

A revision of the genus *Piochardia* HEYDEN, 1870 (Insecta: Coleoptera: Staphylinidae: Aleocharinae)

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Abstract

An examination of the available types and additional material from various collections yielded eight valid species of *Piochardia*. The following new synonymies are established: *Piochardia reitteri* (WASMANN, 1894) = *P. schimmeri* VIEHMEYER, 1918 syn.n., and *P. oberthuri* (FAUVEL, 1878) = *P. escherichi* FAUVEL, 1902 syn.n. Lectotypes are designated for *P. schaumii* (KRAATZ, 1857), *P. bedeli* (FAUVEL, 1886), *P. oberthuri*, and *P. escherichi*. The taxonomic history, systematic position and bionomics of the myrmecophilous genus are outlined. The diagnoses of the species include drawings of the genitalia and further distinguishing characters. They are complemented by comments on distribution and bionomics. A revised key to the known representatives of the genus is provided.

Key words: Coleoptera, Staphylinidae, *Piochardia*, *Cataglyphis*, myrmecophily, new synonymy, taxonomy, Palaearctic Region, Oriental Region, distribution.

Zusammenfassung

Eine Revision der verfügbaren Typen und weiteren Materials aus verschiedenen Sammlungen ergab acht valide Arten der Gattung *Piochardia* sowie die folgenden Synonymisierungen: *Piochardia reitteri* (WASMANN, 1894) = *P. schimmeri* VIEHMEYER, 1918 syn.n., und *P. oberthuri* (FAUVEL, 1878) = *P. escherichi* FAUVEL, 1902 syn.n. Für *P. schaumii* (KRAATZ, 1857), *P. bedeli* (FAUVEL, 1886), *P. oberthuri* und *P. escherichi* werden Lectotypen designiert. Die Geschichte der Gattung und ihrer systematischen Stellung sowie die verfügbaren Angaben zur Bionomie der myrmecophilen Gattung werden zusammengefaßt. Die Beschreibungen werden durch Abbildungen der Genitalien und weiterer Differentialmerkmale, durch Angaben zur Verbreitung und Bionomie sowie durch eine Bestimmungstabelle ergänzt.

Introduction: Taxonomic history and systematics

When KRAATZ (1857) described the genus *Oxysoma*, containing only the new species *O. schaumii*, he placed it near *Aleochara* GRAVENHORST, 1802 and *Dinarda* LEACH in SAMOUELLE, 1819, basing his view especially on a study of the mouthparts and the antennae. Only little more than a decade later HEYDEN (1870) described the genus *Piochardia* for the new species *P. lepismiformis*. Without examining the mouthparts, he concluded from the external resemblance (shape and proportions of body, tarsal formula) that it was closely related to *Homoeusa* KRAATZ, 1856, from which it was separated by the more slender maxillary palpi and the shape of the antennae. There is no reference to *Oxysoma* in his description, but in a short note KRAATZ (1870), after studying the holotype of *P. lepismiformis*, emphasized the similarity of *Piochardia* with *Oxysoma*. In view of the differences in the shape of the pronotum KRAATZ maintained both taxa as distinct genera, but was obviously in doubt stating that in order to be sure the mouth-

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parts would have to be examined. In the following years, five further species were described in the genus *Oxysoma*: *Oxysoma oberthuri* and *O. bedeli* by FAUVEL (1878, 1886), *O. aleocharina* by REITTER (1890), *O. reitteri* by WASMANN (1894) and *O. sefrensis* by PIC (1897), until it was discovered that *Oxysoma* KRAATZ, 1857 was a junior homonym of *Oxysoma* NICOLET, 1849 and that *Piochardia* HEYDEN, 1870 was the valid name (FAUVEL 1897, BLACKWELDER 1952). BERNHAUER (1901) presented a diagnostic key to the genera of the tribe Aleocharini (at that time also including the genera today placed in the Oxypodini and Dinardini), separating *Piochardia* and *Aleochara* from all other Palaearctic genera by the number of joints of the maxillary and labial palps. One year later the same author gave a detailed diagnosis of *Piochardia*, also of the mouthparts, described and keyed all the known species, and synonymized *P. sefrensis* with *P. schaumii* (BERNHAUER 1902). His synopsis did not include *P. escherichi*, which was described in the same year by FAUVEL (1902). A further key, which included *P. escherichi* and the new species *P. schimmeri*, was presented by VIEHMEYER (1918). He added a list of known host ants, according to which four species (*P. schaumii*, *P. bedeli*, *P. oberthuri* and *P. schimmeri*) were associated with *Cataglyphis bicolor* (F., 1793), one species (*P. escherichi*) with *C. albicans* (ROGER, 1895) and one (*P. lepismiformis*) with *C. viaticus* (F., 1787). Further morphological details characterizing the genus, especially regarding the ventral aspect of the body, were given by FENYES (1920), whose description is otherwise in agreement with that by BERNHAUER (1902) and who maintained the position of *Piochardia* in the - meanwhile much more restricted - tribe Aleocharini (near *Aleochara*), where it has remained ever since. WASMANN (1925) presented a revised key to include all the species known at that time and to accommodate the new species *P. donisthorpei* from India. Up to today only one further species of *Piochardia* has been described: *P. guadalupensis* by FAGEL (1959).

Material and measurements

Type specimens and additional material from the following institutions and collections were examined:

DEI	Deutsches Entomologisches Institut, Eberswalde (L. Zerche)
FIS	Forschungsinstitut Senckenberg, Frankfurt a. M. (A. Vesmanis)
HNHM	Hungarian Natural History Museum, Budapest (O. Merkl)
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Bruxelles (D. Drugmand)
MNHUB	Museum für Naturkunde der Humboldt-Universität, Berlin (M. Uhlig)
MHNG	Muséum d'Histoire naturelle, Genève (I. Löbl)
MNHNP	Muséum National d'Histoire Naturelle, Paris (N. Berti)
NHMB	Naturhistorisches Museum Basel, coll. Frey (E. Sprecher)
NHMM	Natuurhistorisch Museum Maastricht (F. N. Dingemans-Bakels)
NHMW	Naturhistorisches Museum Wien (H. Schillhammer)
NMP	Národní Muzeum v Praze (J. Jelínek)
SMTD	Staatliches Museum für Tierkunde, Dresden (O. Jäger)
cAss	author's private collection

I am much indebted to the colleagues indicated above for arranging the loans of material needed for the preparation of the present study.

The following abbreviations are used for the measurements, which are given in mm:

HW: head width at hind margin of eyes; PW: maximal width of pronotum; PL: length of pronotum along median line; EW: maximal width of elytra; EL: length of elytra from apex of scutellum to hind margin; HTiL: length of metatibia; HTaL: length of metatarsus; TiL: length of first joint of metatarsus; T24L: combined length of second, third and fourth metatarsomere; TL: total length.

The genus *Piochardia* HEYDEN, 1870

Type species: *Piochardia lepismiformis* HEYDEN, 1870

Diagnosis: Species of intermediate size; body shape characteristic, wedge-like, with very wide pronotum, short elytra, and abdomen continuously tapering from base to apex.

Head transverse and with large eyes; genae and hind margin finely carinate; antennae rather short and compact; somewhat flattened, in cross-section more or less ellipsoid; antennomeres contiguous, i.e. basal constrictions invisible. Maxillary and labial palpi 4- and 3-jointed, respectively, both with terminal pseudosegment (Fig. 2); ligula broadly bifid, apices apically with minute seta (Fig. 1); labrum and mandibles as in Figs. 3, 4.

Pronotum covering hind part or, when head is bent down, all of the head; strongly transverse, much wider posteriorly than anteriorly with maximal width in posterior half; hind angles distinct, but rounded; hind margin sinuate; hypomera obsolete.

Elytra at suture clearly shorter than pronotum; alae (always?) fully developed; scutellum large, transverse, often covered by pronotum.

Prosternum anteriorly largely membranous, so as to allow the head to be fully bent against procoxae; the latter very long, more or less flatly triangular in cross-section, their anterior and exterior faces flattened and sharply separated by carina, so that, with head bent down, head and the flat profemur can be tightly pressed against the anterior and exterior faces of procoxae, respectively, so as to allow head (including its appendages), procoxae and profemora to form a compact body, which again can be pressed against the mesonotum, dorsally and laterally protected by pronotum, and the mesotibia and the flattened mesofemora, respectively; mesosternum anteriorly broadly concave and carinate, median carina absent; mesosternal process acute and reaching between mesocoxae; hind margin of metasternum centrally with short triangular protrusion; dorsal to hind coxae with large sclerite, quite probably homologous to abdominal sternum II; metepisterna strongly developed, very wide and posteriorly reaching well beyond hind margin of elytra.

Legs very long and slender, hind tarsi more or less slender, in some species almost as long as hind tibiae; first joint of metatarsus elongate, at least as long as the combined length of the two following joints; tibiae without spines; femora flattened in cross-section; inner face of apical half of meso- and metatibiae with more or less dense and long pubescence.

Abdomen with more or less dense, often partly granulose punctation; pubescence decumbent to semi-erect; terga without anterior transverse impressions; hind margin of

tergum VIII more or less concave and with sparse pubescence, that of sternum VIII weakly to strongly convex, with dense and longer pubescence; sexual dimorphism of segment VIII indistinct or absent.

♂: median lobe of aedeagus more or less uniform, very long and slender, internal sac with weakly sclerotized apical structures and short flagellum; apical lobes of parameres very long and with three setae.

♀: spermatheca of rather uniform shape, with large round capsule and short duct.

Comments: Judging from the morphology of the mouthparts, the morphology of the ventral aspect of the thorax and the genitalia (shape of median lobe, internal structures, spermatheca) *Piochardia* is correctly placed in the tribe Aleocharini. The genus shows several morphological adaptations to the association with ants: the stout and flattened antennae (e.g. as in *Lamprinus* HEER, 1839, *Lamprinodes* LUZE, 1901, *Notothecta* THOMSON, 1858, and *Thiasophila* KRAATZ, 1856), the build of the protective pronotum and the wedge-like shape of the body (e.g. as in *Lamprinus*, *Lamprinodes*, *Homoeusa*), the morphology of the pro- and mesosternum, the shape of the procoxae, the flattened femora and the long legs (e.g. as in *Myrmecopora* SAULCY, 1864 s.str.).

Note that according to several authors the scutellum of all (BERNHAEUER 1902, FENYES 1920) or most species (VIEHMEYER 1918, WASMANN 1925) of *Piochardia* is small, an incorrect observation probably resulting from the fact that in normal preparation the scutellum is covered by the posteriorly convex pronotum to various degrees.

Distribution and bionomics: Species of *Piochardia* have been recorded from the southern Mediterranean, from Portugal in the west, the North African countries to the southern Balkans, the Caucasus, the Middle East, and from India. They are associated with Formicidae of the genus *Cataglyphis* FOERSTER, 1850, most of them have been found with ants of the *C. bicolor* species group. However, owing to the number of names in use in *Cataglyphis* on the one hand (see AGOSTI 1990) and the absence of recent taxonomic revisions and keys on the other hand, a safe identification of the host ants at the species level is currently difficult.

ESCHERICH (1902) gives a detailed account of the behaviour of *P. oberthuri*, based on several months of observation of four captured specimens, which he kept together with their host ant (*Cataglyphis* cf. *bicolor*). The beetles neither fed on the ants' eggs, larvae or pupae, nor were they fed by the workers. Instead they climbed onto the workers, licking the cuticula of their whole body and, having finished doing so, looked for a new host worker. When the number of workers declined towards the end of the experiment, the feeding activity of the beetles increased drastically until eventually, with only two ant workers left, the last two *Piochardia* died. From this the author concludes that they probably live on secretions of the ants' cuticular glands. He also observed that, just like their host ants, they usually moved with stilted legs and with the abdomen bent upwards. The ant workers displayed no aggressive behaviour towards guests in their own nest. When confronted with *Piochardia* from other ant nests, however, the beetles were killed immediately.

Nothing is known about the morphology and bionomics of the larvae. On one occasion, a single mature egg of moderate size (Fig. 27) and of the usual aleocharine morphology was observed in the ovaries of a dissected female.

The species of the genus *Piochardia*

Piochardia reitteri (WASMANN, 1894) (Figs. 1 - 11)

Oxysoma reitteri WASMANN, 1894: 206.

Oxysoma oberthuri FAUVEL, 1878 (partim).

Piochardia reitteri (WASMANN): BERNHAUER (1902) - BERNHAUER & SCHEERPELTZ (1926) - VIEHMEYER (1918) - FENYES (1920) - WASMANN (1925).

Piochardia schimmeri VIEHMEYER, 1918: 71 ff., **syn.n.**

Piochardia fauveli SCHEERPELTZ, i. l.

Type material examined: *Oxysoma reitteri*: **Holotype** ♀: Caucasus, Araxesthal, Leder. Reitter/ Type (NHMM).

Additional material examined:

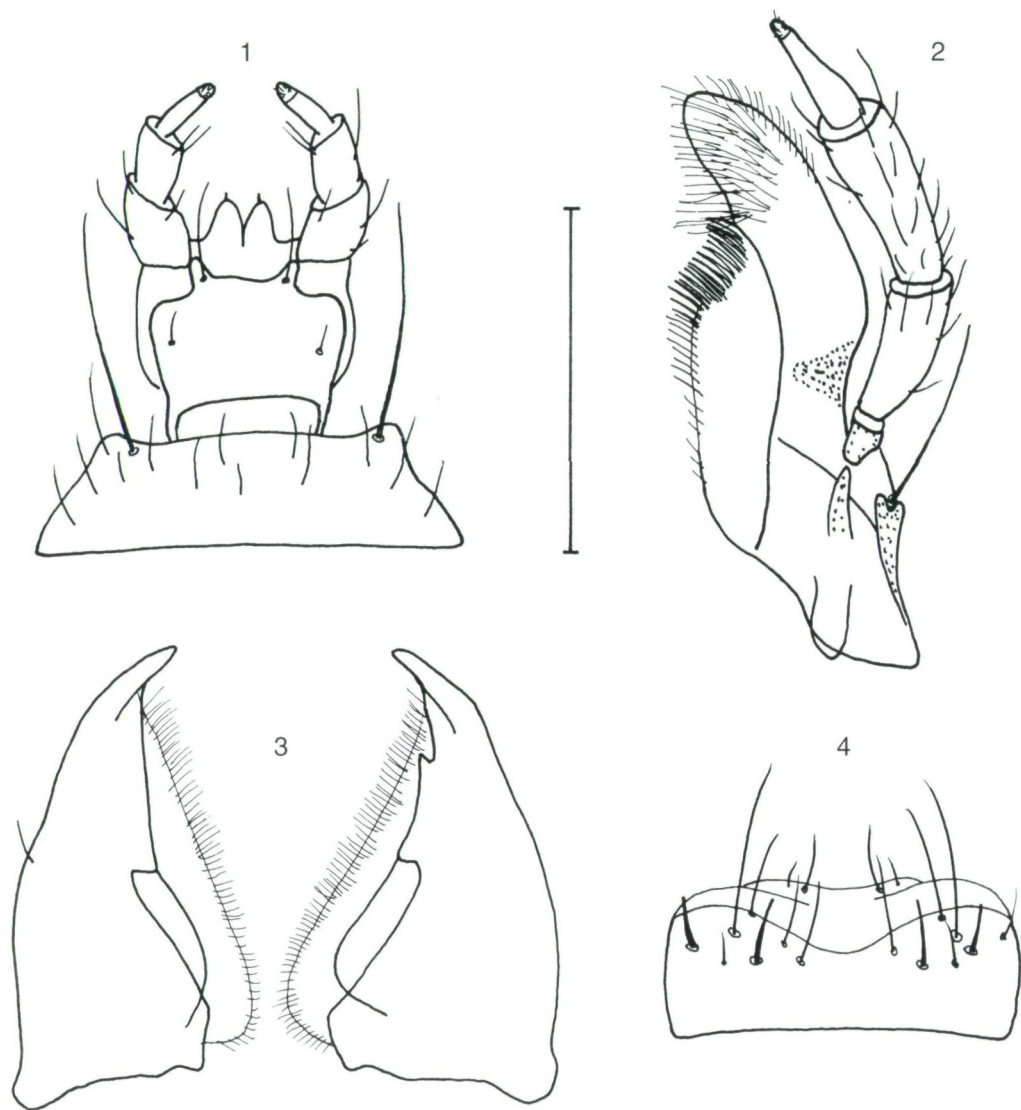
Bosnia-Herzegovina: 1 ♂, Žitomižtic, 13.VI.1911, leg. Schumacher-Spaney (MNHUB). **Albania:** 1 ex., Tiranë, leg. Strupi (NHMW); 3 ♂♂, 1 ♀, 7 ex., "Lumi Beratit", V.1931, with *Cataglyphis nodus* (BRULLÉ), leg. Winkler, Lona, Bischoff (FIS, NHMB, NHMW, cAss); 1 ♂, 4 ex., "Iba-Arsen", VI.1932, leg. Bischoff (FIS, cAss); 6 ex., Vlorë (MNHUB); 1 ex., "Alban. sept., Skutari Mesi", IV.-V.1905, leg. Apfelbeck (NHMW). **Greece:** 3 ♂♂, 3 ♀♀, Thessalia, 5 km NE Vólo, Pilion, 500 - 700 m, with *Cataglyphis nodus* (Brullé), 15.V.1996, leg. Schulz & Vock (cAss). **Turkey:** 1 ♀, Izmir ["Smyrna/ *Oxysoma oberthuri* FvI/ type/ reitteri Wasm./ spec.?/ ex coll. Skalitzy/ Typus *Piochardia fauveli* O. Scheerpeltz, Paralectotypus *Oxysoma oberthuri* Fauvel desig. V. Assing 1997"] (NHMW); 2 ex., Izmir ["Smyrna"], coll. Reitter (HNHM). **Caucasus:** **Azerbaijan:** 3 ♂♂, 1 ♀, 20 ex., Ordubail ["Araxesthal"], leg. Leder, Reitter (DEI, HNHM, IRSNB, NHMB, NHMW, cAss); 2 ♂♂, 11 ex., Gyandzha (= Kirovabad) ["Elisabetpol, Babadjanides"] (DEI, FIS, MNHUB, NHMW, NMP, cAss). Locality not specified: 2 ♀♀, 2 ex., [Kaukasus] (DEI, NMP, cAss). **Syria:** 2 ♀♀ [with *Cataglyphis nodus* attached to the same pin], Damascus, Diabieh, 650 m, 20.IV.1990, leg. Agosti (MHNG, cAss). **Iraq:** 1 ♀, Baghdād, leg. Kálalová (NMP). **Locality not identified:** 1 ex., "Epebah, ACCP, 2.V.1952" (HNHM); 2 ex., "Avlona" [= Greece, Evvoia, Avlonáron?], leg. Holtz (NHMB).

Diagnosis: Measurements (range and arithmetic mean, $n = 74$): HW: 0.64 - 0.74, 0.69; PW: 1.42 - 1.71, 1.58; PL: 0.78 - 0.99, 0.90; EW: 1.40 - 1.65, 1.54; EL: 0.47 - 0.62, 0.55; HTiL: 0.79 - 0.97, 0.90; HTaL: 0.64 - 0.87, 0.78; T1L: 0.23 - 0.34, 0.28; T24L: 0.25 - 0.36, 0.31; TL: 2.7 - 5.4, 3.95.

Colour somewhat variable, uniformly yellowish brown to brown; usually antennomeres 3 - 10, often also parts of abdominal terga III - VI/VII and head darkened, brown to dark brown. Pubescence dense, rather short and inconspicuous on head and thorax, clearly longer on abdomen.

Head transverse, 1.18 times wider than long (length measured from anterior margin of clypeus to hind margin of head), with shallow punctation and microsculpture; eyes large, slightly longer than temples in dorsal view. Antenna short and compact; antennomere 1 weakly oblong and only slightly longer than antennomere 2; antennomeres 2 - 3 oblong, 4 - 5 weakly oblong to subquadrate, 6 - 10 transverse; antennomere 11 approximately as long as the combined length of the two preceding antennomeres.

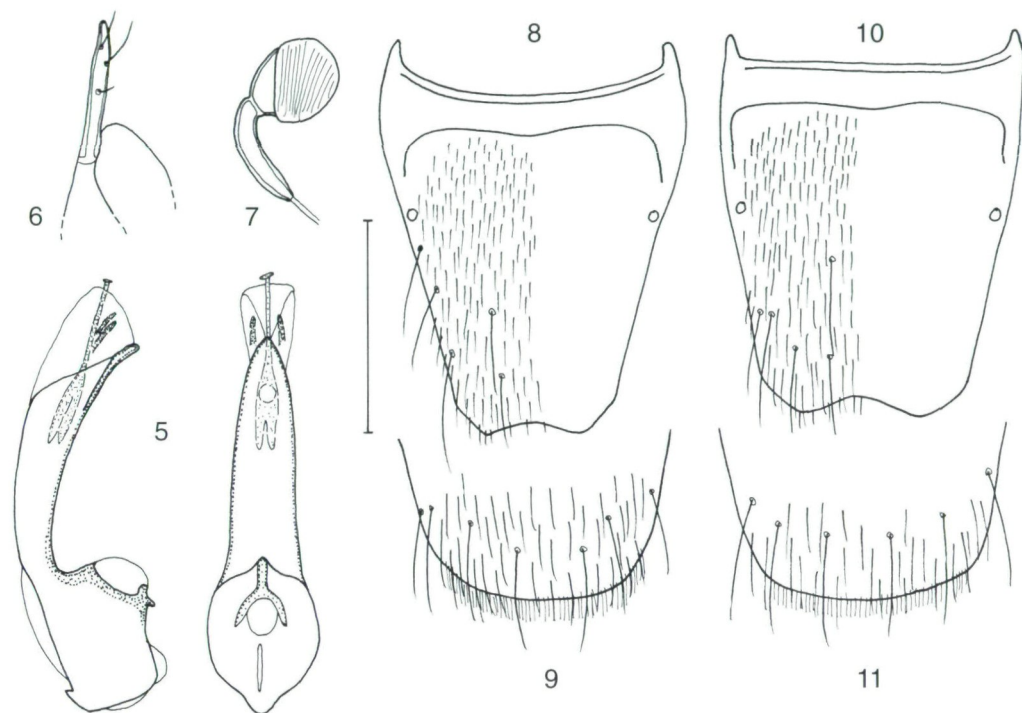
Pronotum distinctly transverse (PW/PL: 1.65 - 1.84, mean: 1.75), much wider than head (PW/HW: 2.09 - 2.48, mean: 2.30), and at least as wide as, usually slightly wider than elytra (PW/EW: 0.99 - 1.06, mean: 1.02); microsculpture and punctation even finer than on head; hind margin comparatively weakly sinuate, i.e. hind margin centrally rather weakly convex, so that in normal preparation the posterior angles more or less reach (or even project over) the transverse tangent to central hind margin and the apex of the scutellum is not covered by the pronotum; hind angles rounded, but more or less marked.



Figs. 1 - 4: *Piochardia reitteri*: scale = 0.25 mm, (1) labium, (2) maxilla, (3) mandibles, (4) labrum.

Elytra much shorter than pronotum (EL/PL: 0.56 - 0.68, mean: 0.61); punctation fine and dense; relatively mat due to rather dense microsculpture composed of transverse meshes.

Legs very long, metatarsus 0.77 - 0.93 times (mean: 0.85) the length of metatibia, first metatarsomere almost as long as the combined length of the three following tarsomeres (T1L/T24L: 0.75 - 1.00, mean: 0.88); pubescence of internal face of apical half of meso- and metatibia moderately dense.



Figs. 5 - 11: *Piochardia reitteri*: scale = 0.5 mm, (5) aedeagus in lateral and in ventral view, (6) apical lobe of paramere, (7) spermatheca, (8) ♂ tergum VIII, (9) hind margin of ♂ sternum VIII, (10) ♀ tergum VIII, (11) hind margin of ♀ sternum VIII.

Abdomen with dense and slightly granulose punctation, which is less dense on the posterior half of tergum VII than on the preceding terga; hind margins of abdominal terga III - VI each with a row of distinct, longitudinal granula; microsculpture very indistinct or absent.

Hind margin of tergum VIII distinctly concave, that of sternum VIII weakly convex in both sexes (Figs. 8 - 11).

♂: aedeagus small, shape as in Fig. 5; apical lobe of paramere with median seta close to apical seta (Fig. 6).

♀: duct of spermatheca distinctly bent (Fig. 7).

Comments: VIEHMEYER (1918) based his description of *P. schimmeri* on a single specimen from "Votno in der Nähe von Üsküb [now Skopje]" in Macedonia. The holotype was looked for, but not found, in the Staatliches Museum für Tierkunde, Dresden, where the Viehmeyer collection is deposited; the whereabouts of the collection of F. Schimmer are unknown (HORN & al. 1990). When describing *P. schimmeri*, VIEHMEYER (1918) had only few (old) specimens of *P. reitteri* for comparison, so that it was impossible for him to fully assess the intraspecific variation in that species; records from the Balkans were unknown to him. The morphological details he indicates in the original description all

fall in the range of *P. reitteri*. The only distinguishing character he explicitly mentions in his key is body colour; in addition, differences in body size, width of pronotum and the size of the scutellum ("das Schildchen der *reitteri* ist winzig und kaum sichtbar") can be inferred. The latter observation is clearly an error, the scutellum in *P. reitteri* - as in its congeners - is large; in normal preparation the pronotum covers the scutellum to various degrees, which probably led Viehmeyer to believe that the scutellum of the specimen(s) he examined was minute. The indicated body size (4.5 mm) and the width of the pronotum (1.65 mm) are well within the range of *P. reitteri* (see measurements). Finally, numerous specimens of *Piochardia* matching Viehmeyer's description from several localities in the Southern Balkans (Albania, Greece), near the type locality of *P. schimmeri* and identified as *P. schimmeri* by various coleopterists, were examined; all of them proved to be *P. reitteri*. As there can be hardly any doubt that the specimen Viehmeyer described was in fact conspecific with *P. reitteri*, *P. schimmeri* is here considered a junior synonym of that species.

Distribution and bionomics: *Piochardia reitteri* is distributed from the Southern Balkans (Albania, Bosnia-Herzegovina, Macedonia, Greece) to the Caucasus, Anatolia, Syria, Iraq, and Iran (BERNHAEUER & SCHEERPELTZ 1926, LIKOVSKY 1981, VIEHMEYER 1918, WASMANN 1925; see material examined). It has been collected in spring from April to June (material examined) and in August (LIKOVSKY 1981) in association with *Cataglyphis nodus* (BRULLÉ, 1832).

Piochardia schaumii (KRAATZ, 1857) (Figs. 12 - 16)

Oxysoma schaumii KRAATZ, 1857: 18 f.

Oxysoma schaumii KRAATZ: FAUVEL (1886).

Piochardia schaumii (KRAATZ): FAUVEL (1897) - BERNHAUER (1902) - BERNHAUER & SCHEERPELTZ (1926) - VIEHMEYER (1918) - FENYES (1920) - WASMANN (1925).

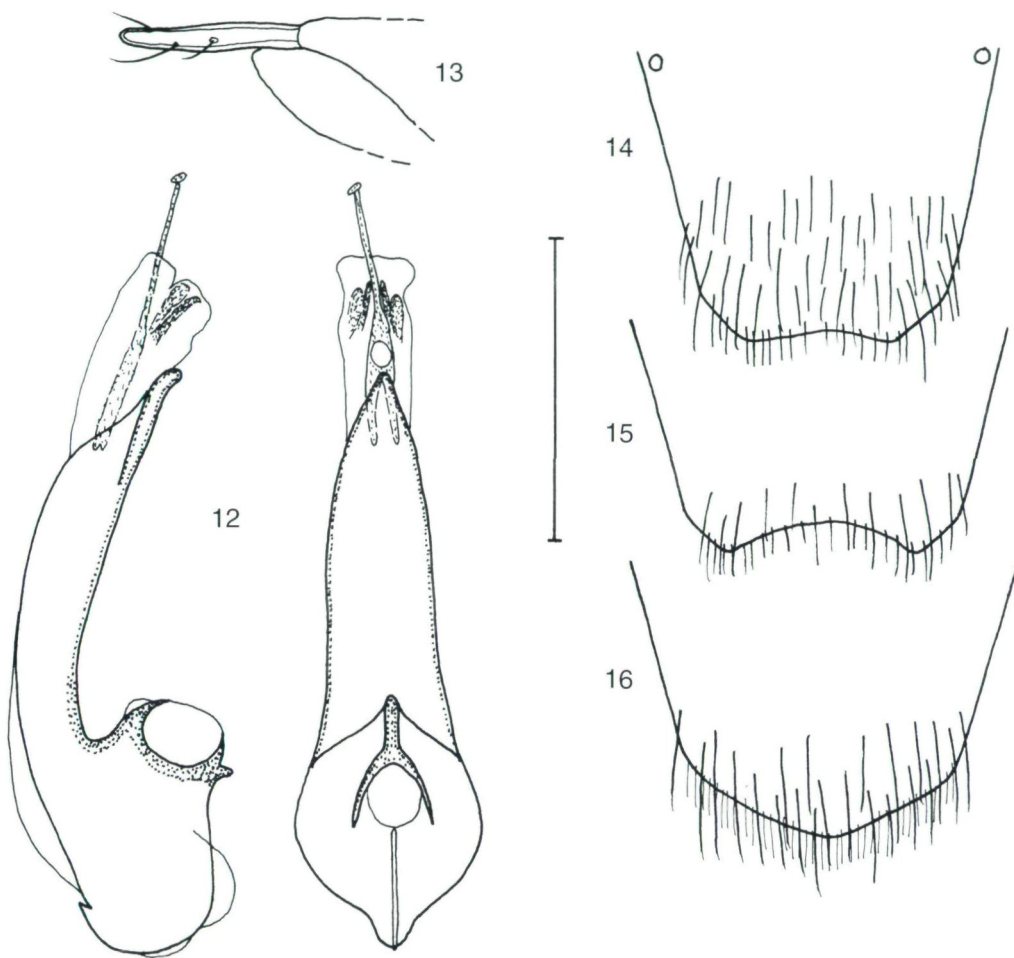
Piochardia sefrensis (PIC, 1897): synonymy by BERNHAUER (1902).

Type material examined: Lectotype ♂ (aedeagus examined; legs partly and mouthparts missing), here designated and labelled accordingly: *Oxysoma schaumii* m./ coll. Kraatz/ Syntypus/ DEI Eberswalde (DEI).

Additional material examined: **Morocco:** 1 ex., [locality not specified] (DEI). **Algeria:** 2 ex., Constantine, "Les Lacs" (IRSNB); 1 ♀, 2 ex., Biskra [1 ex. with label "avec oberthuri"] (DEI, IRSNB); 1 ex., Touggourt (IRSNB); 1 ex., [locality not specified] (DEI). **Tunisia:** 5 ♂♂, 5 ♀♀, 11 ex., El Djem, 2.IV.1925, leg. Rambousek (FIS, NMP, cAss); 3 ex., Al-Qayrawān ["Kairouan"], III.1925, leg. Rambousek (NMP); 4 ex. [1 ex. with worker of the *Cataglyphis bicolor* group attached to the pin], Al-Qayrawān (IRSNB, NHMB, NHMW, NMP); 1 ♂, 2 ex., Sfax, 31.III.1925, leg. Rambousek (NMP, cAss); 1 ex., "Ben-Saada" (NHMW); 1 ♂, 3 ♀♀, 5 ex., Rhadès near Tunis (DEI, HNHM, IRSNB, MNHUB, NHMW, cAss); 1 ex., [locality not specified] (NHMW); 1 ex., Souk-el-Arba, V.1899, leg. Alluaud (NMP). **Libya:** 2 ex. [each with a worker of the *Cataglyphis bicolor* group attached to the pin], Tarābulus [Tripoli], 1. & 5.III.1926, leg. Schatzmayr (NHMB, cAss). **Egypt:** 1 ex., Alexandria (MHNG); 1 ♂, Cairo (NHMW); 1 ♀, Ismā'īliya ["Ismailich"], 16.IV.1933, leg. Alfieri (NHMB). **Jordan:** 2 ex., Ammān, 800 m, 2.III.1957, leg. Klapperich (HNHM, MHNG).

Diagnosis: Measurements (range and arithmetic mean, n = 52): HW: 0.68 - 0.78, 0.74; PW: 1.32 - 1.59, 1.49; PL: 0.87 - 1.01, 0.96; EW: 1.48 - 1.71, 1.62; EL: 0.54 - 0.66, 0.60; HTiL: 0.74 - 0.89, 0.83; HTaL: 0.66 - 0.82, 0.74; T1L: 0.23 - 0.29, 0.25; T24L: 0.29 - 0.34, 0.31; TL: 2.9 - 6.0, 4.37.

In size and proportions similar to *P. reitteri*. Body bicoloured: head, pronotum and abdomen blackish brown to black; elytra, the narrow margins (rarely a larger area on the sides) of the pronotum, the hind margins of the abdominal terga, antennomeres 3 - 10,



Figs. 12 - 16: *Piochardia schaumii*: scale = 0.5 mm: (12) aedeagus in lateral and in ventral view, (13) apical lobe of paramere, (14, 15) hind margins of tergum VIII of two ♂♂, (16) hind margin of ♂ sternum VIII.

maxillary palpi and legs ferruginous; antennomeres 1 - 2 and apical half of antennomere 11 often yellowish. Pubescence of pronotum and especially on elytra and abdomen less dense than in *P. reitteri*.

Head with shape, punctuation and microsculpture similar to *P. reitteri*, but on average more transverse. Antenna somewhat more strongly incrassate apically than in *P. reitteri*, with antennomeres 6-10 more transverse, antennomere 6 distinctly transverse.

Pronotum rather variable in shape and size, less transverse than in *P. reitteri* (PW/PL: 1.43 - 1.65, mean 1.55), much wider than head, though less so than in *P. reitteri* (PW/HW: 1.84 - 2.18, mean: 2.03), narrower than elytra (PW/EW: 0.87 - 0.97, mean: 0.92); posterior angles less pronounced and hind margin centrally more convex than in *P. reitteri*, so that in normal preparation the hind angles clearly do not reach the trans-

verse tangent to the central hind margin and the scutellum is mostly completely covered; microsculpture shallow, but usually more distinct and punctuation less dense than in *P. reitteri*.

Elytra much shorter than pronotum (EL/PL: 0.57 - 0.68, mean: 0.62); punctuation fine, less dense and transverse microsculpture somewhat shallower than in *P. reitteri*. Metatarsus 0.82 - 0.95 times (mean: 0.90) the length of metatibia, (T1L/T24L: 0.72 - 0.88, mean: 0.81); pubescence of internal face of terminal half of meso- and metatibia somewhat denser than in *P. reitteri*.

Abdomen with shallow, yet distinct transverse microsculpture; punctuation somewhat variable, decreasing in density posteriorly on each of the terga; the granulate punctures more distinct and clearly sparser than in *P. reitteri*. Hind margin of tergum VIII distinctly concave (but depth of concavity rather variable), that of sternum VIII concave to weakly pointed in both sexes (Figs. 14 - 16).

♂: aedeagus slightly larger and apex of median lobe in lateral view of different shape than in *P. reitteri* (Fig. 12); apical lobe of paramere with median seta approximately halfway between apical and basal seta (Fig. 13).

♀: duct of spermatheca almost straight (cf. Fig. 17).

Comments: KRAATZ (1857) based his description on two specimens from Egypt ("Habitat in Aegypto; specimina duo legit Dom. Dr. Schaum ..."). The specimen here designated as lectotype is without doubt one of the syntypes. The mouthparts have been dissected by Kraatz, who in the original description of the genus *Oxysoma* gives an account of the morphology of labium and maxilla. The whereabouts of the second syntype are unknown; the specimen in the MNHUB, where parts of Schaum's Staphylinidae collection are kept, is definitely no syntype, since according to the label, which is identical to that attached to a further specimen in the Fauvel collection (same handwriting), it was collected in Tunisia.

The use of the name "*schaumi*" by all later authors constitutes, according to Article 33 (d) of the International Code, an incorrect subsequent spelling.

In the collections examined, *P. schaumii* was frequently confused with *P. bedeli* (FAUVEL) and vice versa, very likely due to the emphasis the keys by BERNHAUER (1902) and VIEHMEYER (1918) place on the variable punctuation of the abdomen.

Distribution and bionomics: *Piochardia schaumii* has been recorded from numerous localities from all the Northern African countries bordering the Mediterranean Sea to Jordan in the east (FAUVEL 1886, 1897, 1902, KOCH 1936, NORMAND 1934, WASMANN 1925; see also material examined). BERNHAUER & SCHEERPELTZ (1926) and KOCH (1936) also indicate records from the Caucasus, but they appear to be based on mis-identifications and very likely refer to *P. reitteri*. The material examined did not contain any such specimens. BERNHAUER (1902), too, states that he has not seen the species from the Caucasus (see also FAUVEL 1897). Specimens from Izmir with the identification label "*schaumi*" proved to be *P. reitteri*.

Adult specimens have been collected in March through June and in October and November (FAUVEL 1897, 1902, NORMAND 1934; material examined), on one or two

occasions together with *P. oberthuri* (FAUVEL 1886; material examined). The ant workers attached to the studied specimens were identified as members of the *Cataglyphis bicolor* group. FAUVEL (1897, 1902), WASMANN (1894) and VIEHMEYER (1918) indicate *C. viaticus* var. *megalocola* (FOERSTER, 1850) and *C. bicolor megalocola* (FOERSTER, 1850) (synonyms of *C. bicolor* (F.)) as host ants. On one occasion *P. schaumii* was apparently collected with ants of the genus *Pheidole* WESTWOOD, 1839 (FAUVEL 1902).

***Piochardia aleocharina* (REITTER, 1890) (Figs. 17 - 19)**

Oxysoma aleocharina REITTER, 1890: 166 f.

Piochardia aleocharina (REITTER): BERNHAUER (1902), lectotype designation. - BERNHAUER & SCHEERPELTZ (1926) - VIEHMEYER (1918) - FENYES (1920) - WASMANN (1925).

Type material examined: Lectotype ♀: Caucasus, Araxesthal, Leder, Reitter/ *Oxysoma aleocharina* m. 1890/ coll. Reitter/ Holotypus *Oxysoma aleocharina* Reitter 1890 [sic!] (HNHM).

Diagnosis: Measurements (LT): HW: 0.76; PW: 1.69; PL: 1.15; EW: 1.77; EL: 0.64; HTiL: 0.87; HTaL: 0.72; T1L: 0.21; T24L: 0.31; TL: 3.5.

Externally highly similar to *P. schaumii*, but clearly larger (see measurements). Coloration as in *P. schaumii*. Pubescence of head, elytra and especially of pronotum longer, slightly denser and more conspicuous than in *P. schaumii*, surface therefore less shiny.

Head similar to *P. schaumii*, but antennae somewhat more strongly flattened.

Pronotum relatively wider, yet less transverse than in average *P. schaumii* (PW/HW: 2.22; PW/PL: 1.46), slightly narrower than elytra (PW/EW: 0.95); hind margin centrally as convex as in *P. schaumii*, but hind angles more pronounced, more strongly projecting posteriorly and the hind margin near the hind angles more concave.

Elytra similar to *P. schaumii* (EL/PL: 0.55), but punctuation somewhat more distinct. Metatarsus on average relatively shorter, first metatarsomere only as long as the combined length of the two following tarsomeres (HTaL/HTiL: 0.83; T1L/T24L: 0.67).

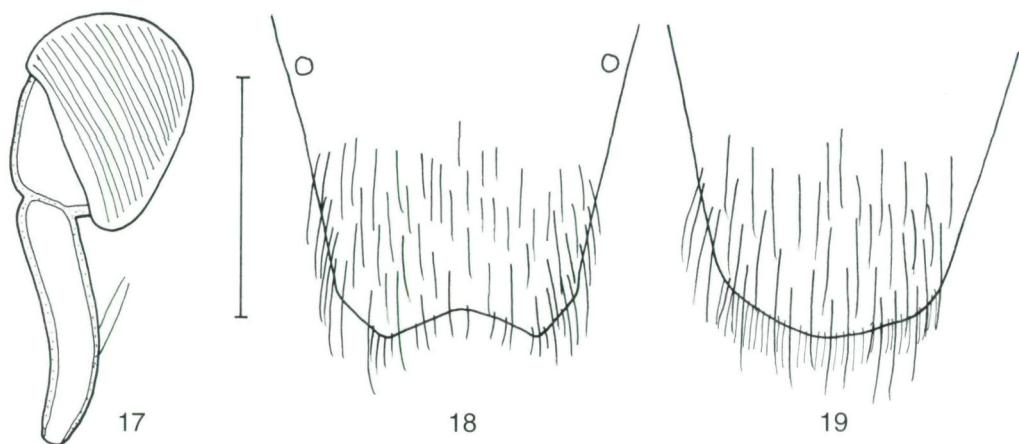
Abdomen with microsculpture, punctuation and shape of hind margin of tergum VIII similar to *P. schaumii*, but pubescence of tergum and sternum VIII longer (Figs. 18, 19).

♂: unknown.

♀: spermatheca as in *P. schaumii* (Fig. 17).

Comments: REITTER (1890) did not specify the number of specimens he had before him. In stating that he saw "das einzige typische Exemplar, welches mir durch die Güte des Herrn Edm. Reitter vorlag" BERNHAUER (1902) designated a lectotype, the single specimen in Reitter's collection.

Distribution and bionomics: Apart from the type locality, "Araxesthal bei Ordubad" (REITTER 1890), no further records have become known. According to the original description the species was collected with ants "wahrscheinlich *Crematogaster subdentata* MAYR", but this seems highly unlikely considering that all the other species of *Piochardia* are associated with ants of the genus *Cataglyphis*.



Figs. 17 - 19: *Piochardia aleocharina* (LT): (17) spermatheca, scale = 0.25 mm, (18 - 19) scale = 0.5 mm: (18) hind margin of ♀ tergum VIII, (19) hind margin of ♀ sternum VIII.

Piochardia bedeli (FAUVEL, 1886) (Figs. 20 - 27)

Oxysoma bedeli FAUVEL, 1886: 88 f.

Piochardia bedeli (FAUVEL): FAUVEL (1897) - BERNHAUER (1902) - BERNHAUER & SCHEERPELTZ (1926) - VIEHMEYER (1918) - FENYES (1920) - WASMANN (1925).

Type material examined: **Lectotype** ♂ (aedeagus dissected prior to present study), **here designated** and labelled accordingly: Edough [=Idūgh], juin 1885/ Coll. et det A. Fauvel, *Oxysoma bedeli* FvL., R.I.Sc.N.B. 17.479/ *Piochardia bedeli* (FvL.) det. R. Pace 1985, Lectotypus [sic!] (IRSNB). **Paralectotypes:** 1 ♂, 1 ♀, 2 ex., same locality as lectotype (IRSNB).

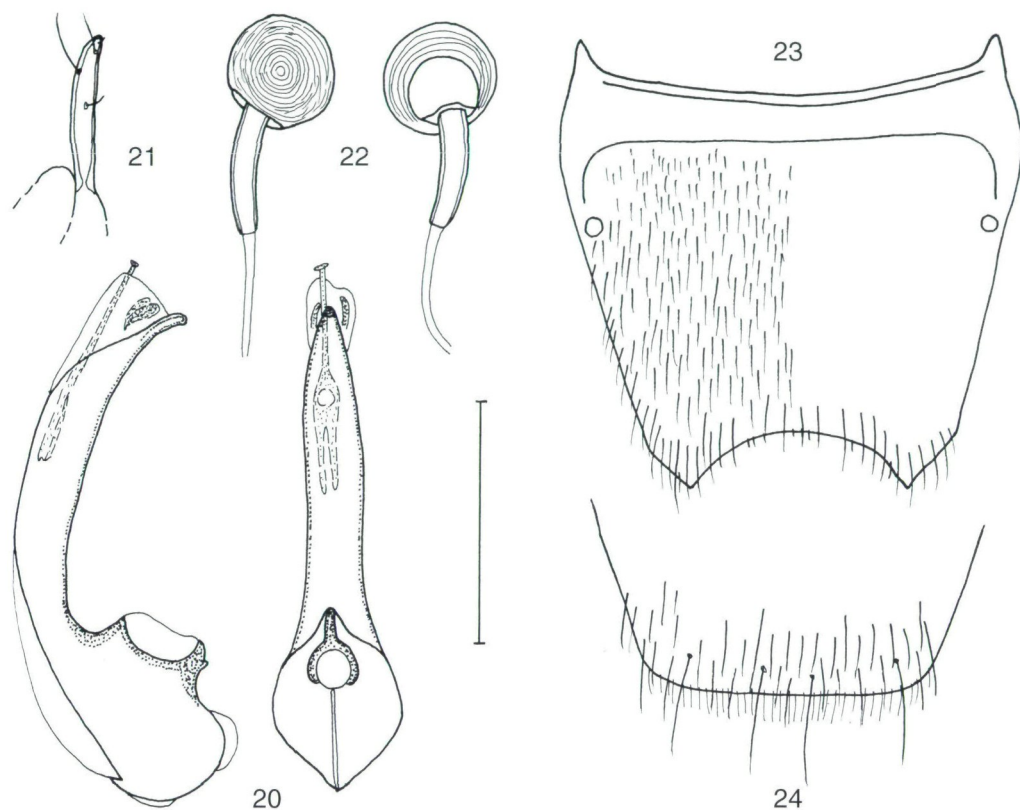
Additional material examined: **Algeria:** 1 ex., Annaba ["Bonê"] (IRSNB); 1 ex., Constantine, Medjez-Amar (IRSNB); 2 ex., NE Constantine, Idūgh (DEI, MHNG); 1 ♂, Mahouna, 1400 m (cAss); 2 ex., Mahouna (HNHM, NHMW); 4 ♂♂, 2 ♀♀, 9 ex. [1 ♀ with egg in ovary], Dellys, Bou Berak (DEI, NHMW, NMP, cAss); 3 ex. [1 ex. with worker of the *Cataglyphis bicolor* group attached to the pin], Bou Berak (NHMB). **Tunisia:** 1 ex., Firnānah (IRSNB); 1 ex., Le Kef, leg. Normand (NMP).

Diagnosis: Measurements (range and arithmetic mean, $n = 30$): HW: 0.68 - 0.78, 0.71; PW: 1.44 - 1.65, 1.58; PL: 0.87 - 1.03, 0.95; EW: 1.57 - 1.83, 1.72; EL: 0.52 - 0.66, 0.60; HTiL: 0.87 - 0.97, 0.92; HTaL: 0.66 - 0.87, 0.80; T1L: 0.23 - 0.33, 0.29; T24L: 0.27 - 0.35, 0.32; TL: 2.9 - 5.1, 4.19.

Externally highly similar to *P. schaumii*. Colour as in *P. schaumii*, but sides of pronotum usually more widely ferrugineous, sometimes large parts, rarely most of the pronotum brownish. Pubescence of pronotum and elytra slightly denser and more distinct than in *P. schaumii*.

Head with shape, punctuation and microsculpture similar to *P. schaumii*, but antennae somewhat stouter; antennomere 4 subquadrate to weakly transverse (in *P. schaumii* usually at least slightly oblong) and antennomere 6 more distinctly transverse, approximately 2 times wider than long.

Pronotum with shape of hind margin and hind angles as in *P. schaumii*, also of similar proportions (PW/PL: 1.56 - 1.76, mean: 1.66; PW/HW: 2.0 - 2.24, mean: 2.13; PW/EW:



Figs. 20 - 24: *Piochardia bedeli*, scale = 0.5 mm: (20) aedeagus in lateral and in ventral view, (21) apical lobe of paramere, (22) spermatheca in two different aspects, (23) ♂ tergum VIII, (24) hind margin of ♂ sternum VIII.

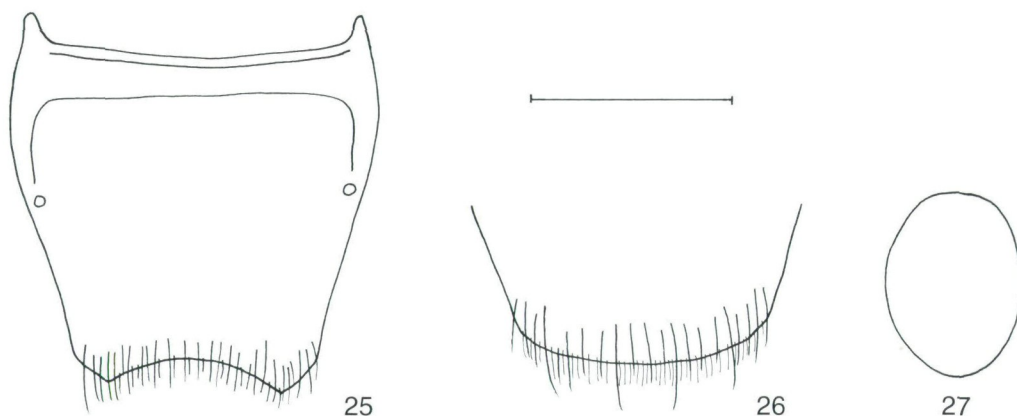
0.88 - 0.95, mean: 0.92), but on average more transverse, the dorsal surface slightly less convex and the sides somewhat flatter; punctation on average more distinct and slightly denser than in *P. schaumii*.

Elytra as in *P. schaumii* (EL/PL: 0.57 - 0.68, mean: 0.63), but punctation somewhat more distinct. Metatarsus on average relatively shorter, first metatarsomere on average relatively longer than in *P. schaumii* (HTaL/HTiL: 0.76 - 0.91, mean: 0.87; T1L/T24L: 0.75 - 1.0, mean: 0.90).

Abdomen with very weak microsculpture; punctation clearly finer and denser than in *P. schaumii*. Hind margin of tergum VIII with pronounced, almost semicircular concavity; the hind margin laterally more acutely pointed in ♂♂ than in ♀♀ (Figs. 23 - 26).

♂: median lobe in lateral view apically slender and slightly bent (Fig. 20); apical lobe of paramere as in Fig. 21.

♀: spermatheca as in *P. schaumii* (Fig. 22).



Figs. 25 - 27: *Piochardia bedeli*, scale = 0.5 mm: (25) ♀ tergum VIII, (26) hind margin of ♀ sternum VIII, (27) outline of mature egg.

Distribution and bionomics: *Piochardia bedeli* has become known from numerous localities in Algeria and Tunisia (FAUVEL 1886, 1897, 1902, NORMAND 1934; see also material examined). The species was collected in March, May, June, and October (FAUVEL 1902) together with ants of the *Cataglyphis bicolor* species group, in one instance at 1400 m above sea-level.

Piochardia oberthuri (FAUVEL, 1878) (Figs. 28 - 32)

Oxysoma oberthuri FAUVEL, 1878: 155f. (partim).

Oxysoma oberthuri FAUVEL: FAUVEL (1886) - FAUVEL (1902) - BERNHAUER (1902) - VIEHMEYER (1918) - BERNHAUER & SCHEERPELTZ (1926).

Oxysoma oberthuri FAUVEL: WASMANN (1894).

Piochardia oberthuri (FAUVEL): FAUVEL (1897), WASMANN (1925).

Piochardia oberthuri (FAUVEL): FENYES (1920).

Piochardia escherichi FAUVEL, 1902: 184 f., **syn.n.**

Type material examined: *Oxysoma oberthuri*: **Lectotype** ♂ (aedeagus examined, with a worker of the *Cataglyphis bicolor* species group attached to the same pin), **here designated** and labelled accordingly: Bousaada, avec la grosse fourmi/ Smyrna [sic!]/ Laghouat [sic!] (IRSNB). **Paralectotypes:** 1 ♀, Bousaada/ Biskra, Myrm. viaticus [sic!] (IRSNB); 1 ex., Bousaada (Oberthur)/ oberthuri Fvl., Algier/ c. Epplsh. Steind. d. (NHMW); 1 ♀, Smyrna/ *Oxysoma oberthuri* Fvl./ type/ reitteri Wasm./ spec. ?/ ex coll. Skalitzky/ Typus *Piochardia fauveli* O. Scheerpeltz/ *Piochardia reitteri* (Wasmann) det. V. Assing 1997 (NHMW).

Piochardia escherichi: **Lectotype** ♀ (spermatheca and terminalia examined, with a completely black worker of the *C. bicolor* species group attached to the same pin), **here designated** and labelled accordingly: Biskra, avec Myrmecoc. albicans Roger [sic!] (IRSNB).

Additional material examined: **Libya:** 2 ♂♂, 5 ♀♀, 2 ex., Tarābulus ["Tripoli"], I.III./ 8.III./ 17.III.1926, leg. Schatzmayr (FIS, NHMB, NHMW, cAss); 2 ex. [1 ex. with dark small worker of *Cataglyphis bicolor* group attached to the pin], Gharyan, 22.III.1926, leg. Schatzmayr (NHMB); 1 ex., Misrātah, leg. Andreini (NMP); 2 ♂♂, 1 ♀, Misrātah, XI.1912 - I.1913, leg. Andreini (DEI, cAss). **Tunisia:** 1 ex., Qafsa, 29.III.1926, leg. Rambousek (NMP). **Algeria:** 1 ex., Bou Saāda (DEI).

Diagnosis: Measurements (range and arithmetic mean, n = 16): HW: 0.78 - 0.87, 0.84; PW: 1.85 - 2.12, 1.96; PL: 1.13 - 1.19, 1.16; EW: 2.00 - 2.18, 2.06; EL: 0.66 - 0.72, 0.69;

HTiL: 1.22 - 1.30, 1.27; HTaL: 1.13 - 1.32, 1.22; T1L: 0.45 - 0.52, 0.49; T24L: 0.45 - 0.54, 0.52; TL: 3.9 - 6.7, 5.04.

In general appearance somewhat resembling *P. reitteri*, but distinctly larger and usually lighter. Whole body reddish yellow; head often darker, light brown to blackish. Pubescence of pronotum and elytra very short and inconspicuous.

Head with shallow punctation and very superficial microsculpture. Antenna very stout, more strongly widened apically; antennomere 3 usually distinctly longer than the pedicel; antennomere 4 weakly oblong to slightly transverse; antennomeres 6 - 10 strongly transverse; terminal joint relatively shorter than in *P. reitteri*, shorter than the combined length of the two preceding antennomeres.

Pronotum of similar proportions as in *P. reitteri* (PW/PL: 1.61 - 1.81, mean: 1.69; PW/HW: 2.14 - 2.50, mean: 2.34), but slightly narrower than elytra (PW/EW: 0.91 - 0.98, mean: 0.95) and maximal width at or nearer to hind angles; hind margin centrally more convex than in *P. reitteri* (though clearly less so than in *P. schaumii* and *P. bedeli*), posterior angles do not reach the transverse tangent to central hind margin, apex of scutellum mostly visible; punctation less dense and finer than in *P. reitteri*.

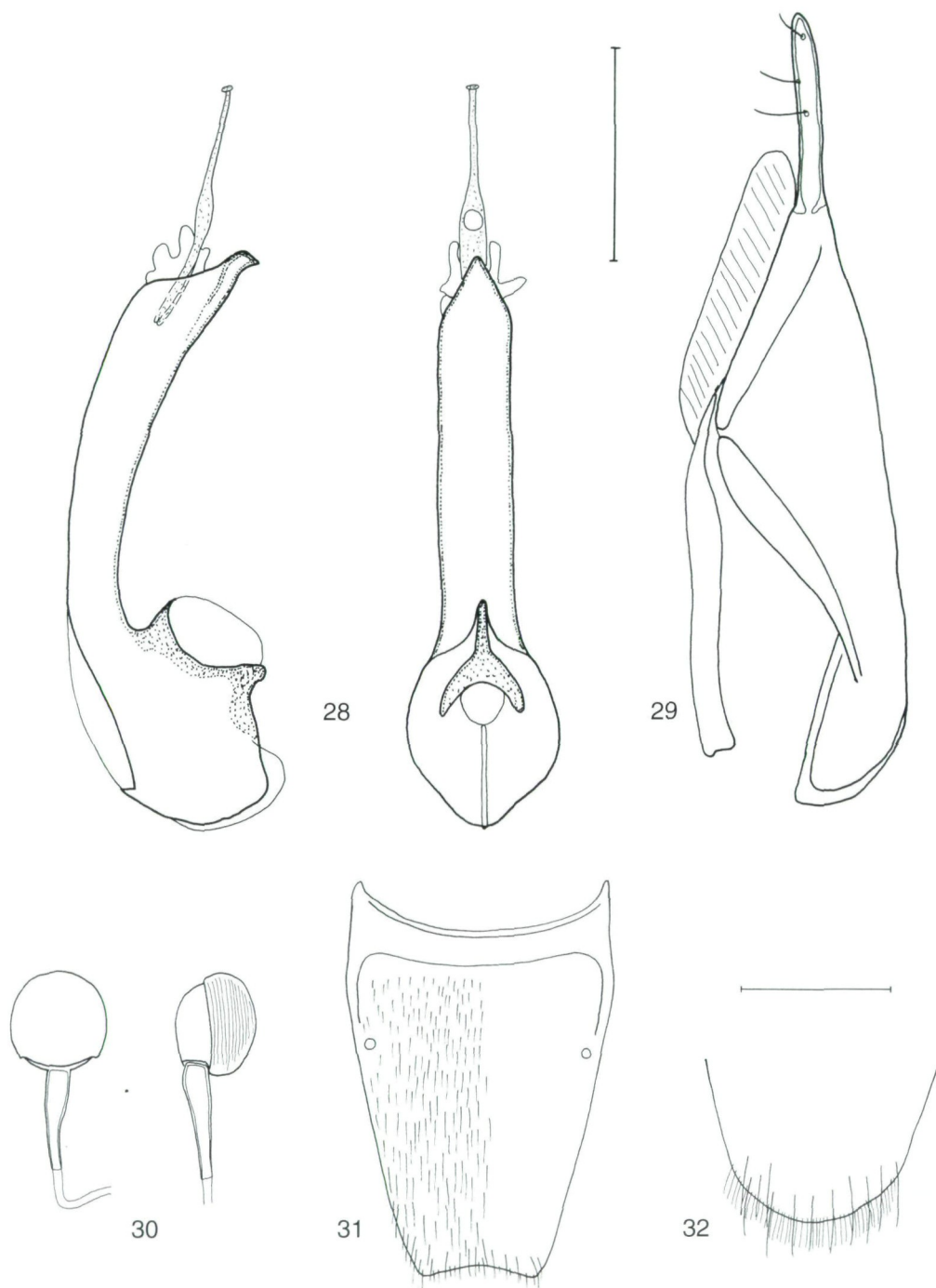
Elytra much shorter than pronotum (EL/PL: 0.56 - 0.62, mean: 0.60); punctation finer and sparser than in *P. reitteri*. Legs extremely long and slender, metatarsus approximately as long as metatibia (HTaL/HTiL: 0.93 - 1.02, mean: 0.97), first metatarsomere as long as the combined length of the three following tarsomeres or nearly so (T1L/T24L: 0.88 - 1.00, mean: 0.95); pubescence of internal face of apical half of meso- and metatibia denser and longer than in other species of the genus.

Abdomen with punctation of similar density as in *P. reitteri*, but finer; granula at hind margins of terga clearly smaller and less oblong; microsculpture very indistinct. Hind margin of tergum VIII moderately concave, that of sternum VIII convex in both sexes; both tergum and sternum VIII very oblong, as in *P. lepismiformis* (Figs. 31, 32).

♂: aedeagus large, median lobe apically of characteristic shape in lateral view (Fig. 28); apical lobe of paramere with median seta closer to basal seta (Fig. 29).

♀: spermatheca as in Fig. 30.

Comments: The two syntypes in the Fauvel collection had two and three different locality labels attached to their pins. It appears that Fauvel was in the habit of mounting several specimens, often from different localities, to the same pin. When specimens were subsequently exchanged or given away, the original labels were usually retained (Schülke, pers.comm.). In his original description FAUVEL (1878) indicates "Bou-Saada" (today Bou Saâda) and "Smyrne" as the type localities, and it can be inferred that he had several specimens (one from "Smyrne") before him and at least one of either sex from "Bou-Saada" in his collection. Since the specimen here designated as lectotype had a larger worker of *Cataglyphis* (*bicornis* species group) attached to the pin, it is here considered to correspond to the label "Boussada avec la grosse fourmi". The second specimen is referred to the label "Boussada" and consequently treated as a syntype, not only because it is a female, but also because Fauvel is unlikely to have given a type specimen away. The paralectotype from "Smyrna" in the NHMW refers to *P. reitteri*.



Figs. 28 - 32: *Piochardia oberthuri*, scale = 0.5 mm: (28) aedeagus in lateral and in ventral view, (29) paramere, (30) spermatheca in two different aspects, (31) σ tergum VIII, (32) hind margin of σ sternum VIII.

Apart from the smaller size, which may be a result of an association with a different ant species, no significant differences could be found between the lectotype of *P. escherichi* and the material of *P. oberthuri*. Apparently, there is no syntype of *P. escherichi* in the Escherich collection (Solem, in litt. 1997), which according to HORN & al. (1990) is kept in Trondheim. As can be inferred from a photograph in WASMANN (1925), there is one male syntype in the Wasmann collection in Maastricht. However, despite repeated requests addressed to both the curator in charge and the director of the Natuurhistorisch Museum Maastricht, a loan of this specimen was refused, so that an examination of the male genitalia was impossible. FAUVEL (1902) compares *P. escherichi* with *P. reitteri* in his original description; there is no reference to *P. oberthuri*. According to VIEHMEYER (1918), *P. escherichi* differs from its congeners in the much larger scutellum. This observation is clearly based on an artefact; in the specimen(s) he used for comparison the pronotum was probably bent forward or partly dissociated from the mesothorax, so that he was able to see the full size of the scutellum. An examination of the syntype in the Fauvel collection, however, showed that the scutellum is of the same size and shape as that in *P. oberthuri*. Therefore, *P. escherichi* is here considered a junior synonym of *P. oberthuri*.

According to the International Code of Zoological Nomenclature (Articles 32c, 33) the subsequent spellings *oberthuri* and *oberthueri* by WASMANN (1894), FAUVEL (1897) and later authors have to be considered incorrect subsequent spellings. In his original description FAUVEL (1878) explicitly dedicates the species "à M. René Oberthur"; therefore the correct original spelling is *oberthuri* (ICZN, Art. 32c), although the collector's name was in fact René Oberthür. The later change to *oberthuri* (FAUVEL 1897) neither meets the provisions for a justified nor those for an unjustified emendation (cf. ICZN, Art. 33).

Distribution and bionomics: *Piochardia oberthuri* has so far been recorded from several localities in Algeria, Tunisia and Libya (FAUVEL 1897, 1902, NORMAND 1934; see also material examined). The record from "Smyrne" (= Izmir) (FAUVEL 1878; WASMANN 1894) refers to *P. reitteri* (specimen examined). Adult specimens were collected in December (in Misrātah in the period from November to January), March and April (FAUVEL 1902; NORMAND 1934; see specimens examined). The host ant is apparently the same species as in *P. bedeli* and *P. schaumii*. On at least one occasion *P. oberthuri* was collected together with *P. schaumii*. NORMAND (1934) indicates an association with *Cataglyphis bicolor* var. *oasium* MENOZZI, 1932. The types of *P. escherichi* were not found with *C. albicans* (ROGER, 1859), as indicated in the original description (FAUVEL 1902) and on the label attached to the syntype in the Fauvel collection; the worker attached to the syntype was identified as a black specimen of the *C. bicolor* species group. For a detailed account of the behaviour of the adult beetles see ESCHERICH (1902), a summary of which is here given in the general remarks on the distribution and bionomics of the genus.

***Piochardia lepismiformis* HEYDEN, 1870 (Figs. 33 - 36)**

Piochardia lepismiformis HEYDEN, 1870: 76 f.

Piochardia lepismiformis HEYDEN: BERNHAUER (1902) - BERNHAUER & SCHEERPELTZ (1926) - VIEHMEYER (1918) - FENYES (1920) - WASMANN (1925).

Type material examined: Holotype ♂ (aedeagus dissected, with worker of *C. cursor* species group attached to the same pin): Guarda 23.6./ an der Stadtmauer unter Steinen, 1 Expl./ b. Myrmecocystus viaticus F./ *Piochardia lepismiformis* Heyd. orig./ Wasmann vid./ Holotypus/ coll. L. v. Heyden, DEI Eberswalde (DEI).

Diagnosis: Measurements (HT): HW: 0.68; PW: 1.59; PL: 1.09; EW: 1.50; EL: 0.52; HTiL: 0.74; HTaL: 0.58; T1L: 0.16; T24L: 0.27; TL: 3.4.

Colour of body dark brown, with the elytra, the (wide) margins of the pronotum, the hind margins of the abdominal terga, the terminalia, the legs, mouthparts and the basal and terminal antennomeres lighter, ferrugineous to yellowish. Pubescence of pronotum and especially of elytra and abdomen significantly longer than in *P. reitteri* and other preceding congeners.

Head with sparser and more distinct punctuation than in *P. reitteri*. Antenna of characteristic shape: very short with maximal width at antennomeres 6 - 7; antennomere 3 only weakly oblong, 4 transverse, 5 - 10 strongly transverse, and 11 longer than the combined length of the two preceding joints.

Pronotum of remarkable shape: anterior angles obsolete, so that anterior and lateral margins form a nearly semicircular outline; hind margin strongly sinuate, posterior angles pronounced, hind margin centrally moderately convex (as in *P. oberthuri*); in normal preparation the posterior angles just project over the transverse tangent to central hind margin; apex of scutellum in holotype visible; pronotum less transverse than in other species of *Piochardia* (PW/PL: 1.45; PW/HW: 2.33), and slightly wider than elytra (PW/EW: 1.05); punctuation similar to *P. reitteri*.

Elytra in relation to pronotum relatively shorter than in other congeners (EL/PL: 0.47); punctuation sparser than in *P. reitteri*. Legs shorter than in other species of *Piochardia*; metatarsus 0.78 times the length of metatibia, first metatarsomere barely as long as the combined length of the two following tarsomeres (T1L/T24L: 0.62); pubescence of internal face of apical half of meso- and metatibia similar to *P. reitteri*.

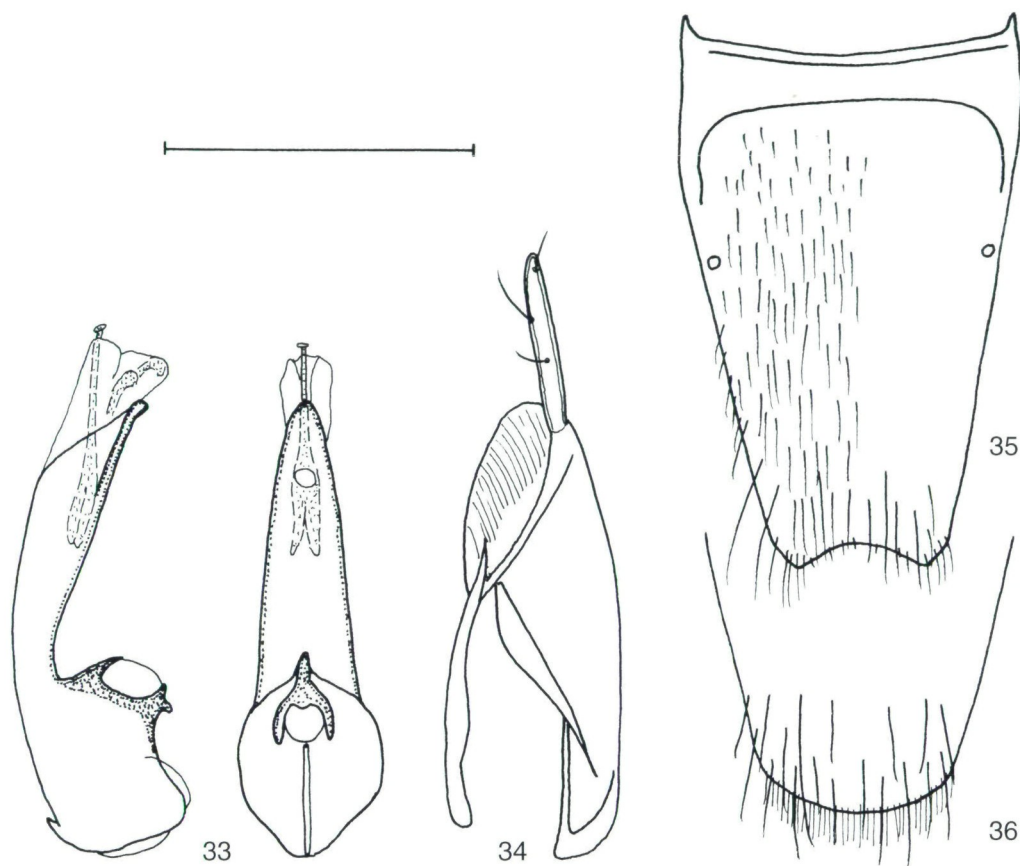
Abdomen with clearly sparser punctuation than in *P. reitteri*, the granulose and somewhat oblong punctures increasing in strength posteriorly on each of terga III - VII; microsculpture indistinct. Hind margin of tergum VIII distinctly concave, that of sternum VIII convex (Figs. 35, 36); both tergum and sternum VIII very oblong (similar to *P. oberthuri*).

♂: aedeagus small, shape as in Fig. 6a; apical lobe of paramere with median seta closer to basal seta (Fig. 34).

♀: unknown.

Comments: HEYDEN (1870) explicitly based his description on a single specimen. *Piochardia lepismiformis* is characterized by several significant characters, above all the shape of the antennae and the pronotum as well as the short legs, which it shares only with the following two species of the *P. lepismiformis* species group and which separate them from the preceding species of the genus, here referred to as *P. reitteri* species group. In accordance with the morphological differences, the species of the *P. lepismiformis* species group are not associated with ants of the *Cataglyphis bicolor* species group.

Distribution and bionomics: At present the species is only known from the type locality in Portugal, where, according to the labels attached to the holotype, it was collected in June under a stone together with *Cataglyphis viaticus* (F., 1787). There has been considerable confusion regarding the identity of this ant species (for a discussion see AGOSTI 1990). Based on the key in AGOSTI (1990), the ant worker attached to the holotype was identified as a representative of the *C. cursor* species group.



Figs. 33 - 36: *Piochardia lepismiformis* (HT), scale = 0.5 mm: (33) aedeagus in lateral and in ventral view, (34) paramere, (35) ♂ tergum VIII, (36) hind margin of ♂ sternum VIII.

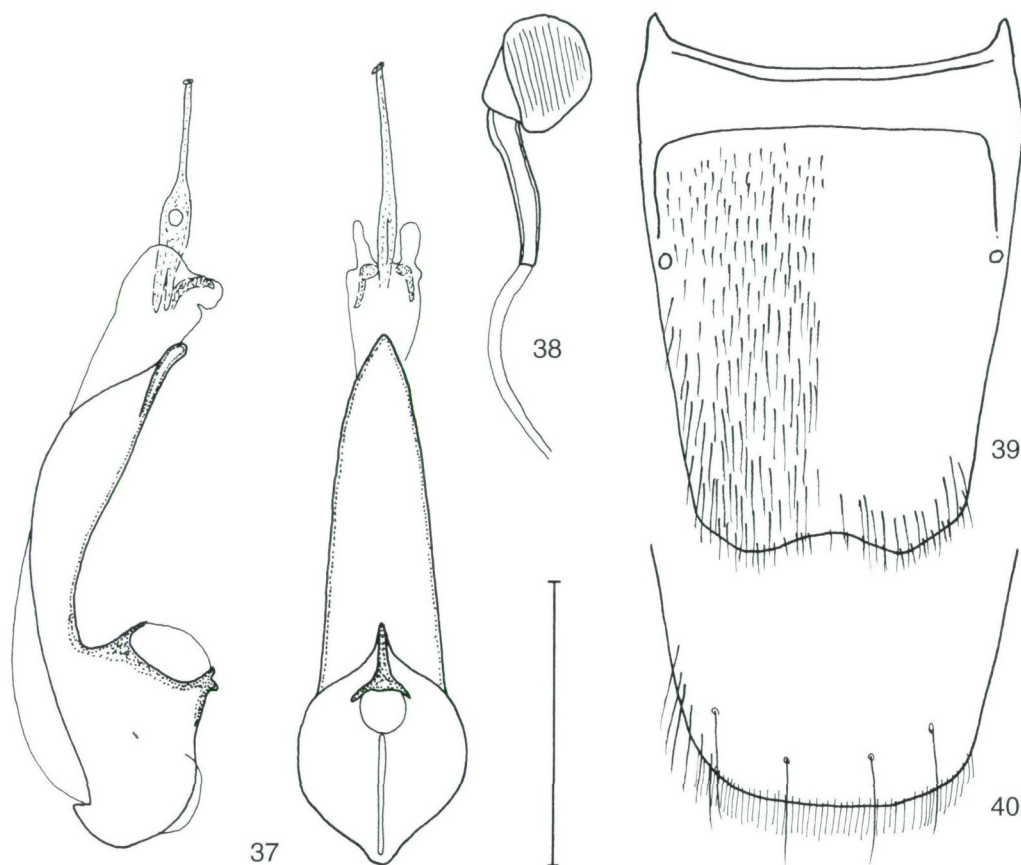
***Piochardia guadalupensis* FAGEL, 1959 (Figs. 37 - 40)**

Piochardia guadalupensis FAGEL, 1959: 97 ff.

Type material examined: **Holotype** ♀ (aedeagus dissected, with worker of *C. cursor* species group attached to the same pin): Espagne: Estremadura, Guadalupe, Mirabel, V.1958, G. Fagel/ G. Fagel det., *Piochardia guadalupensis* n. sp./ Type/ [round green label] (IRSNB). **Paratypes:** 1 ♂, 1 ♀: same data and labels as holotype, but "Paratype" (IRSNB).

Diagnosis: Measurements (range, n = 3): HW: 0.68 - 0.71; PW: 1.44 - 1.62; PL: 0.99 - 1.01; EW: 1.46 - 1.48; EL: 0.52 - 0.54; HTiL: 0.76 - 0.78; HTaL: 0.62 - 0.66; T1L: 0.15 - 0.16; T24L: 0.29 - 0.31; TL: 3.5 - 4.1.

Externally highly similar and closely related to *P. lepismiformis*. Colour of head and basal abdominal terga dark brown to blackish; antennomeres 4 - 10 and pronotum brown to dark brown; antennomeres 1 - 3 and 11, legs, elytra, hind margins of anterior abdominal terga and all of posterior terga lighter, yellowish to reddish.



Figs. 37 - 40: *Piochardia guadalupensis*, scale = 0.5 mm: (37) aedeagus in lateral and in ventral view, (38) spermatheca, (39) ♂ tergum VIII, (40) hind margin of ♂ sternum VIII.

Antennomere 3 somewhat longer and more slender than in *P. lepismiformis*, but less distinctly so than indicated by FAGEL (1959). Pronotum of similar shape as in *P. lepismiformis* - i.e. anterior angles obsolete, so that the outline of anterior and lateral margins approximately form a semicircle - but posterior angles less strongly protruding posteriorly, posterior margin therefore more weakly sinuate.

Pubescence and microsculpture of pronotum and elytra as in *P. lepismiformis*; elytral punctuation slightly more distinct. Legs of similar proportions and with similar pubescence as in *P. lepismiformis* (T1L/T24L: 0.52 - 0.53). Abdomen less distinctly narrowed posteriorly than in *P. lepismiformis* and with denser punctuation. Hind margin of tergum VIII moderately concave, that of sternum VIII weakly convex (Figs. 39, 40); both tergum and sternum VIII less oblong than in *P. lepismiformis*.

♂: aedeagus of similar shape as in *P. lepismiformis*, but larger (Fig. 37); apical lobe of paramere with median seta approximately halfway between basal and apical seta.

♀: spermatheca as in Fig. 38.

Comments: There is some doubt that *P. guadalupensis* really represents a species distinct from *P. lepismiformis*. It is presently not possible to sufficiently assess intra-specific variation based on only one and three specimens of *P. lepismiformis* and *P. guadalupensis*, respectively. Only when further material is available it can be decided, whether or not the observed differences are constant.

Distribution and bionomics: Apart from the type locality near Guadalupe in Extremadura, Spain, no further records have become known. The host ant is closely related to, possibly conspecific with that of *P. lepismiformis*.

***Piochardia donisthorpei* WASMANN, 1925 (Figs. 41 - 43)**

Piochardia donisthorpei WASMANN, 1925: 1 f.

Type material examined: Holotype ♂ [with worker of host ant attached to the same pin]: G. R. Dutt! (Donisth. ded.)/ b. Cataglyphis setipes For. (Dutt!), Pusa (Bengal) 22.9.12/ Found in a nest of Myrmecocystus setipes Forel, Pusa Behar, 22.IX.12, G. R. Dutt/ *Piochardia Donisthorpei* Wasm. n. sp./ Type (NHMM).

Diagnosis: Measurements (HT): HW: 0.74; PW: 1.90; PL: 1.26; EW: 1.83; EL: 0.60; HTiL: 0.82; HTaL: 0.70; T1L: 0.20; T24L: 0.30; TL: 3.2.

Colour yellowish to light brown; flagellum of antennae somewhat darker. Pubescence of pronotum and especially of elytra longer and less dense than in *P. reitteri*; pubescence of abdomen distinctly longer and sparser than in that species.

Antenna short and compact, distinctly shorter and more compact than in *P. reitteri*, of similar shape as in *P. lepismiformis*; antennomere 1 oblong, longer than antennomere 2; antennomeres 2 clearly and 3 weakly oblong, 4 subquadrate, 5 - 10 increasingly transverse; antennomere 11 narrower than the penultimate joints, approximately as long as the combined length of the two preceding antennomeres.

Pronotum of similar shape as in *P. lepismiformis*, but larger; apex of scutellum in holotype not visible; pronotum more transverse than in *P. lepismiformis* (PW/PL: 1.51; PW/HW: 2.56).

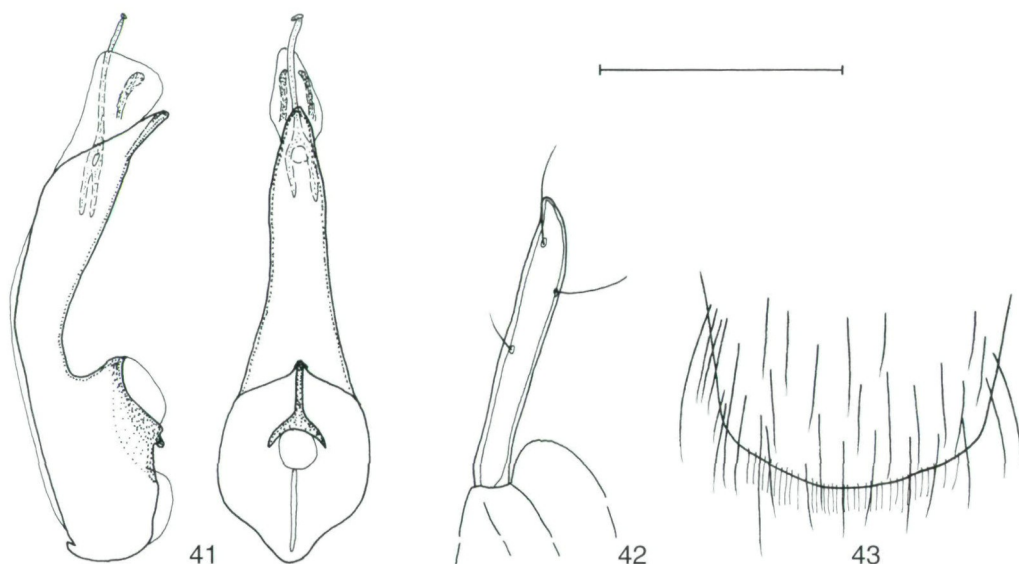
Elytra slightly narrower than pronotum (PW/EW: 1.03) Legs short and in this respect similar to *P. lepismiformis*; metatarsus 0.85 times the length of metatibia, first metatarsomere about as long as the combined length of the two following tarsomeres (T1L/T24L: 0.67); pubescence of internal face of apical half of meso- and metatibia similar to *P. reitteri*.

Abdomen with punctuation similar to *P. lepismiformis*; microsculpture indistinct. Hind margin of sternum VIII convex (Fig. 43).

♂: aedeagus small, shape and apical lobe of paramere as in Figs. 41, 42.

♀: unknown.

Comments: Based on the shape of the pronotum, antennae and legs, the pubescence and the male sexual characters, *P. donisthorpei* is most closely related to *P. lepismiformis* and *P. guadalupensis*, which is quite remarkable, since the former is the only known representative of the genus from the Oriental Region and the latter two species occur in the extreme southwest of the Western Palaearctic Region.



Figs. 41 - 43: *Piochardia donisthorpei* (HT), (41, 43) scale = 0.5 mm: (41) aedeagus in lateral and in ventral view, (42) apical lobe of paramere, scale = 0.25 mm, (43) hind margin of ♂ sternum VIII.

Distribution and bionomics: Apart from the holotype, which was collected in Eastern India in association with *Cataglyphis* identified by Wasmann as *C. setipes* (FOREL, 1894), no further records have become known.

Key to the species of *Piochardia*

- 1 Pronotum of characteristic shape: anterior angles absent, so that anterior and lateral margins form a semicircle; hind margin distinctly sinuate, hind angles almost reaching or slightly projecting over the transverse tangent to central convexity; antenna very short and compact, antennomere 4 transverse or subquadrate; legs short, metatarsi always distinctly shorter than metatibiae; first metatarsomere barely as long as the combined length of the two following tarsomeres. ***P. lepismiformis* species group** 2
- Pronotum with anterior angles at least weakly indicated, on average more transverse; antenna longer, antennomere 4 subquadrate to oblong; legs longer, metatarsi often as long as metatibiae or nearly so; first metatarsomere in all but one species clearly longer than the combined length of the two following tarsomeres. ***P. reitteri* species group** 4
- 2 Body distinctly larger (PW: >1.7; PL: >1.2; EW: >1.7); colour of body more or less uniformly yellowish to reddish brown. ♂: aedeagus as in Fig. 41. Oriental Region: Eastern India. ***P. donisthorpei***
- Body smaller (PW: <1.7; PL: <1.1; EW: <1.6); colour at least partly darker, pronotum and abdomen brown to dark brown. Western Palearctic: Iberian Peninsula. 3
- 3 Posterior angles of pronotum more strongly projecting posteriad, hind margin therefore more distinctly sinuate; antennomere 3 weakly oblong; elytral punctation very fine; abdomen strongly narrowed posteriad; tergum VIII more oblong, its hind margin more strongly concave (Fig. 35). ♂: aedeagus smaller (Fig. 33). Portugal. ***P. lepismiformis***

- Posterior angles of pronotum less strongly projecting posteriad, hind margin more weakly sinuate; antennomere 3 distinctly oblong; elytral punctation more distinct, finely granulose; abdomen less strongly narrowed posteriad; tergum VIII less oblong, its hind margin less strongly concave (Fig. 39). ♂: aedeagus larger (Fig. 37). Estremadura, Spain. *P. guadalupensis*
- 4 Body bicolored, elytra distinctly lighter than pronotum and abdomen; pronotum on average less transverse (PW/PL often <1.65), with central hind margin strongly convex, hind angles clearly not reaching transverse tangent to central convexity; first metatarsomere shorter than the combined length of the three following tarsomeres. 5
- Body more or less unicolored, elytra of (nearly) the same colour as pronotum and abdomen, only head sometimes darkened; pronotum more transverse (PW/PL: >1.60), with central hind margin less strongly convex, hind angles reaching transverse tangent to central convexity or nearly so; first metatarsomere almost as long as or equal to the combined length of the three following tarsomeres. 7
- 5 Pronotum on average more transverse (PW/PL: >1.55), dorsal surface slightly less convex and the sides somewhat flatter; punctation on abdominal terga finer and denser; abdominal tergum VIII with very deep and broad, sometimes almost semi-circular concavity (Figs. 23, 25); aedeagus as in Fig. 20. Northern Africa. *P. bedeli*
- Pronotum on average less transverse (PW/PL: <1.65), dorsal surface more convex, lateral margins more strongly bent downwards; punctation of abdomen, especially in the posterior halves of the terga clearly sparser and coarser; abdominal tergum VIII with less pronounced concavity. 6
- 6 Larger species, PW: >1.6 , PL: >1.1 , EW: >1.7 ; first metatarsomere only about as long as combined length of the two following tarsomeres (T1L/T24L: ca. 0.65); hind angles of pronotum more pronounced; pubescence of head, elytra and especially of pronotum longer and more conspicuous. Caucasus. *P. aleocharina*
- Smaller species, PW: <1.6 , PL: <1.1 , EW: <1.75 ; first metatarsomere longer than the combined length of the two following tarsomeres (T1L/T24L: >0.7); hind angles of pronotum less pronounced; pubescence of head, elytra and pronotum short and inconspicuous; aedeagus as in Fig. 12. Northern Africa and Eastern Mediterranean. *P. schaumii*
- 7 Larger species (PW: >1.7 , EW: >1.8), colour on average lighter, usually more or less yellowish with the head often darkened to various degrees; hind margin of pronotum more convex centrally, hind angles less pronounced, not reaching the transverse tangent to the central convexity; pronotum slightly narrower than elytra (PW/EW: 0.91 - 0.98); legs very long and slender (HTiL: >1.0 ; HTaL: >0.9), metatarsus approximately as long as metatibia (HTaL/HTiL: >0.9); pubescence of apical interior face of meso- and metatibiae dense and long; aedeagus large (Fig. 28); spermatheca in lateral view with more or less straight duct (Fig. 30). Northern Africa. *P. oberthuri*
- Smaller species (PW: <1.7 , EW: <1.65), colour on average somewhat darker, usually more or less reddish or light brown; hind margin of pronotum weakly convex centrally, hind angles more pronounced, reaching (or even projecting beyond) the transverse tangent to the central convexity; pronotum as wide as or wider than elytra (PW/EW: 0.99 - 1.06); legs shorter (HTiL: <1.0 ; HTaL: <0.9), metatarsus usually slightly shorter than metatibia (HTiL/HTaL: <0.95); pubescence of apical interior face of meso- and metatibiae distinctly less dense and shorter; aedeagus smaller and of different shape apically (Fig. 5); spermatheca in lateral view with bent duct (Fig. 7). Southern Balkans to Anatolia, Caucasus and Iraq. *P. reitteri*

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