distinctly sclerotised internal structures. - Afrotropical and Oriental regions, in the Palaearctic confined to Egypt (Fig. 2). Micrillus aegyptiacus group.
2 Eyes fully developed or of reduced size, but always composed of ommatidia. Posterior margin of abdominal tergite VII at least with narrow rudiment of a palisade fringe. . . . 3

- Eyes extremely reduced, without ommatidia. Abdominal tergite VII without palisade fringe. - Distribution confined to North Africa.
3 Posterior margin of head distinctly concave in the middle (Fig. 61). Eyes, elytra, and hind wings not reduced (Figs. 59-60, 62). Posterior margin of male sternite VIII with deeply and broadly triangular excision (Fig. 64). Aedeagus as in Figs. 66-74. - Known distribution confined to Iraq and Israel (Fig. 58). $\qquad$ M. irakensis (Cameron)
- Posterior margin of head not distinctly concave, usually truncate. Aedeagus of different morphology.
4 Species of pale (yellowish, reddish or pale brown) coloration. Eyes, elytra, and hind wings not reduced (Figs. 48-49). Posterior margin of male sternite VIII with shallow emargination (Fig. 50). Aedeagus of distinctive shape, rather broad in ventral view, ventral process apically not bent dorsad, and with two clusters of moderately sclerotised internal structures (Figs. 51-55). - Caucasus region and Middle Asia (Fig. 58).
M. pallidus (Reitter)
- Mature specimens usually (but not always!) of darker coloration, reddish to dark brown. Eyes, elytra, and hind wings often of reduced size or length, respectively. Aedeagus more slender, with one cluster of internal structures and with ventral process apically bent dorsad.
5 Wing-dimorphic, on average smaller species; eyes on average larger (EyL/POL: 0.23-0.55). Elytra and abdomen with finer puncturation (Figs. 4-9, 11). Posterior margin of male sternite VIII with deeper triangular emargination (Fig. 13). Widespread species with slender aedeagus with more weakly sclerotised ventral process (Figs. 16-26), or distribution confined to Algeria.
- Monomorphic brachypterous species (Figs. 34-35); eyes (Fig. 38) usually smaller (EyL/POL: 0.21-0.33). Elytra and abdomen with coarser and denser puncturation (Figs. 35, 37). Posterior margin of male sternite VIII with shallow emargination (Fig. 56). Aedeagus relatively broad and with rather strongly sclerotised ventral process (Figs. 41-46). Endemic to northern Morocco (Fig. 47).
M. scabrosus (Fauvel)

6 Aedeagus longer ( $>0.75 \mathrm{~mm}$ ), slender, and with weakly sclerotised internal structures (Figs. 16-26). - Widespread in the south of the West Palaearctic region (Fig. 32).
M. testaceus (Erichson)

- Aedeagus shorter $(<0.70 \mathrm{~mm})$, broader, and with distinctly sclerotised internal structures (Figs. 106-110). - Known only from the surroundings of Biskra, Algeria (Fig. 47). . . .
M. biskrensis (Fauvel)

7 Elytra slightly narrower than pronotum (Fig. 98). Eye rudiments (Fig. 99) slightly larger, $0.06-0.07 \mathrm{~mm}$, EyL/POL: $0.12-0.15$. Aedeagus apically pointed in ventral view (Figs. 102-103). - Known only from two localities in Taza district, Morocco (Fig. 47).
. M. tenuipennis $\mathbf{n}$.sp.

- Elytra approximately as wide as pronotum. Eye rudiments
(Figs. 77, 88) smaller, $0.03-0.05 \mathrm{~mm}$, EyL/POL: 0.07-0.13. Aedeagus apically weakly to distinctly concave in ventral view. - Distribution confined to Algeria.
.8
8 Smaller species; HL $<0.80 \mathrm{~mm}$, HW $<0.80 \mathrm{~mm}$, PW $<$ 0.80 mm . Antenna shorter (Fig. 89), AL $<2.05 \mathrm{~mm}$. Eye rudiments smaller (Fig. 88), EyL: $0.03-0.05 \mathrm{~mm}$. Pronotum on average more oblong (Fig. 87), PL/PW: 0.12-0.17. Head less oblong (Fig. 87), HL/HW: 0.97-1.02, and smaller in relation to pronotum, approximately as wide as pronotum (Fig. 87), PW/HW: 0.97-1.02. Head with coarser and denser puncturation and with more pronounced microsculpture (Fig. 87). Aedeagus apically weakly concave in ventral view and less strongly bent dorsad in lateral view (Figs. 93-96). - Algeria: surroundings of Algier (Fig. 47). . M. subterraneus Raffray
- Larger species; HL $\geq 0.90 \mathrm{~mm}$, HW $>0.85 \mathrm{~mm}$, PW $>$ 0.80 mm . Antenna longer (Fig. 78), $\mathrm{AL}>2.15 \mathrm{~mm}$. Eye rudiments slightly larger (Fig. 77), EyL: 0.05 mm . Pronotum on average less oblong (Fig. 76), PL/PW: 0.10-0.13. Head more oblong (Fig. 76), HL/HW: 1.03-1.08, and larger in relation to pronotum, wider than pronotum (Fig. 76), PW/HW: $0.90-0.97$. Head with finer and sparser puncturation and with weaker microsculpture (Fig. 76). Aedeagus apically distinctly concave in ventral view and strongly bent dorsad in lateral view (Figs. 81-85). - Algeria: Djebel Bou Zegza (Fig. 47). . . . . . . . . . . . . . . . . M. hypogaeus (Peyerimhoff)
9 Smallest species of the genus; HL $<0.60 \mathrm{~mm}$, HW $<$ 0.60 mm , PL $<0.65 \mathrm{~mm}$, PW $<0.55 \mathrm{~mm}$. Wing-dimorphic (Figs. 128-129); brachypterous morph with very small eyes (Fig. 130), short elytra, and reduced hind wings (Fig. 128). Valvulae of abdominal segment IX relatively short (Fig. 136). Male sternite VIII posteriorly very deeply and very narrowly incised (Figs. 134-135). Aedeagus of distinctive morphology (Figs. 130-134). - Egypt and Sudan (Fig. 143). .
M. torretassoi (Koch)
- Larger species; HL $>0.70 \mathrm{~mm}$, HW $>0.70 \mathrm{~mm}$, PL $>$ $0.80 \mathrm{~mm}, \mathrm{PW}>0.65 \mathrm{~mm}$. Monomorphic macropterous species with distinctly larger eyes. Valvulae of abdominal segment IX very long. Male sternite VIII posteriorly with much less deep and broader excision. Aedeagus of completely different morphology.
10 Eyes smaller (Fig. 145). Male sternite VIII posteriorly more deeply and more narrowly incised (Fig. 148). Aedeagus of distinctive morphology (Figs. 150-153). - India (Fig. 126)..
. ............................... indicus (Eppelsheim)
- Eyes larger. Male sternite VIII and aedeagus of different morphology. - Africa.

11
11 Eyes larger and more bulging (Figs. 155-156). Head shorter, HL $0.79-0.85 \mathrm{~mm}$. Pronotum (Fig. 155) and abdomen with very dense puncturation. Male sternite VIII with short stout modified setae in the middle and with pronounced posterior excision (Fig. 159). Aedeagus of distinctive morphology (Figs. 161-163). - Sudan (Fig. 126)..... . M. sudanicus n.sp.

- Eyes somewhat smaller and less bulging (Figs. 112-113). Head longer, HL $0.88-0.94 \mathrm{~mm}$. Pronotum (Fig. 112) and abdomen with less dense puncturation. Male sternite VIII without modified setae and with broader and less deep posterior excision (Fig. 116). Aedeagus of completely different morphology (Figs. 118-123). - Egypt (Fig. 126).
M. aegyptiacus (Bernhauer)


### 3.4 Synonymic catalogue

The species names are listed in alphabetic order in Tab. 1; species from regions other than the Palaearctic are
given in square brackets. The distribution is based exclusively on examined material.

### 3.5 On the identity of Scymbalium minimum Eppelsheim

The species, which was originally described from "Macedonien" (Eppelsheim 1888), has been listed in the catalogues by Bernhauer \& Schubert (1912) and Smetana (2004), and was also included in the key to the species of Scymbalium by Wanka (1914), but has never been recorded again. Since, with few exceptions, all the Micrillus species described before 1980 were originally described in Scymbalium, it did not seem unlikely that $S$. minimum, too, should belong to Micrillus. An examination of the types, however, revealed that they refer to neither of the two genera, but to the following species of the genus Pseudomedon:

## Pseudomedon dido (Saulcy, 1865)

Scymbalium minimum Eppelsheim, 1888408 f.; n.syn.
Medon apfelbecki Bernhauer, 1899: 25; synonymy confirmed.

Type material examined
S. minimum: Holotype ơ: "Macedon. / 26 / minimum Epp., Deutsch. ent. Zeit. 1888, p. 408 / Typus / c. Epplsh. Steind. d. / Holotypus Scymbalium minimum Eppelsheim rev. V. Assing 2007 / Pseudomedon dido (Saulcy) det. V. Assing 2007" (NHMW).
M. apfelbecki: Lectotype ${ }^{\top}$, here designated: "Sarajevo, Hochwass / Apfelbecki Bernh. Type / Medon Apfelbecki Typus / Lectotypus Medon apfelbecki Bernhauer desig. V. Assing 2007 / Pseudomedon dido (Saulcy) det. V. Assing 2007" (NHMW). Paralectotype [abdomen missing]: "Hochwasser / Apfelbecki Bernh. Bosn., Apfelb. Type / Typus" (NHMW).

Additional material examined
Bosnia-Herzegovina: 1 ex., Ilidže, 1902, leg. Apfelbeck (NHMW); 1 ex., Sarajevo, leg. Apfelbeck (NHMW).

## Comments

The original description of Scymbalium minimum is explicitly based on a single specimen from "Macedonien" (Eppelsheim 1888). An examination of the aedeagus revealed that it is conspecific with the current interpretation of Pseudomedon dido.

Bernhauer (1899) based the original description of Medon apfelbecki on several specimens ("in mehreren Stücken" from the "Umgebung von Sarajevo in Bosnien". Two of these syntypes, one of them a male in good condition and the other a specimen without abdomen, were found in the collections of the NHMW. The male is here designated as the lectotype.

Tab. 1. Synonymic catalogue of Micrillus spp.

| Species | Distribution |
| :---: | :---: |
| aegyptiacus (Bernhauer, 1910) <br> $=$ bernhaueri (Koch, 1934); n.syn. | Egypt |
| biskrensis (Fauvel, 1898) | Algeria |
| hypogaeus (Peyerimhoff, 1907) | Algeria |
| [indicus (Eppelsheim, 1890)] | India |
| irakensis (Cameron, 1940) | Iraq, Israel |
| pallidus (Reitter, 1887) <br> = rufotestaceus (Cameron, 1939) <br> = caucasicus Coiffait, 1980; n.syn. | Armenia, Azerbaijan, Russian South European territory, Uzbekistan, Turkmenistan |
| scabrosus (Fauvel, 1875) | Morocco |
| subterraneus Raffray, 1873 | Algeria |
| [sudanicus n.sp.] | Sudan |
| tenuipennis $\mathbf{n}$.sp. | Morocco |
| testaceus (Erichson, 1840) <br> $=$ grandiceps (Jacquelin du Val, 1853); resyn. <br> $=$ longicollis (Mulsant \& Rey, 1853) <br> $=$ pubipennis Fairmaire, 1860); n.syn. <br> = longipennis (Brisout, 1863); n.syn. <br> = saintpierrei (Allard, 1869) <br> = trapezicollis (Uhagón, 1876) <br> $=$ meridionalis (Gridelli, 1914) <br> = tergestina (Gridelli, 1914); n. syn. <br> = zuercheri (Wanka, 1914); n. syn. <br> = libanicus Coiffait, 1980; n. syn. <br> $=$ hispanicus Coiffait, 1980; n.syn. <br> = zacinthicus Coiffait, 1980; n.syn. <br> $=$ syriacus Coiffait, 1980; n.syn. <br> = calabricus Coiffait, 1980; n.syn. <br> $=$ turcicus Coiffait, 1980; n.syn. <br> = graecus Coiffait, 1980; n.syn. <br> = cypriacus Coiffait, 1980; n.syn. <br> = corcyranus Coiffait, 1980; n.syn. <br> = brekhovi Grebennikov, 2001; n. syn. | Mediterranean region: Tunisia, Algeria, Morocco, Gibraltar, Spain, Portugal, France, Italy, Croatia, Bosnia-Herzegovina, Montenegro, Albania, Greece, Turkey, Cyprus, Lebanon, Syria, Israel; Ukraine, southwest of Russian Federation (Russian South European territory) |
| torretassoi (Koch, 1934) <br> = collare (Scheerpeltz, 1962); n.syn. | Egypt, Sudan |

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Author's address:
Dr. Volker Assing, Gabelsbergerstr. 2, 30163 Hannover, Germany; e-mail: vassing.hann@t-online.de

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