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## The Near Eastern species of Leptodirini Lacordaire (Coleoptera, Leiodidae, Cholevinae)

by Michel Perreau

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**Abstract:** The Near Eastern species of Leptodirini (from Armenia, Georgia, Iran, Israel, Lebanon, Southwestern Russia, Syria, Turkey) are reviewed. The new monospecific genus *Mixanigia* n. gen. is described for *Mixanigia faillei* n. sp., *Huetheriella pinargozu* n. sp. is described. The genus *Catopsinus* (Motschulsky, 1868) is resurrected for four species previously placed in *Bathysciola* Jeannel, 1910: *C. cavazzutii* (Giachino, 1996) comb. n., *C. lindbergi* (Jeannel, 1957), comb. n., *C. peyronis* (Abeille de Perrin, 1875) comb. n., *C. pusillus* (Motschulsky, 1840), plus three new species: *C. hlavaci* n. sp., first Syrian species of Leptodirini, *C. loebli* n. sp. and *C. meybohmi* n. sp. from south Turkey. This solves the long time pending problem of the name “*Bathysciola*”, used since 1910 notwithstanding the anteriority of the senior name *Catopsinus* of which it should have been considered as synonym. *Bathysciola fausti* Reitter, 1883 is provisionally transferred to *Sbordoniola* Zoia & Rampini, 1994. *Bathysciola caucasica* Giachino, 1998 is synonymized with *Bathysciola brignolii* Zoia & Rampini, 1996. New faunistic data are provided for *C. pusillus*, *C. peyronis*, *B. suramensis* Jeannel, 1930, *Pisidiella spatulifera* Jeannel, 1930 and *P. ovoidea* Jeannel, 1955. The geographical distribution of *Catopsinus* is discussed within the frame of the “Anatolian diagonal”. Distribution maps are provided and identification tables for all genera of the region and for species of *Catopsinus* and *Huetheriella*.

**Résumé:** Les espèces proche-orientales de Leptodirini Lacordaire (Coleoptera, Leiodidae, Cholevinae). Les espèces proche-orientales de Leptodirini, (incluant l'Arménie, la Géorgie, l'Iran, Israël, le Liban, la Russie du sud-ouest, la Syrie et la Turquie) sont révisées. Le nouveau genre monospécifique *Mixanigia* est décrit pour *Mixanigia faillei* n. sp., *Huetheriella pinargozu* n. sp. est décrite. Le genre *Catopsinus* Motschulsky, 1868 est réintroduit pour quatre espèces préalablement placées dans le genre *Bathysciola* Jeannel, 1910: *C. cavazzutii* (Giachino, 1996) comb. n., *C. lindbergi* (Jeannel, 1957) comb. n., *C. peyronis* (Abeille de Perrin, 1875) comb. n., *C. pusillus* (Motschulsky, 1840), et trois nouvelles espèces: *C. hlavaci* n. sp., première espèce syrienne de Leptodirini, *C. loebli* n. sp. et *C. meybohmi* n. sp. de Turquie du sud. Ceci résout le problème, resté depuis longtemps en suspens du nom “*Bathysciola*”, utilisé depuis 1910 en dépit de l'antériorité du nom *Catopsinus* dont il aurait du être considéré comme synonyme. *Bathysciola fausti* Reitter, 1883 est transféré provisoirement dans le genre *Sbordoniola* Zoia & Rampini, 1994. *Bathysciola caucasica* Giachino, 1998 est mis en synonymie avec *Bathysciola brignolii* Zoia & Rampini, 1996. De nouvelles localités sont révélées pour *C. pusillus*, *C. peyronis*, *B. suramensis* Jeannel, 1930, *Pisidiella spatulifera* Jeannel, 1930 et *P. ovoidea* Jeannel, 1955. La répartition du genre *Catopsinus* est discutée dans le cadre de la "diagonale anatolienne". Des cartes de

répartition sont fournies ainsi que des clés d'identification des genres de la région et des espèces de *Catopsinus* et *Huetheriella*.

**Key words.** Near East, Leiodidae, Leptodirini, new genus, new species, subterranean evolution, Anatolian diagonal

## Introduction

Since the first described species *Catops pusillus* Motschulsky, 1840, Leptodirini are represented in the Near East region by 15 genera in the following countries: Armenia, Georgia, Iran, Israel, Lebanon, Southwestern Russia, Syria, Turkey. A recent update of the fauna of cave dwelling invertebrates of Turkey enumerates a few Cholevinae (Kunt *et al.* 2010).

The present paper brings further taxonomic, systematic, phylogenetic and faunistic informations on several genera of this region: *Bathysciola* Jeannel, 1910, *Catopsinus* Motschulsky, 1868 (resurrected), *Huetheriella* Jeannel, 1934, *Pisidiella*, Jeannel, 1930 and *Sbordoniola* Zoia & Rampini, 1994, and contains the description of one new genus: *Mixanigia* n. gen. and five new species.

Three maps (Figs. 56–58) illustrate the distribution of all genera and species of Leptodirini of the Near East, including those which are not taxonomically or faunistically considered in this paper: *Besuchetiola* Rampini & Zoia, 1991, *Bithyniella* Jeannel, 1955, *Cavazzutiella* Casale & Giachino, *Coiffaitiella* Jeannel, 1955, *Capraiola* Zoia & Rampini, 1994, *Iranobathyscia* Zoia & Rampini, 1994, *Karadeniziella* Casale & Giachino, 1989, *Sengletiella* Zoia & Rampini, 1994.

Genera living in this region belong to two of the six subtribes of Leptodirini: Bathysciina (*Huetheriella*, *Pisidiella* and *Phaneropella* Jeannel, 1910) and Pholeuina (all other genera). However the definition of these two subtribes may be discussed as their phylogenetic relevance is doubtful.

## Material and methods

After dissection, genital structures were treated as follows. The aedeagus of male specimens was dehydrated in 95% ethanol, before being mounted in Euparal on a glass slide. Female genitalia were cleared in hot 10% KOH for 10 min, stained with a diluted ethanolic solution of Azoblack (Carayon 1969), rinsed in demineralized water, and mounted in dimethyl-hydantoin-formaldehyde (DMHF) on a glass slide. In both cases, the glass slide is glued on half of its surface on a cardboard and pinned under the specimen in collection.

Pictures have been taken with a keyence VHX5000 microscope and a VH-Z250T lens. When necessary, multifocus layers were combined in a single picture through the Helicon focus software (<http://www.heliconsoft.com/heliconsoft-products/helicon-focus/>)

Examined specimens belong to institutions and private collections which are abbreviated as follows: MNHN: Paris National History Museum, France; MHNG: Natural History Museum of Geneva, Switzerland; NMPC: Národní Muzeum, Prague, Czech Republic; RBIN: Royal Belgian Institute of Natural Sciences, Brussels, Belgium; RMNH: Naturalis Biodiversity Center, Leiden, The Netherlands; ZMUM: Zoological Museum of the university

of Moscow, Russia; ZSMC: Zoologische Sammlung des Bayerischen Staates, München, Germany; CAFS: Arnaud Faille, Stuttgart, Germany; CAPZ: Andreas Pütz, Eisenhüttenstadt, Germany; CDCK: David Ceplik, Kosice, Slovakia; CISK: Ivan Smatana, Kosice, Slovakia; CJRZ: Jan Růžička, Prague, Czech Republic; CMPR: Michel Perreau, Paris, France; CMSB: Michael Schülke (Museum für Naturkunde Berlin); COKV: Ondřej Konvička, Zlín, Czech Republic; CPHV: Peter Hlaváč, Prague, Czech Republic; CPMG: Pier Mauro Giachino, Torino, Italy; CRLI: Roman Lohaj, Limbach, Czech Republic.

Maps of Figs. 57 and 58 have been generated from the ASTER Digital Elevation Model V002 (<https://lpdaac.usgs.gov/products/astgtmv002/>) for terrestrial reliefs, the Hydroshed river network at 15 seconds resolution (<https://www.hydrosheds.org/>) for rivers and the Global Administrative Area Data (<https://gadm.org/>) for states boundaries. Data have been compiled with QGIS 3.10.4 (<https://www.qgis.org/>).

The text of labels of the specimens examined and the type localities from original publications are exactly reported. When additional notes are added, they are set into square brackets. The geographical coordinates, when they are not originally mentioned in the literature or on labels of specimens, and when they could be inferred, are also quoted between square brackets.

## **Taxonomy**

### **Genus *Mixanigia* n. gen.**

**Type species:** *Mixanigia faillei* n. sp.

urn:lsid:zoobank.org:act:FCD13DDE-AFE8-470B-8069-55EF56326594

**Diagnosis.** Anophthalmic. Body ovoid very convex (Fig. 1). Male protarsi five segmented, female protarsi four segmented. Mesotarsi and metatarsi 5 segmented and undilated in both sexes. All tarsi with a single developed strong empodial seta (Fig. 4). Protibiae without a lateral row of regular spines on the outer side. Meso and metatibiae without a crown of regular spines around the apical perimeter. Elytra shiny, with sparse tiny and superficial punctation associated with setae, without microstrigae nor microreticulation, with a parasutural stria. Aedeagus with an apical dropout like a bayonet in lateral view (Fig. 5).

**Etymology.** the genus is dedicated to Harald Mixanig, tireless collector of subterranean beetles, especially the specimens of this new genus.

### ***Mixanigia faillei* n. sp.**

urn:lsid:zoobank.org:act:6258CD81-F720-4BF8-B03C-2DD6D1F5CCE0

**Holotype:** 1 ♂, TR, Alanya, Akseki, Ürünlu, 410 m, Düden suyu mağarasi [37°02'N 31°38'E] 10.10.1998, leg. H. Mixanig, in ZSMC. Paratypes: 1 ♂ and 2 ♀, same data as holotype (ZSMC; CMPR).



**Description.** Length: 2.1-2.4 mm. Body ovoid very convex, uniformly dark brown and shiny (Fig. 1). Head without eyes. Antennae with the following ratios of antennomeres lengths reported to the length of the first antennomere 1; 1.54; 1.05; 0.90; 0.86; 0.82; 0.98; 0.60; 0.90; 0.84; 1.36.

Pronotum 1.8 times as wide as long, the maximum width at the base. Surface shiny, with sparse and tiny punctation associated with setae, without microstrigae nor microreticulation. Mesoventrum with a strong mesoventral process separating mesocoxae and extending over the metaventrum (Fig. 3).

Elytra shiny, with sparse tiny and superficial punctation associated with setae, without microstrigae nor microreticulation, as pronotum, with a parasutural stria, extended on the two apical third of the length of the elytra (Fig. 2).

Legs: protarsi five segmented and widely dilated (males) or four segmented and undilated (females). Mesotarsi and metatarsi five segmented and undilated in both sexes. All tarsi with a single developed strong empodial seta (Fig. 4). Protibiae without a lateral row of regular spines on the outer side. Meso and metatibiae without a crown of regular spines around the apical perimeter. Apical perimeter of the tibial apex of all tibia with a trifid inner spur.

Aedeagus elongated, median lobe dilated just before the apex in dorsal view, the apex widely rounded, with a small rectangular expansion at the tip in dorsal view (Figs. 6, 7), arcuate in lateral view with a dropout like a bayonet at the place of the dilatation and the apex very thin in lateral view (Fig. 5). Parameres bent inward at the apex in dorsal view, arcuate parallelly of the median lobe in lateral view (Fig. 5), with three apical setae (Figs. 8, 9)

Female with a narrow expansion on the anterior edge of the abdominal ventrite VIII (Fig. 10). Genital segment (abdominal segment IX) complete. Spermaduct long, with a tiny basal sclerite (bs in Fig. 11). Spermatheca elongated with two long sclerotized capsules at the base and at the apex and a short membranous medial part (Fig. 11).

**Etymology.** Species dedicated to Arnaud Faille, outstanding specialist of the subterranean fauna, who let us know the existence of these specimens in ZSMC.

**Distribution.** Known only by the four type specimens from the type locality: Düden suyu mağarası.

**Discussion.** The placement in the conventional set of subtribes of Leptodirini is in Pholeuina, according to the combination of characters corresponding to pentamerous male protarsi, absence of outer row of regular spines on protibiae and of apical crown of spines on meso and metatibiae and an entire female genital segment.

But, the presence of a single developed empodial seta (Fig. 4) is unique in genera presently recorded in the considered region. Most genera of Leptodirini (including all other genera of the Near East) have two interangular empodial setae (Fig. 16). Species which have a single empodial developed seta belong to genera *Platycholeus* (Newton 1998; Gnaspini *et al.* 2017) in subtribe Platycholeina, and some french genera as *Diaprysius* (Gnaspini *et al.* 2017), *Speonomus* (Perreau 2000; Antunes-Carvalho & Gnaspini, 2015); *Troglocharinus* (Antunes-Carvalho & Gnaspini 2015), belonging to Pholeuina, but whose distribution areas are far remote from Turkey. When a single developed seta occurs, it goes generally with a very small basal spine considered as homologous of the second seta (Antunes-Carvalho & Gnaspini 2015; Gnaspini *et al.* 2017). But this spine is too small to be visible without SEM

observation, and it has not been observed in *M. faillei*. The phylogenetic relevance of this character has been preliminary investigated by Antunes-Carvalho *et al.* (2019) and surely *Mixanigia* belongs to a different lineage than other genera of Pholeuina of the Near East.

### Genus *Huetheriella* Jeannel

*Huetheriella* Jeannel, 1934a: 21, type species: *Huetheriella maximiliani* Jeannel, 1934. (monotypy)

*Huetheriella* Jeannel, 1934b: 164. (Further description)

*Huetheriella* Jeannel, 1934: Casale & Giachino 1990: 132. (Further description)

The genus contains presently two species located south of Beyşehir lake. *H. maximiliani* Jeannel recorded from two caves: Ferzen mağarasi near Seydişehir (the type locality) and Güvercin tasi Deliği located on the western side of the Suğla lake (Fig. 57), and *H. notenboomi* Casale & Giachino from the single cave: Sakal Tutan Düdeni (Fig. 57), located in Giden Gelmez Dağları (Self 1987) also near Seydişehir.

No male specimens were previously collected in the type locality. The male of *H. maximiliani* has been described on specimens from Güvercin tasi Deliği (Casale & Giachino 1990) which is located twice farther from the type locality of *H. maximiliani* than from the type locality of *H. notenboomi* (Fig. 57). Actually, *H. notenboomi* and *H. maximiliani* are distributed on two opposite slopes of the northern part of Giden Gelmez Dağları, but the specific identity of the populations of *H. maximiliani* living in Güvercin tasi Deliği could nevertheless be questioned.

For the first time the aedeagus of a male of *H. maximiliani* from the type locality (Fig. 20) is illustrated, together with the aedeagus of a male from Güvercin tasi Deliği (Fig. 21). The comparison confirms that the two populations belong to the same species. The little differences in the endophallus are likely due to a lateral compression during desiccation. The aedeagus of *H. notenboomi* is also illustrated on Fig. 22. The habitus of the three species, including the new one described below and located on the eastern side of Beyşehir lake are illustrated on Figs. 12-14.

### *Huetheriella pinargozu* n. sp.

urn:lsid:zoobank.org:act:F263567B-6AC8-4693-8F58-E258047AB110

**Holotype** 1 ♂, TR, Toros Dağları, nord Beyşehir gölü, Badem ili, Pinargözü mağarasi [37°41'48"N 31°18'27"E] 1559 m, 14.vi-5-xi.08, H. Mixanig (CMPR)

**Description.** Length: 3.6 mm. Habitus in Fig. 12. Pholeuonid body shape, anophthalm, dark brown. Antennae (Fig. 15) with the following ratios of antennomeres lengths reported to the length of the first antennomere: 1; 1.00; 0.81; 0.72; 0.96; 0.85; 1.07; 0.67; 1.00; 0.89; 1.13.

Pronotum slightly transverse, the maximum width at the middle, the lateral sides narrowed straight both from the middle to the anterior margin and from the middle to the posterior margin. Surface of pronotum with strong and distant punctation associated with semierect setae, without microreticulation. Mesoventerum with a mesoventral process separating the mesocoxae, not extending over the metaventerum.

Elytra with regular strong and distant punctation associated with semierect setae (slightly stronger than the punctation of pronotum), without any trace of alignment nor transverse strigae (Fig. 17), and without microreticulation. Sutural stria absent.

Protarsi four segmented, mesotarsi and metatarsi five segmented (Fig. 16). All tarsi undilated. Protibia without a lateral row of regular spines on the outer side. Meso and meta tibiae without a crown of regular spines around the apical perimeter. Apical perimeter of the tibial apex of all tibia with a trifid inner spur. Empodium with 2 long and strong setae (Fig. 16).

Female ventrite VIII with a short *spiculum ventrale* (Fig. 24) Spermaduct of the genital segment with a voluminous basal sclerite (Fig. 23).

Male unknown.

**Etymology.** The name of the species is the same as the name of the cave which is its type locality: Pinargözü, taken as substantive in apposition. It means “eye of the water” in Turkish.

**Distribution.** Known only by the type specimen from the type locality: Pinargözü mağarası, on the eastern side of Beyşehir lake (Fig. 57). The cave opens on the northern slopes of Mount Dedegöl (Chabert 1977, Yamaç *et al.* 2021), it is presently the longest cave of Turkey (Nakik & Beyeri, 2018; Yamaç *et al.* 2021).

**Discussion.** Despite the male is unknown, the population of this cave is clearly a different species compared to the two other species of the genus. It differs by the significantly larger size, more than 3.5 mm versus less than 3.3 mm (Figs. 12-14), the elongation of the four last antennomeres (Fig. 15), and the small elytral punctation (Fig. 17) as *H. maximiliani* (Fig. 18), but a shorter and recumbent setation as *H. notenboomi* (Fig. 19). The *spiculum ventrale* of the female VIIIth abdominal ventrite is short in the whole genus (Figs. 24, 26), slightly wider for *H. maximiliani* (Fig. 25). The three species can easily be identified with the following identification key.

1. – Lateral sides of pronotum widely rounded, straight only close to the basal angles. Eighth antennomere elongate, more than 1.5 times longer than wide. Elytra with very long and erected setae (Fig. 18).....*H. maximiliani* Jeannel
  - Lateral sides of pronotum narrowed straight on the basal half of their length. Eighth antennomere globose, at most 1.25 times as long as wide. Elytra with shorter and semi-erected or recumbent setae.....2
2. – Smaller size, body length less than 3.3 mm. Elytra with very strong and deep punctation (Fig 19).....*H. notenboomi* Casale & Giachino
  - Larger size, body length more than 3.5 mm. Elytra with lighter punctation (Fig. 17).....*H. pinargozu* n. sp.

### Genus *Catopsinus* Motschulsky, 1868 (stat. res.)

*Catopsinus* Motschulsky, 1868: 58, espèce type: *Catops pusillus* Motschulsky, 1840. (monotypy)

*Bathysciola* Sectio 1: Jeannel 1924: 99. (pars)

*Bathysciola* Jeannel of the “*pusilla*” species group: Perreau 2000: 232. (pars)

**Diagnosis.** Convex and bathyscioid body shape, with unpigmented teguments. Head generally with small eyes (with less than 10 ommatidies), generally pigmented, unpigmented in *C. cavazzutii*, completely lacking in *C. lindbergi*. Pronotum generally as wide as the elytra, sometimes slightly wider (*C. meybohmi* n. sp.). Pronotal surface with very thin and dense punctation, not aligned in transverse microstrigae. Elytra with transverse microstrigae and with a strong sutural stria very distant and not parallel to the suture, more distant from the suture in the middle than at the base or the apex (Fig. 34a). Mesoventral process not extending over the metaventrum. Male protarsi five segmented and dilated (Figs. 27b-33b). Female protarsi four segmented, mesotarsi and metatarsi five segmented and undilated in both sexes. Protibias without an outer row of spines of equal length, meso and metatibia without a crown of spines. Apex of all tibiae with a strong and denticulate inner spur, and a strong simple outer spur. Empodium with two interungular setae. Parameres dilated at the apex in lateral view, with three setae, two apical and one subapical (Figs. 41c-47c). The tip of the median lobe is generally tilted ventrally (except *C. loebli*), what is especially visible in lateral view (Figs. 41b-47b). The details of this tip is a differential character for species. Female abdominal ventrite VIII with a thin and more or less long *spiculum ventrale* (Figs. 48a-52a). Spermatheca more or less long, thin, and with two sclerotized capsules, one at both ends (Figs. 48b-52b). Spermaduct with a more or less developed basal sclerite (Fig. 48c).

**Discussion.** The genus *Catopsinus* corresponds to an homogeneous group of species already spotted by several authors (Jeannel 1957; Giachino 1996). It contains four previously known species and three more here described. The main distinctive characters of species are the morphology of aedeagus, the degree of reduction of eyes and the width of male protarsi.

**Distribution.** All localities presently recorded of the species of *Catopsinus* occur in a narrow stripe oriented from the southwest to the northeast, extending in Armenia, Georgia, Israel, Lebanon, Syria and Turkey, and materialised in blue on the map of Fig. 56. The northeastern limit is Georgia, where it reaches a very close vicinity of the Russian border. The southwestern limit is the far north of Israel, near the Lebanon border.

It should be noticed that this oblique stripe is nearly parallele, contiguous to and overlapping at both its southern and northern ends the “Anatolian diagonal”, an oblique narrow zone which has been recognized to be a significant environmental barrier and a biogeographic boundary separating the central and eastern Anatolian floras and faunas (Davis 1971; Ekim & Güner 2011; Gür 2016). This zone is also a hot spot of biodiversity for many zoological and botanical groups. Its axis and boundaries are indicated on the map of Fig. 56, the outline follows the map of Kuzucuoğlu *et al.* (2019, p. 116 fig. 4.72).

In the southern part of the distribution of the genus, four species occupy circumscribed areas that are scattered along the eastern coast of the Mediterranean sea and along the mountain ranges which run parallel to this coast, from north to south (Fig. 58): *C. loebli* in the northern part of the Hatay province of Turkey, on the western side of Nur Dağları (Amanos mountain range); *C. meybohmi*, in the southern part of the Hatay province, near Antakya, on the south-eastern slopes of Kizil Dağı and the northwestern slopes of Ziyaret Dağı; *C. hlavaci* in Syria, on the central axis and the western slopes of Jabal an Nuşayriyah; *C. peyronis*, in Lebanon and North Israel, westerly to Jabal Loubnâne (occidental Lebanon mountain range) and to Jabal al-Jarmaq (Mount Meron). This high level of diversity and endemism contrasts

with the northernmost single species *C. pusillus*, widely distributed in a large area in Armenia and Georgia.

***Catopsinus cavazutii* (Giachino) comb. nov.**

*Bathysciola cavazutii* Giachino, 1996: 51. (holotype in CPMG examined)

Type locality: Turchia, villayet Tunceli, Tunceli m 1200.

**Diagnosis.** Length 1.9 mm. Head with small hyaline unpigmented, unafaceted area at the place of eyes (Fig. 32a). Antenna (Fig. 32c) with the following ratios of antennomeres lengths reported to the length of the first antennomere: 1; 1.19; 0.56; 0.48; 0.65; 0.58; 0.86; 0.49; 0.81; 0.75; 1.31. Male protarsus 0.8 time as wide as the the protibia (Fig. 32b). Aedeagus with the apex of median lobe widely rounded in dorsal view (Fig. 37c), the tip shortly tilted ventrally (Figs. 41a, 41b) and with parameres significantly shorter than the median lobe (Fig. 37c). Setae of the apex of parameres inequal in length, the subapical much longer than the two others (Fig. 41c).

**Specimens examined.** Holotype and single known specimen of the species from Tunceli (Fig. 56).

**Distribution.** Turkey: Tunceli [39° 12' 53"N 39°28'17"E].

**Discussion.** Large species easily identifiable by the hyaline traces of eyes.

***Catopsinus hlavaci* n. sp.**

urn:lsid:zoobank.org:act:DCD22003-496F-40EF-B057-7C6A40D011F4

**Holotype**, ♂, Syria, Jabal an Nusayriyah, Slunfeh env. (Almanzeleh), 525 m, N 35°35.638' - E 36°09.825', sifting, northern part of wadi, 18.4.2008 (NMPC). **Paratypes**: 2 ♂ & 2 ♀, same data as holotype (NMPC, CPHV, CDCK); 2 ♀, Syria, Jabal an Nusayriyah, Slunfeh env., 544 m, N 35°36.549' - E 36°05.775', sifting, wet litter under rock wall, 17.4.2008, P. Hlaváč leg. (CPHV, CMPR); 2 ♂ & 1 ♀: Syria, Jabal an Nusayriyah, Slunfeh env., 1500 m, N 35°36.268' - E 36°13.546', 15-16.4.2008, P. Hlaváč leg. (CDCK, CMPR); 1 ♂: Syria, Jabal an Nusayriyah, Qual'at al Saladin, N 35°35,509 E 36°03,827, 1344 m, 17.IV.2008, P. Hlaváč leg. (CMPR).

**Diagnostic description.** Length: 1.5-1.7 mm. Body uniformly brown, the antennae yellowish. Habitus in Fig. 34a. Head with pigmented eyes of about ten ommatidies (Fig. 29a). Antenna (Fig. 29c) especially slender, except the last antennomere which is 1.25 times as wide as the penultimate. Eighth antennomere as long as wide. Ratios of antennomeres lengths reported to the length of the first antennomere are the following: 1; 1.10; 0.48; 0.48; 0.61; 0.48; 0.71; 0.32; 0.52; 0.52; 1.17. Metatergum moderately elongated, with a triangular posterior apophysis (Fig. 34b). Mesoventral carina with a sharp ventral edge, not extending over the metaventrum. Protarsi five segmented and widely dilated in male, 1.2 time as wide as the apex of the protibias (Fig. 29b), four segmented and undilated in females. Mesotarsi and metatarsi five segmented and undilated in both sexes. Median lobe of the aedeagus wide and thick near the base, apically rounded with a slight preapical narrowing (Fig. 34c), the apical plate flat and angular in lateral view (Figs. 43a, 43b). Parameres significantly longer than the

median lobe (Figs. 34c, 43a), very wide from the base to the apex and with a very wide preapical dilatation (Figs. 43a; 43c), with three internal setae, a short apical one, and two preapical ones of unequal lengths (Fig. 43c). Basal lobe of the tegmen thin. Endophallus with a basal Y shaped piece and a median structure made of two successive similar odd pieces (Fig. 34c). Female abdominal ventrite VIII with a long and thin *spiculum ventrale* (Fig. 48a). Spermatheca long and slightly curved, with sclerotized basal and apical lobes (Fig. 48b). Spermatheca with a strongly sclerotized basal piece (Fig. 48c).

**Etymology.** This species is dedicated to its first collector: Peter Hlaváč, famous specialist of Staphylinidae Pselaphinae.

**Distribution.** *C. hlavaci* n. sp. is located on the central axis and the western slopes of the northern part of Jabal an Nuşayriyah (Figs. 56, 58). It is the first Syrian species of Leptodirini, and is located in a natural continuity of the geographical distribution of the genus in this region.

**Discussion.** This species is different from the other species of the genus *Catopsinus* by the details of the endophallus (Fig. 34c), by the length of the parameres which extend significantly beyond the apex of the median lobe, and by the apical plate of the median lobe which is strongly tilted ventrally in lateral view shortly before the apex (Fig. 43b).

### ***Catopsinus lindbergi* (Jeannel) comb. n.**

*Bathysciola lindbergi* Jeannel, 1957: 23. (holotype in MNHN, examined)

Type locality: Turquie: Anatolie orientale grotte Korkha près de Lice

*Bathysciola lindbergi* Jeann.: Coiffait 1959: 30. (distribution)

**Diagnosis.** Length: 1.75-2.05 mm. Body uniformly dark brown (significantly darker than the other species of the genus). Head without eyes. Antennae (Fig. 33c) with the following ratios of antennomeres lengths reported to the length of the first antennomere: 1.00; 1.05; 0.62; 0.50; 0.60; 0.50; 0.88; 0.41; 0.71; 0.62; 1.10. Eighth antennomere 1.28 times as wide as long. Male protarsi as wide as the apex of protibias (Fig. 33b). Aedeagus very slender, the apex rounded, shortly sinuate at the tip in dorsal view (Fig. 39c), weakly arcuate in lateral view, the apex moderately tilted ventrally (Figs 42a; 42b). Parameres barely shorter than the median lobe, the apex as in Fig. 42c. Female abdominal ventrite VIII with a short *spiculum ventrale* (Fig. 52a), spermatheca on Fig. 52b.

**Type specimens examined.** 1 ♂: Turquie 14.9.56, Korkha, Lindberg, Gi [Galerie] Supérieure, dans le guano TYPE [red label, black letters] [holotype].

**Other specimens examined.** 3 ♂ & 5 ♀: grotte sup. de Korkha, Anatolie or., Lindberg IX.56 (MNHN).

**Distribution.** known from a single cave: Korkha cave near Lice [38°27'30"N 40°39'E] (Fig. 56)

**Discussion.** Large species easily identifiable by the lack of eyes.

### ***Catopsinus loebli* n. sp.**

urn:lsid:zoobank.org:act:0FB70D45-71A1-4FDA-803C-E3779EB83911

**Holotype:** 1 ♂, Turquie, Antakya, Urabat [near Yakacik=Yahacik: 37°46'27"N 36°13'06"E], 6.v.78, Cl. Besuchet (MHNG). **Paratypes:** 2 ♀: same data as holotype. (CMPR, MHNG). 1 ♀: Turquie, Antakya, 7 km. E. Yesilkent, 350-400 m., 4.v.78, Besuchet, Löbl (MHNG).

**Diagnostic description.** Length: 1.40-1.70 mm. Body uniformly brown, antenna and tarsi lighter. Head with pigmented eyes of about 6-7 ommatidies (Fig. 31a). Antennae thick (Fig. 31c) with the following ratios of antennomeres lengths reported to the length of the first antennomere: 1.00; 1.00; 0.48; 0.37; 0.40; 0.37; 0.52; 0.27; 0.41; 0.48; 1.02, the eighth antennomere very transverse, 2.24 times as wide as long. Male protarsi five segmented, approximately as wide as the apex of protibiae. Female protarsi four segmented and with the first protarsomere slightly dilated (Fig. 31d). Mesotarsi and metatarsi five segmented and undilated in both sexes. Apex of aedeagus regularly narrowed near the apex which is rounded in dorsal view (Fig. 36c), straight at the apex which is blunt in lateral view (Figs. 47a, 47b). Parameres slightly longer than the median lobe (Fig. 34c), which is not clearly apparent on the lateral view of Fig. 47a because they are widely divergent on the microscopic slide. Female eighth abdominal ventrite with a thin *spiculum ventrale* (Fig. 50a). Spermatheca with two sclerotized and globose capsules at both ends separated by a short and thin membraneous zone (Fig. 50b). Basal sclerite of spermaduct elongated.

**Etymology.** The species is dedicated to Ivan Löbl, a member of the expedition during which this species has been collected, and an incomparable specialist of Staphylinoidea.

**Distribution.** *C. loebli* is localised in the northern part of the Hatay province, along the coast in the southern vicinity of Osmaniye, westernly of Nur Dağları (Fig. 56, 58).

**Discussion.** Compared to other species of *Catopsinus*, males of *C. loebli* can be easily distinguished by the apex of the aedeagus straight, not even shortly tilted towards the ventral side, and females by the slight dilatation of the protarsi and the short spermatheca with wide and globose basal and apical capsules and short membraneous intermediate zone.

### *Catopsinus meybohmi* n. sp.

urn:lsid:zoobank.org:act:1CF470E6-08C2-4F0A-ADD2-46F6F9F49AD1

**Holotype:** 1 ♂, Turquie, Antakya, Kışlak-Şenköy [36°00'00"N 36°07'41"E] 800-850 m, 2.v.78, Besuchet, Löbl (MHNG). **Paratypes:** 11 ♂ & 12 ♀ same data as holotype (MHNG, CMPR); 1 ♂ & 1 ♀, TR Umg. Antakya, Ziyaret Dağı, 25 km südl. Senköy, 920 m, N 36° 1'; E 36° 7'; Süd Turkey, 27.4.2002, leg. Brachat & Meybohm (CMPR); 2 ♀, Süd Turkey, Umg. Antakya, Ziyaret Dağı, 25 km südl. Senköy, 920 m, N 36° 2'; E 36° 7', 26.4.2002, Brachat & Meybohm (CMPR); 1 ♂ & 4 ♀, Turkey (Antakya) Ziyaret Dağı, 19 km S Antakya SW Şenköy, 36°01'48" N, 36°07'19" E, 915 m E slope, oak & laurel shrubs sifted, 5.IV.2004, leg. M. Schülke, [T04-13] (CMPR, CMSB); 1 ♀, Turkey (Antakya) Ziyaret Dağı, 22 km S Antakya SW Şenköy, 940 m, 36°00'32" N, 36°07'13" E, N slope, oak, beech & laurel shrubs sifted, 2.IV.2004, leg. M. Schülke, [T04-02] (CMSB); 2 ♂ & 3 ♀, Turkey (Antakya) Kizil Dağı, 20 km W Antakya, NW Teknepinar, 36°12'33" N, 35°57'30" E, 340 m, *Quercus* forest with *Pinus*, sifted, 3.4.2004, leg. M. Schülke, [T04-06] (CMPR, CMSB); 1 ♂ & 1 ♀, Turkey (Antakya) Kizil Dağı, 17 km W Antakya, NW Teknepinar, 36°11'18" N, 35°58'56" E, 410 m, *Pinus* forest with *Quercus ilex* and shrubs, sifted, 3.4.2004, leg. M. Schülke, [T04-04] (CMSB); 1 ♀, Turkey (Antakya) Kizil Dağı, 19 km W Antakya, NW Teknepinar, 36°12'16" N, 35°57'46" E, 360 m, Creek bank, *Platanus*, dead wood, sifted, 3.4.2004, leg. M. Schülke, [T04-05] (CMSB).

**Other probable specimens.** 1 ♀, Turquie, Antakya, Harbiye, 3.v.78, Besuchet, Löbl (MHNG) [tamisage de feuilles mortes près du bord d'une rivière (Ivan Löbl, pers. comm.)]

**Diagnostic description.** Length 1.42-1.67 mm. Head with pigmented eyes of about ten ommatidies (Fig. 28a). Antennae (Fig. 28c) with the following ratios of antennomeres lengths reported to the length of the first antennomere 1; 1.20; 0.62; 0.57; 0.62; 0.50; 0.77; 0.42; 0.58; 0.58; 1.10. Pronotum slightly wider than the elytra and very convex, 1.67-1.70 times as wide as long. Male protarsus five segmented, as wide as the apex of protibia (Fig. 28b). Female protarsi four segmented and undilated. Mesotarsi and metatarsi five segmented and undilated in both sexes. Aedeagus short, with the apex widely rounded in dorsal view (Fig. 40c), with a shortly acute tip pointing towards the ventral side in lateral view (Figs. 44a, 44b). Parameres slightly longer than the median lobe (Figs. 40c). Preapical dilatation of the parameres moderate (Fig. 44c). Female eighth abdominal ventrite with a thin *spiculum ventrale* (Fig. 49a), slightly shorter than the *spiculum ventrale* of *C. hlavaci*. Spermatheca long (Fig. 49b). Basal sclerite of spermaduct less developed than *C. hlavaci*.

**Etymology.** The species is dedicated to Heinrich Meybohm, tireless collector of Coleoptera, especially Staphylinoidea.

**Distribution.** Turkey, district of Antakya, in the southern part of the Hatay province, on slopes of both sides of the Orontes river valley: the south-eastern slopes of Kizil Dağı and the northwestern slopes of Ziyaret Dağı (Figs. 56, 58).

**Discussion.** Identifiable by the aedeagus very short compared to other species.

### ***Catopsinus peyronis* (Abeille de Perrin) comb. nov.**

*Adelops Peyronis* Abeille de Perrin, 1875: 216. (holotype in MNHN examined)

Type locality: Liban: environs de Beyrouth

*Bathyscia* (*Bathyscia*) *Peyronis* Abeille: Reitter 1884b: 21. (change of combination, synonymy of *B. syriaca*)

*Bathyscia Peyroni* Abeille, 1975: Jeannel 1907: 64.

*Bathysciola Peyroni* Abeille: Jeannel 1910: 26. (change of combination)

*Bathysciola Peyroni* Abeille: Jeannel 1911: 213. (further description)

*Bathysciola Peyroni* Abeille: Fagniez 1927: 18. (erroneous identification)

*Bathysciola Peyroni* Ab.: Coiffait 1959: 30. (distribution)

*Bathyscia syriaca* Reitter, 1884a: 255.

Type locality: Beirut

**Diagnosis.** Length: 1.4-1.7 mm. Head with pigmented eyes of ~10 ommatidies (Fig. 27a). Antenna (Fig. 27c) with the following ratios of antennomeres lengths reported to the length of the first antennomere 1; 1.10; 0.48; 0.48; 0.48; 0.48; 0.65; 0.34; 0.48; 0.58; 1.03. Male protarsus 0.85 times as wide as the apex of protibia (Fig. 27b). Median lobe of aedeagus narrow and elongate, with a very small triangular apical expansion at the tip in dorsal view (Fig. 35c), tilted ventrally at the apex in lateral view (Figs. 45a, 45b). Parameres with a weak preapical dilatation and three long setae (Fig. 45c).

**Data from literature.** Lebanon, Beirut (type locality); Lebanon, Beirut, entrance of the Cave of Nahr el Kelb (= cave of Jeita) (Abeille de Perrin 1875; Jeannel 1911; 1924; Coiffait 1959). Israel: Mount Carmel [32°44'N 35°03'E] (Jeannel 1911; 1924; Coiffait 1959). Syria (Reitter 1884b, Jeannel 1910).

**Known specimens examined.** 1♂: Museum Paris, Liban, Beyrouth, coll. Abeille de Perrin, TYPE [red label, black letters] [Holotype]; 1 ex [undetermined sex, only the abdomen



remains]: Museum Paris, Liban, Beyrouth, coll. Abeille de Perrin, TYPE [white label red letters]; 1\$, Liban, R. Jeannel, ex Abeille, Museum Paris, coll. Jeannel, 1931, peyroni, COTYPE [white label red letters]; 1 £, peyroni, Beyruth, Reitt. 85, Museum Paris coll. R. Jeannel, 1931; 1 £: Appl. 1878 I. Beirut, Bathyscia peyronis, Syria; 1 \$ Museum Paris (coll. E. Reitter) A. Grouvelle, 1913, 53 [without locality]; 1 \$: Syrien, peyronis, Museum Paris (coll. E. Reitter) A. Grouvelle, 1913 [only the label, specimen lost ?] (MNHN).

**Additional specimens.** 1 \$: Israel, Galilée, Eilon, N Betsset [33°04'14.52"N 35°08'9.23"], 22.iv.1982, Besuchet, Löbl (MHNG); 2 £: Israel, Galilée, Monfort [33°02'41"N, 35°13'33"E], 19.iv.1982, Besuchet, Löbl (MHNG).

**Distribution.** Lebanon and north of Israel (Figs. 56, 58). Specimens collected in the cave of Nahr el Kelb by P. de La Brûlerie and in Mount Carmel (under a stone) by F. de Saulcy were reported first by Bedel (Bedel & Simon 1875) as undescribed species of *Adelops*, then attributed to *C. peyronis* respectively by Abeille de Perrin (1875) and Jeannel (1911). Ancient records from Syria of the XIXth and early beginning of XXth centuries (Reitter 1884b, Jeannel 1910) should be understood as from the "Great Syria" which encompassed territories now spread into several countries: Israel, Jordan, Lebanon, Palestine, they refer to the specimens known at this time from Lebanon. The citation from Turkey: "Asie mineure, Goek Dagh" (Fagniez 1927), in the district of Kutahya, from collects of Bodemeyer, is certainly an erroneous identification.

### *Catopsinus pusillus* (Motschulsky)

*Catops pusillus* Motschulsky, 1840: 175. (holotype in ZMUM examined)

Type locality: Caucase: Ananur, Darial

*Catopsinus pusillus* Motschoulsky: Motschulsky 1868: 58. (change of combination)

*Adelops pusilla* Motsch.: Weise, in Schneider & Leder 1878: 142. (change of combination)

*Bathyscia* (*Bathyscia*) *pusilla* Motsch.: Reitter 1884b: 21. (change of combination)

*Bathysciola pusilla* Motschoulsky: Jeannel 1910: 26. (change of combination)

*Bathysciola pusilla* Motsch.: Iablokoff-Khnzorian 1950: 629. (distribution)

*Bathysciola pusilla* (Motschulsky, 1840): Zoia & Rampini 1994: 776. (further description)

**Diagnosis.** Length: 1.5-1.6 mm. Head with pigmented eyes of ~10 ommatidies (Fig. 30a). Antenna (Fig. 30c) with the following ratios of antennomeres lengths reported to the length of the first antennomere: 1; 1.06; 0.56; 0.52; 0.61; 0.50; 0.70; 0.44; 0.59; 0.59; 1.18. Male protarsi 1.22 times as wide as the apex of protibias (Fig. 30b). Aedeagus stout, widely rounded at the apex in dorsal view (Fig. 38c), with two preapical strictions in lateral view (Figs. 46a, 46b). Parameres as long as the median lobe, wide from base to apex and with a very wide preapical dilatation (Fig. 46c). Female adominal ventrite VIII on Fig. 51a, spermatheca on Fig. 51b.

**Data from literature.** Armenia: Lorut [40°56'20"N, 044°46'21"E] (Khnzorian, 1950); Akhtala [41°08'54"N, 44°45'56"E] (Khnzorian, 1950). Georgia: Ananur [42°09'52"N 44°42'09"E] (type locality); Darial [42°44'42"N, 44°37'30"E] (Motschulsky, 1840); Bolnissi (under the old german name of Katharinenfeld) [41°27'N, 44°32'E] (Schneider & Leder, 1878); Dmanisi (under the name of Dumaniss) [41°19'56"N 44°13'00"E] (Schneider & Leder, 1878); Martkopi [41°47'17"N, 45°01'11"E] (Jeannel, 1924); Gombori [41°47'N, 45°22'E] (Zoia & Rampini, 1994).

**Additional specimens.** Georgia: 124 USSR, Caucasus, Georgia, Lagodekhi reserve [41°54' N 46°20' E], forest Fagus, Fraxinus, Acer, &c., litter, logs, under stones 600-700m, 5-6.V.1983 S. Golovatch leg. (ZMUN); Georgia or. Lagodekhi, 18-19.7.2014 (COKV): Lagodekhi, 24.X.1958, K. N. (ZMUN); Georgia, village Khevsha [42°23'35" N, 44°40'50" E], Joriskara, under stones, 08.2004, leg. G. Chaladze (MPER); Georgia, village Khevsha, Sakdara, under stones, 05.08.2004, leg. G. Chaladze (CDCK); Georgia, Kakheti, 580m Pshaveli env., above Lechuri, deciduous forest, sifting 42.147491N, 45.413303E, 14.VII.2015 Z. Švec leg. (CPHV); Georgia, Kakheti, 1300m, Tetrtsklebi env, deciduous forest, sifting 41.18616381N, 45.337633E, 15.VII.2015 Z. Švec leg. (CPHV).

**Distribution.** Eastern Georgia and northern Armenia (Fig. 56).

**Identification key** of species of the genus *Catopsinus* Jeannel.

- 1 – Head without eyes or with an unpigmented hyaline area with no visible ommatidies in places of eyes. Large species, longer than 1.75 mm .....2
  - Head with small pigmented eyes with 6 to 10 ommatidies (Figs. 27a-31a). Smaller species, shorter than 1.7 mm.....3
- 2 – Eyes completely absent. Parameres of aedeagus as long as the median lobe (Fig. 39c) .....*lindbergi* Jeannel
  - Head with unpigmented hyaline areas with no visible ommatidies in places of eyes, (Fig. 32a). Parameres of aedeagus significantly shorter than median lobe (Fig. 37c) .....*cavazzutii* Giachino
- 3 – Antennae thick, eighth antennomere extremely flat and transverse, more than 2.2 times as wide as long (Fig. 31c). Female protarsi slightly dilated (Fig. 31d).....*loebli* n. sp.
  - Antennae more slender, eighth antennomere as long as wide or at most 1.5 times as wide as long. Female protarsi undilated.....4
- 4 – Antennae especially slender, except the last antennomere which is 1.25 times as wide as the penultimate. Eighth antennomere as long as wide (Fig. 29c). Parameres of the aedeagus much longer than the median lobe (Fig. 43a).....*hlavaci* n. sp.
  - Antennae regularly widened from base to apex so that the last antennomere and the penultimate are of same width. Eighth antennomere slightly transverse. Parameres of the aedeagus at most as long as the median lobe.....5
- 5 – Male protarsi more than 1.22 times as wide as the apex of protibias (Fig. 30b). Median lobe of the aedeagus with two preapical strictures on the dorsal side in lateral view (Figs. 46a, 46b). Parameres especially wide in lateral view (Figs. 46a, 46c).....*pusillus* Motschulsky
  - Male protarsi at most as wide as the apex of protibias. Dorsal side of the median lobe of the aedeagus regularly attenuated. Parameres more slender, dilated only just before the apex.....6
- 6 – Body more parallel. Pronotum exactly of the same width as elytra. Antennae slightly less slender (Fig. 27c). Median lobe of the aedeagus slender and with a more distinct triangular apical expansion at the tip in dorsal view (Fig. 35c), less arcuate in lateral view (Fig. 45a) ..... *peyronis* Abeille de Perrin
  - Body more oval. Pronotum voluminous, slightly wider than elytra. Antennae slightly more slender (Fig. 28c). Median lobe of the aedeagus shorter and with an indistinct triangular apical

expansion at the tip in dorsal view (Fig. 40c), more arcuate in lateral view (Fig. 44a)  
.....*meybohmi* n. sp.

### **Genus *Sbordoniola* Zoia & Rampini**

*Sbordoniola* Zoia & Rampini, 1994: 794, type species: *Bathyscia persica* Abeille de Perrin, 1881. (original designation)

#### ***Sbordoniola fausti* (Reitter) comb. n.**

*Bathyscia Fausti* Reitter, 1883: 72. (holotype in MNHN examined)

Type locality: Samara

*Bathysciola Fausti* Reitter: Jeannel 1910: 26. (change of combination)

**Specimen examined.** The single known specimen of this species: the holotype, a female from Samara (MNHN).

**Discussion.** The single known specimen of *Bathysciola fausti* Reitter, 1883 is a female, then the number of male protarsomeres and the conformation of the aedeagus are not known, which does not help to find a clear generic assignation. The general morphology is extremely small (1.1 mm): Reitter (1883) noticed that *B. fausti* is half the size of *C. pusillus*. The body is convex, with the pronotum approximately as long as the elytra (an unusual proportion for a *Catopsinus* or a *Bathysciola* species), without sutural stria (present in the genus *Catopsinus* and absent or present in *Bathysciola* according to species groups).

*Bathysciola fausti* is clearly not related with any species of the genera *Catopsinus* or *Bathysciola*. The general morphology suggests relationships with the genera described from Iran and the Caspian region by Zoia and Rampini (1994) in the phyletic lineage of “*Bythiniella*”. According to Zoia and Rampini’s identification table (especially the equal length of the two first metatarsomeres) the species should likely take place in *Sbordoniola*. However, the type locality: Samara (Fig. 56), located at more than 600 km north of the northern shore of the Caspian sea, is far from the distribution area of the other species of *Sbordoniola* (the southern shore of the Caspian sea). Such a placement would considerably extend towards the north the distribution area of *Sbordoniola*, or this could be a mistake in the place of collect. This species is provisionally placed in the genus *Sbordoniola*, waiting for further sampling near the type locality in order to find a male.

### **Genus *Bathysciola* Jeannel**

*Bathysciola* Jeannel, 1910: 9, type species: *Bathyscia Aubei* Kiesenwetter, 1850. (original designation)

**Discussion.** With currently 96 species distributed Westwards from Pyrenees and Eastwards to Iran, Israel and Lebanon, the genus *Bathysciola* Jeannel, 1910 is one of the most heterogeneous genus among Leptodirini and widely recognized to be polyphyletic (Fresneda & Salgado 2006; Giachino 1996, 1998; Giachino & Guéorguiev 2006; Zoia & Rampini 1994). The last revisions concern the Pyrenean region (Fresneda & Salgado 2006) and Italia (Giachino & Vailati, 2019). Moreover a nomenclatural issue involves the taxonomy of this genus since its description by Jeannel (1910) with *Bathysciola aubei* as type species. Jeannel

included in *Bathysciola* the *Catopsinus pusillus*, type species (by monotypy) of the senior name *Catopsinus*, making *ipso facto* of *Bathysciola* a junior synonym of *Catopsinus*. Jeannel rejected the name *Catopsinus* as *nomen nudum* (Jeannel, 1924). But, names of genera published before 1931 together with a new species are valid (ICZN article 12.2.6), this is the case for *Catopsinus*.

Since Jeannel, the junior synonym *Bathysciola* has been conventionally conserved by authors, firstly according to Jeannel's authority then, in more recent times, according to the certitude its polyphyly will make inevitable a revision which will lead to its fragmentation in several genera among them the two names will validly coexist in the nomenclature.

This fragmentation began recently when Giachino and Vailati (2019) removed six Italian species and one species living in Austria and north Balkans to place them respectively into seven new genera. A further step consists in the identification of a presumed monophyletic subgroup in the genus *Bathysciola*, including the species *pusillus* Motschulsky, raised at the genus level, and taking naturally the name *Catopsinus*, as presented above.

*B. fausti* Reitter being also removed from the genus and transferred to *Sbordoniola*, four species remain: *B. suramensis* Jeannel, 1930, *B. caucasica* Giachino, 1998, *B. brignolii* Zoia & Rampini, 1996 and *B. patrizii* Cerruti, 1959.

*B. brignolii* and *B. caucasica* have been described nearly simultaneously on specimens collected in the same locality. They are evidently synonyms, *B. brignolii* being described slightly before *caucasica* has the priority.

Zoia & Rampini (1994) preserved the traditional placement of *B. suramensis* in *Bathysciola*. In the context of their paper, this decision is doubly surprising. First they explicitly noticed in the redescription of the species the absence of sutural stria, which contradicts the alternative in which it is placed in the identification key (Zoia & Rampini 1994: 825). Secondly, Jeannel (1930) noticed the close morphological affinities between *B. suramensis* and *B. persica*, the latter precisely transferred by Zoia & Rampini to *Sbordoniola* in the same paper.

The examination of the holotype of *B. suramensis* and of additional specimens collected near the type locality shows that *B. suramensis* and *B. brignolii* are closely related. Their aedeagi are quite similar (Figs. 53d, 54d). They differ by some details of the endophallus and the length of parameres which are significantly shorter in *brignolii* than in *suramensis*. The general morphology shows that they are more closely related to *Sbordoniola* rather than to *B. patrizii* or to *Catopsinus*. However, the aedeagi of these species is particularly thick and compact in lateral view (Giachino 1998 fig. 2; Zoia & Rampini 1994: fig. 7, 1996: fig. 3), much more than the species of *Sbordoniola*. So the set *B. brignolii*+*B. suramensis* could probably be considered as an independent genus. This genus will not be formally described presently, waiting for more accurate phylogenetic investigations. The genetic approach should help to support (or not) this hypothesis. They are provisionally placed in *Bathysciola* of the so-called “*suramensis*” species group.

Therefore remains *B. patrizii*, which is certainly not closely related to the species of the “*suramensis*” species group and whose phylogenetic relationships with the other genera of the region remains enigmatic. It is provisionally placed it in a monospecific “*patrizii*” species group.

But at least two other undescribed species are also possibly related to *Bathysciola* without belonging to the *suramensis* species group since their elytra have a (non entire) sutural stria and the aedeagus is not so thick, but also different from the very peculiar aedeagus and parameres of *B. patrizii* (Figs. 55d; 55e). One has been collected in Abant Dağ (RBIN) and the other in Boz Dağlar (Izmir) (CAPZ). Their descriptions are left to later studies.

#### *Bathysciola* of *suramensis* species group

##### ***Bathysciola suramensis* Jeannel**

*Bathysciola* (*s. str.*) *suramensis* Jeannel, 1930: 223. (holotype in MNHN examined)

Type locality: Transcaucasie: monts Meschiis ou monts Suram

*Bathysciola suramensis* Jeannel, 1930: Zoia & Rampini 1994: 775. (description of male)

**Further description.** Aedeagus in dorsal view in Fig. 53d.

**Known specimens examined.** 1\$ Caucasus. Meskisch Gb. [N42°01' E43°33'] Leder. Reitter. Museum Paris coll. R. Jeannel, 1931, *B. suramensis* R. Jeannel, TYPE [red label black letters] [holotype]; 2 \$: Caucasus. Meskisch Gb. Leder. (Reitter). *Bathyscia persica* Abeille, Muséum Paris collection Léon Fairmaire, 1908, Muséum Paris coll. R. Jeannel, 1931; 1 £: Kaukas, Leder, 44, *persica*, Muséum Paris (coll. E. Reitter) coll. A. Grouvelle, 1913; 2 £: Kaukasus, Swanetien, Leder. Reitter. Museum Paris (coll. E. Reitter) A. Grouvelle 1913. (MNHN).

**Additional specimens.** 1 £: Georgia, Borjomi-Kharagauli NP, 41°87886'N/43°380'E, 25.7.2008, G. Chaladze (CPHV). 2 \$ & 2 £: Georgia: Imereti, Kharagauli municipality, Merelisi env. 482 m, N41°56'56.25" E43°17'00.9", Baňaň, Hlaváč, Barjadzeh, Magradze lgt., 29.8.2019, sifting forest mixed forest (CMPR). 3 \$, 5 £: Georgia: Imereti, Borjomi-Kharagauli NP, vill. Vakhani, Megelauri, 684 m, N41°56'21.9"E43°10'45.6", Baňaň, Hlaváč, Barjadze, Magradze lgt., 28.8.2019, sifting forest in valley (CPHV). 2 \$, 7 £: Georgia: Imereti, Borjomi-Kharagauli NP, vill. Nunisi, 852 m, N41°56'46.2" E43°24'53.9", Baňaň, Hlaváč, Barjadze, Magradze lgt., 26.8.2019, sifting near stream (CPHV). 1 \$: Georgia: Imereti, Borjomi-Kharagauli NP, vill. Nunisi, 880 m a.s.l., N41°56'41.5"E43°24'33.3", Baňaň, Hlaváč, Barjadze, Magradze lgt., 26.8.2019, sifting in mixed forest (CPHV). 1 \$: Georgia: Imereti, Borjomi-Kharagauli NP, Rkinis Jvari, cca 600 m, Baňaň, Hlaváč, Barjadze, Magradze lgt., 25.8.2019, sifting in valley with *Alnus* (CPHV). 1 £: Georgia: Imereti, near Kutaisi, Satapalia NR, N42°18'43.9"E42°40'23.1", 453 m, sifting between rock in forest, 27.8.2019, Baňaň, Hlaváč, Barjadze, Magradze lgt. (CPHV).

**Distribution.** Georgia, presently recorded between Surami pass, Borjomi and Koutaïssi.

##### ***Bathysciola brignolii* Zoia & Rampini**

*Bathysciola* (*Bathysciola*) *brignolii* Zoia & Rampini 1996: 201 (holotype in MZUL).

Type locality: Turquie: vil. Artvin, Borcka

*Bathysciola caucasica* Giachino, 1998: 106. **n. syn.** (holotype in CPMG, paratypes examined).

Type locality: URSS, Adzarkaja SSR, Batumi

**Known specimens.** Type series of *B. brignolii*: from Batumi in Georgia and Borcka (type locality) [N41°21'45" E41°40'48"] in Turkey) and of *B. caucasica*: from Batumi [N41°39' E41°39'] in Georgia.

**Additional specimens.** 1 ♂: Turquie, Ahravi, 1500 m, tamisage, 22.VI.1986, T. Deuve, M. Perreau, I. Sade (CMPR). 1 \$: Turkey, Artvin prov. 20 km W Borçka, Cankurtaran Geçidi [pass], Jiří Háček & Jan Růžička leg., 29-30.VI.2004, 41°23.7'N 41°32.0'E – 41°23.3'N 41°31.9'E, margin of deciduous forest (with dominant *Fagus*, *Castanea*) (CJRZ).

**Further description.** Aedeagus in dorsal view in Fig. 54d.

**Distribution.** Recorded along the coast of the black sea, from an area straddling Turkey and Georgia (Fig. 56). Georgia: Batumi (Giachino 1998; Zoia & Rampini 1996); Turkey: Artvin, Borçka (Zoia & Rampini 1996; and new specimens presently recorded).

### “*Bathysciola of patrizii*” species group

#### *Bathysciola patrizii* Cerruti

*Bathysciola* (s. str.) *Patrizii* Cerruti, 1959: 125.

Type locality: Turchia, Anatolia. Piccola grotta nell’Inn Dag (retrotterra di Adalia, Tauro di Pisidia)

*Bathysciola* (s. str.) *Patrizii* Cerr.: Coiffait 1959: 30. (distribution)

**Further description.** Aedeagus in dorsal view in Fig. 55d, spermatheca in Fig. 55b. The apex of parameres, turned inward with a bump on the outer side (Fig. 55e).

**Specimens examined.** 7 \$ & 7 ♂ et Turkey, Antalya vill. In Dagh Mts. 2-4.VI.2003, Kocain Magara (cave), I Smatana, lgt. 834 m [37°12'05"N 30°40'28"E] (CISK, CMPR)

**Distribution.** Kocain Magara (cave) in Inn Dağ (Fig. 57). This cave has been called by different names according to references: “piccola grotta nell’Inn Dag” (Cerruti 1959); “Grotte des monts Inn Dag, près de la grotte d’Ulysse, Taurus de Pisidie” (Coiffait 1959). They designate one and the same cave which is the type locality (Chabert 1979; Yamaç *et al.* 2021).

**Discussion.** The morphology of the parameres is a major distinctive character of this species.

### Genus *Pisidiella* Jeannel

*Pisidiella* Jeannel, 1930: 226, type species: *Pisidiella spatulifera* Jeannel, 1930. (original designation)

*Pisidiella* Jeannel: Jeannel 1955: 6. (identification table)

This genus should be revised in a future work. The present distribution area is located North of Antalya and Alanya, in the vicinity of Beyşehir lake (Fig. 57), but it extends over the Taurus mountains from Antalya to at least the region of Mersin, where a new species has been collected near Kiliç (CRLI).

#### *Pisidiella ovoidea* Jeannel

*Pisidiella ovoidea* Jeannel, 1955: 8. (holotype in MNHN examined)

Type locality: Turquie: Villayet d’Isparta, grotte Zindan à Yenice

*P. ovoidea* Jeann.: Coiffait 1959: 30. (distribution)

**Data from literature.** Turkey: Isparta, Zindan Mağarasi [N37°48'42" E31°05'03"] near Aksu (Jeannel 1955; Coiffait 1959).

**Additional specimens.** 3 ex.: Turkey, Isparta, Çayıralan, 37°48'39"N 31°08'08"E, 1396 m, 03.xii.2017-06.vii.2018, Sinan Anlaş leg. (CRLI); 2 ex., Turkey, Aksu, Su Mağarası, N 37°50'46" E 31°05'54", XI-2012 and XI-2014, H. Mixanig leg. (CAFS).

**Distribution.** Endogeous and hypogeous in a region located at the north of Aksu between the Eğirdir lake and the Beyşehir lake (Fig. 57). Lives together with *P. spatulifera* in Zindan mağarası and Su mağarası.

### ***Pisidiella spatulifera* Jeannel**

*Pisidiella spatulifera* Jeannel, 1930: 226. (holotype in MNHN, examined)

Type locality: Asie mineure: grotte dans les monts Dipojras, près de Bey Schéhir, dans le Taurus de Pisidie

*Pisidiella spatulifera* Jeann.: Coiffait 1959: 30. (distribution)

**Data from literature.** A cave in Dipoyraz mountains (Jeannel, 1930, type locality) [N37°39'30" E31°17'30"]; Zindan Mağarası (Coiffait 1959); Aven near Belgeyix (Coiffait 1959).

**Additional specimens.** Turkey: 2 ex., Turkey, Aksu, Su Mağarası, N 37°50'46" E 31°05'54", XI-2012, H. Mixanig leg. (CAFS).

**Distribution.** Hypogeous in the region located north of Aksu, between the Eğirdir lake and the Beyşehir lake (Fig. 57). The type locality: Dipoyraz is a hill on Mount Dedegöl (Cemal Çağrı Çetin pers. comm.), the same mountain but another slope on which is located the Pinargözü mağarası, type locality of *Huetheriella pinargozu*. *P. spatulifera* lives together with *P. ovoidea* in Zindan mağarası and Su mağarası.

### **Identification table of genera of Leptodirini from Near East.**

- 1 – Four segmented and indistinctly dilated male protarsi. (Bathysciina Guéorguiev).....2
  - Five segmented and generally distinctly dilated male protarsi (Pholeuina Guéorguiev)...4
- 2 – Elytra with distinct transverse strigae. Parameres of the aedeagus without a hyaline spoon-like apical expansion..... ***Phaneropella* Jeannel**
  - Elytra without transverse microstrigae, with at most indistinct alignments of punctuation. Parameres of the aedeagus with a hyaline spoon-like apical expansion.....3
- 3 – Pholeuonid body shape, pronotum significantly narrower than the elytra. Female spermatheca with a huge basal sclerite (Fig. 23).....***Huetheriella* Jeannel**
  - Bathyscioid body shape, pronotum at the base, approximately of the same width as the elytra. Female spermatheca without or with a small basal sclerite.....***Pisidiella* Jeannel**
- 4 – Mesoventral process extending over the metaventrum. Elytra always with a sutural stria, at least on the posterior half.....5
  - Mesoventral process not extending over the metaventrum. Elytra with or without a sutural stria .....7
- 5 – Antennae long: body only 1.8 times as long as the antennae. Sutural stria entire.....***Coiffaitiella* Jeannel**
  - Antennae shorter, body more than two times as long as the antennae. Sutural stria limited to the half or at most 2/3 apical portion of the elytra.....6

- 6 – Aedeagus extremely long, as long as the abdomen and the metathorax together.....**Besuchetiola** Rampini & Zoia  
 – Aedeagus of normal length, significantly shorter than the abdomen alone (species of *Bathysciola* other than those of the *suramensis* species group).....**Bathysciola patrizii** Cerruti
- 7 – Elytra with a sutural stria.....8  
 – Elytra without sutural stria.....10
- 8 – Body very elongate, more than 2.2 times as long as wide.....**Karadeniziella** Casale & Giachino  
 – Body less elongate, less than 2 times as long as wide.....9
- 9 – Elytral sutural stria strong, running along the whole length of the elytra and very distant from the suture in the middle, more close from the suture at the base and the apex (Fig. 34a). Parameres slightly dilated near the apex in lateral view (Figs 41c-47c). Head generally with small eyes (except *C. lindbergi*).....**Catopsinus** Motschulsky  
 – Elytral sutural stria superficial, present only on the apical half of elytra. Parameres thin on their whole length except close to the base. Anophthalmic....**Cavazzutiella** Casale & Giachino
- 10 – Body large and strongly convex. Elytral surface without transverse strigae nor microreticulation, the space between the very sparse and tiny punctation smooth and shiny. A single strong empodial seta.....**Mixanigia** n. gen.  
 – Body less convex. Elytral surface mat, with transverse strigae and microreticulated background. Two thin empodial setae.....11
- 11 – Head without eyes.....**Bythiniella** Jeannel  
 – Head with small eyes.....12
- 12 – Metatergal apophyse longer and thin (*Bathysciola* of “*suramensis*” species group).....13  
 – Metatergal apophyse shorter and thick.....14
- 13 – Parameres of the aedeagus significantly shorter than the median lobe (Fig. 54d) .....**Bathysciola brignolii** Zoia & Rampini  
 – Parameres of the aedeagus barely shorter than the median lobe (Fig. 53d) .....**Bathysciola suramensis** Jeannel
- 14 – First metatarsomere significantly longer than the second one.....15  
 – First and second metatarsomeres of comparable length.....16
- 15 – Metafemur with two basal teeth on the posterior margin. Parameres triangularly dilated at the apex. Median lobe of the aedeagus without a transverse apical expansion in lateral view.....**Iranobathyscia** Zoia & Rampini  
 – Metafemur without basal teeth on the posterior margin. Apex of parameres not dilated. Median lobe of the aedeagus with a transverse apical expansion in lateral view.....**Capraiola** Zoia & Rampini
- 16 – Median lobe of the aedeagus with a transverse apical expansion in lateral view.....**Sengletiola** Zoia & Rampini  
 – Median lobe of the aedeagus without a transverse apical expansion in lateral view.....**Sbordoniola** Zoia & Rampini

It should be noticed that Zoia and Rampini (1994) considered *Capraiola* with the first and second metatarsomeres of comparable length. It is clear however on their fig. 53 that the first metatarsomere is significantly longer than the second one.



## Conclusion

In regards to the development of karst areas in the Near East, the number of recorded genera and species of Leptodirini is very small, because they are vastly under studied.

For example, for Turkey alone, one of the most explored country of the Near East in the view of karstology and speleology, karst areas cover not less than 40% of landmasses (Nazik *et al.* 2019; Yamaç *et al.* 2021). These areas have been divided into six main karst regions (Fig. 59, from Nazik *et al.* 2019): The Taurus Mountains Karst Region, the Western Anatolian Karst Region, the Thrace and Black Sea Mountains Karst Region, the Central Anatolian Karst Region, the Eastern Anatolian Karst Region and the Southeastern Anatolian Karst Region.

Three regions host the ten known genera and the 27 known species of Turkish Leptodirini. First the Taurus Mountain Karst Region, located along the coast of the Mediterranean sea, where live six genera (*Cavazzutiella*, *Catopsinus*, *Coiffaitiella*, *Huetheriella*, *Mixanigia*, *Pisidiella*) and 14 species. All genera of this region are troglobitic except *Catopsinus* which is endogeous. Second the Thrace and Black Sea Mountains Karst Region, located along the coast of the Black sea, with four genera (*Besuchetiella*, *Bithyniella*, *Karadeniziella*, *Phaneropella*) and nine species, mostly endogeous. The genus *Bathysciola* is present in both of these distant regions but this disconnected distribution only reflects its polyphyly. Third the Eastern Anatolian Karst Region hosts only two species of *Catopsinus*. *Catopsinus* and *Bathysciola* are the single genera to overlap several karst regions (and also several countries).

The three other regions are presently devoid of Lepodirini: the Western Anatolian Karst Region, the Central Anatolian Karst Region and the Southeastern Anatolian Karst Region. The latter, located along the Syrian border of Turkey with very compact karst areas seem a very promising ground for future explorations of subterranean biotopes.

But this is notwithstanding the possible presence of subterranean Leptodirini in superficial underground environments outside karst areas, which is also a poorly explored field in Turkey.

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Figures captions:

Figures 1–11. *Mixanigia faillei*. 1, habitus; 2, elytral surface (ss=sutural stria); 3, mesoventral process; 4, empodium of metatarsus; 5, aedeagus lateral view; 6, aedeagus dorsal view; 7, apex of aedeagus; 8, apex of paramere dorsal view; 9, apex of paramere, lateral view; 10, female abdominal ventrite VIII; 11, female abdominal segment IX (bs=basal sclerite).

Figures 12–26. Genus *Huetheriella*. 12–14, habitus: 12, *H. pinargozu*; 13, *H. maximiliani*; 14, *H. notenboomi*. 15. *H. pinargozu*: antenna. 16. *H. pinargozu*, protarsus. 17–19. Dorsal surface of elytra. 17, *H. pinargozu*. 18, *H. maximiliani*. 19, *H. notenboomi*. 20–22, Aedeagus. 20, *H. maximiliani* from Ferzen mağarasi. 21, *H. maximiliani* from Güvercin tasi Deliği; 22. *H. notenboomi*. 23, *H. pinargozu*, female genital segment. 24–26, Female VIIIth abdominal ventrite: 24, *H. pinargozu*. 25, *H. maximiliani*. 26, *H. notenboomi*.

Figures 27–33. Genus *Catopsinus*, external morphology. 27, *C. peyronis*. 28, *C. meybohmi*. 29, *C. hlavaci*, 30, *C. pusillus*. 31, *C. loebli*. 32, *C. cavazzutii*. 33, *C. lindbergi*. A, head with vestigial eyes. b, male protarsus. c, antenna. d, female protarsus.

Figures 34–40. Genus *Catopsinus*. 34, *C. hlavaci*. 35, *C. peyronis*. 36, *C. loebli*. 37, *C. cavazzutii*. 38, *C. pusillus*. 39, *C. lindbergi*. 40, *C. meybohmi*. a. habitus. b. metatergum (male). c. aedeagus dorsal view (holotype for *C. lindbergi*).

Figures 41–47. Genus *Catopsinus*, male genitalia. 41, *C. cavazzutii*. 42, *C. lindbergi* (holotype). 43, *C. hlavaci*. 44, *C. meybohmi*. 45, *C. peyronis*. 46, *C. pusillus*. 47, *C. loebli*. a, aedeagus lateral view. b, apex of aedeagus lateral view. c, apex of parameres, lateral view.

Figures 48–55. Genera *Catopsinus*: female genitalia and *Bathysciola*: male and female genitalia. 48, *C. hlavaci*. 49, *C. meybohmi*. 50, *C. loebli*. 51, *C. pusillus*. 52, *C. lindbergi*. 53, *B. suramensis*. 54, *B. brignolii*. 55, *B. patrizii*. a, VIIIth abdominal ventrite. b, spermatheca. c, basal sclerite of the spermaduct. d, aedeagus, dorsal view. e, apex of paramere, dorsal view.

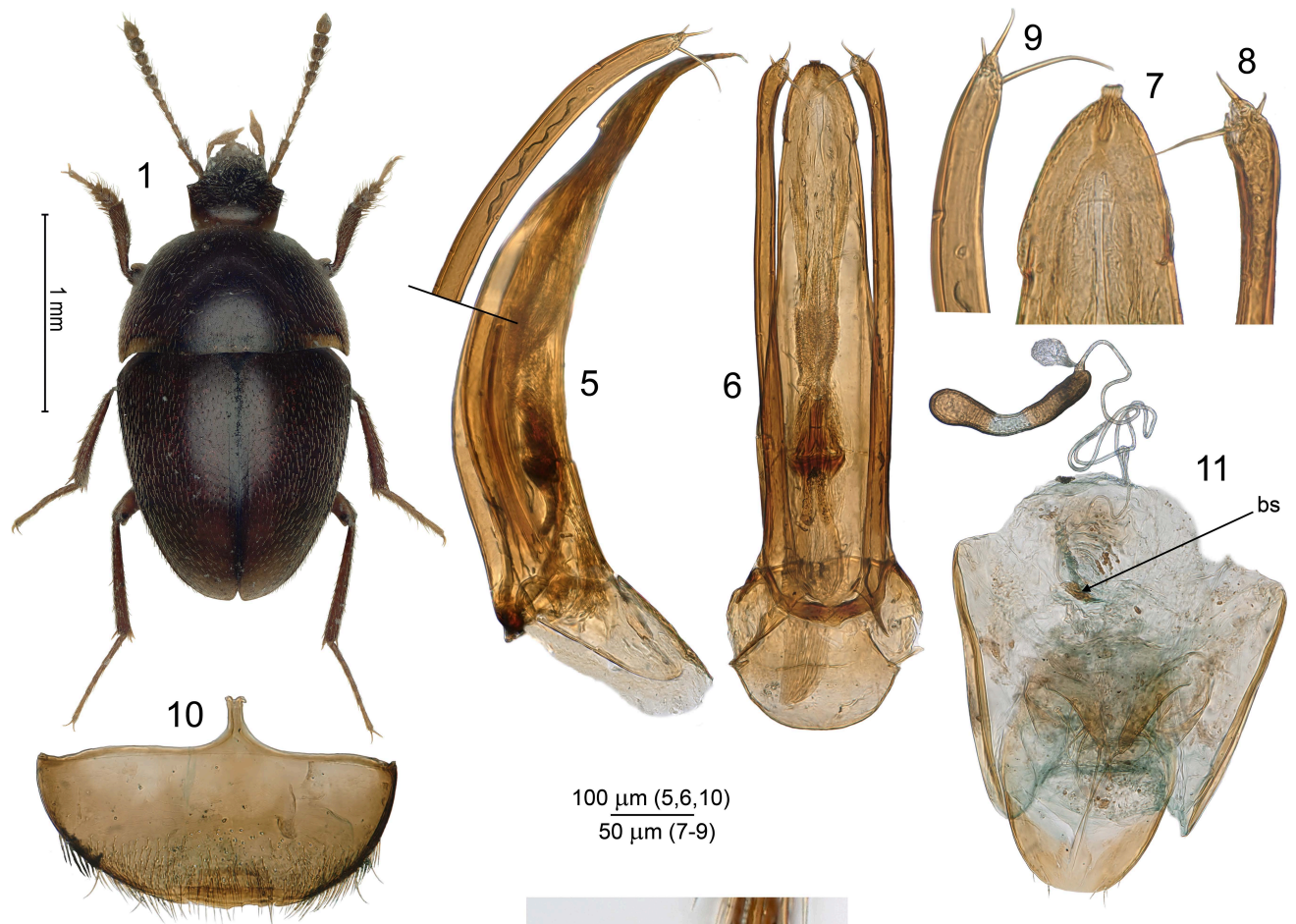
Figure 56. Distribution map of genera and species of Leptodirini of the Near East.

Figure 57. Distribution map of species of Leptodirini in South Eastern Taurus.

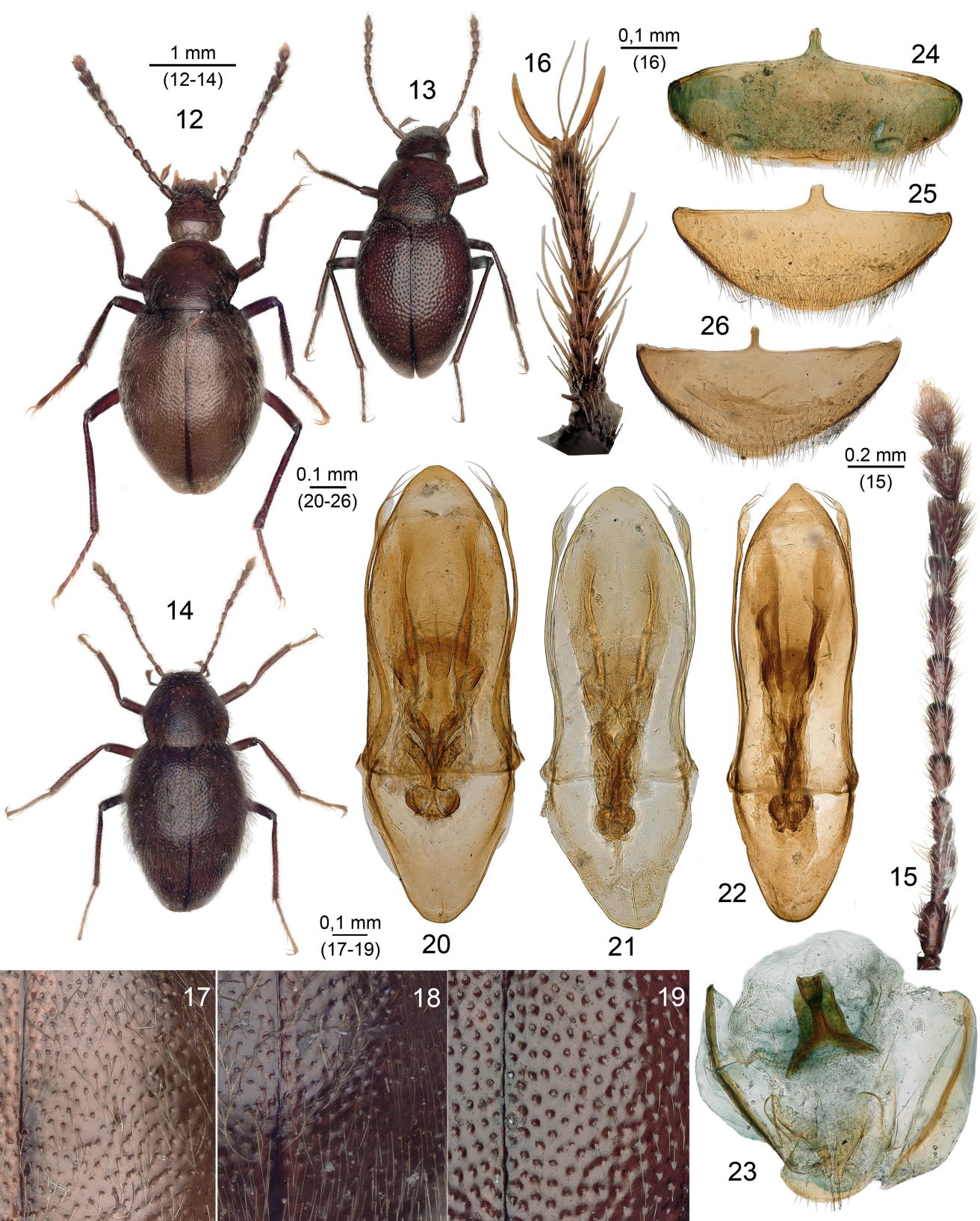
Figure 58. Distribution map of *Catopsinus* species along the eastern Mediterranean coast.

Figure 59. The main karst areas of Turkey, with locations of the main caves and geological formations (modified from Nazik *et al.* 2019).













27a



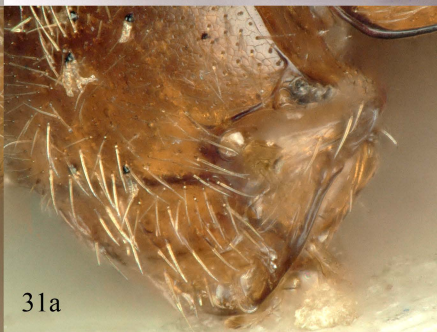
28a



29a



30a



31a



32a



33b



30b



32b



28c



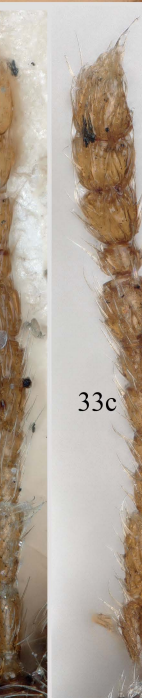
29c



30c



31c



32c



33c



28b



27b



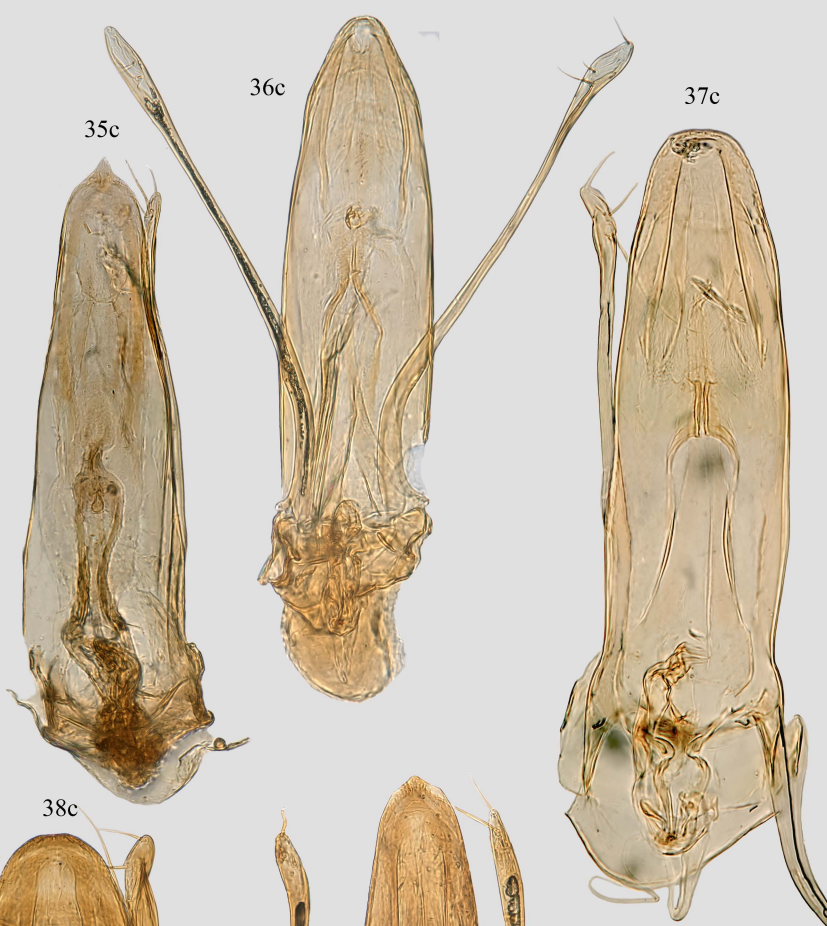
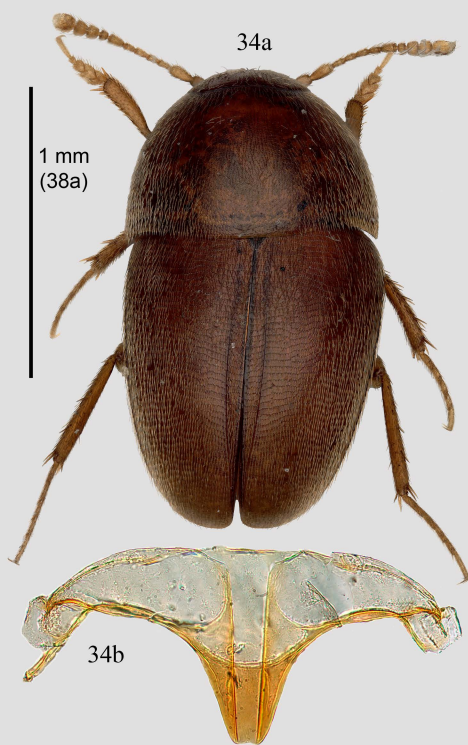
29b



31d

0,1 mm (a,b,d)  
0,15 mm (c)





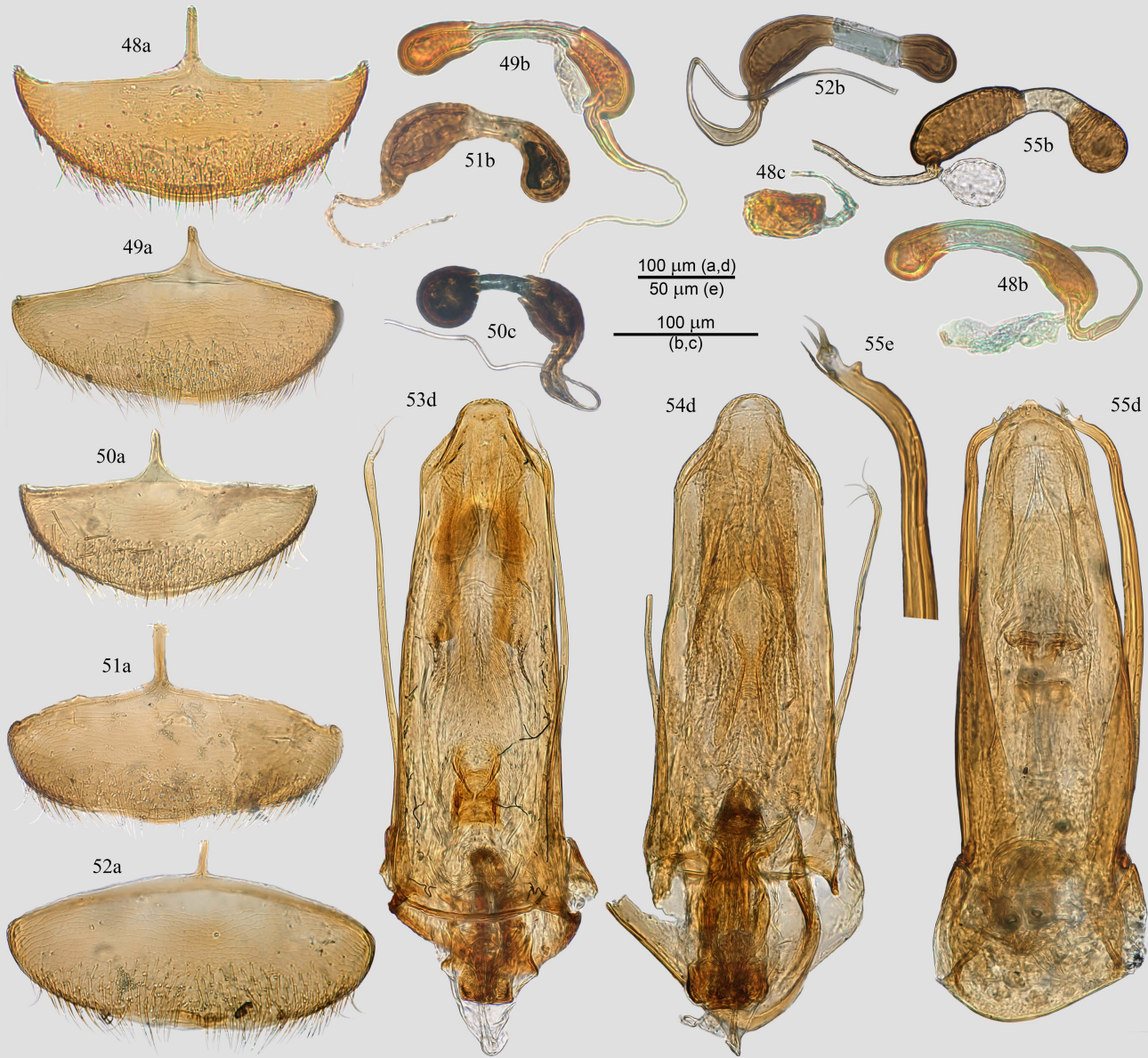
0,1 mm (b,c,d)  
0,05 mm (e,f)

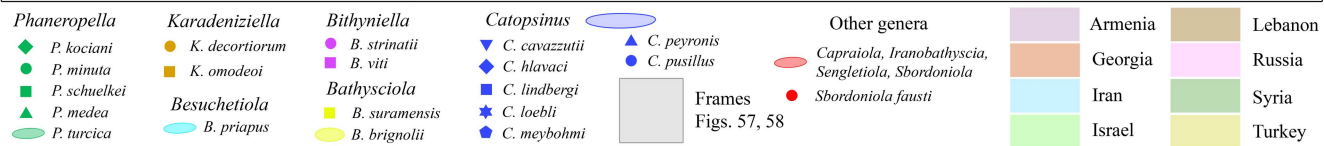
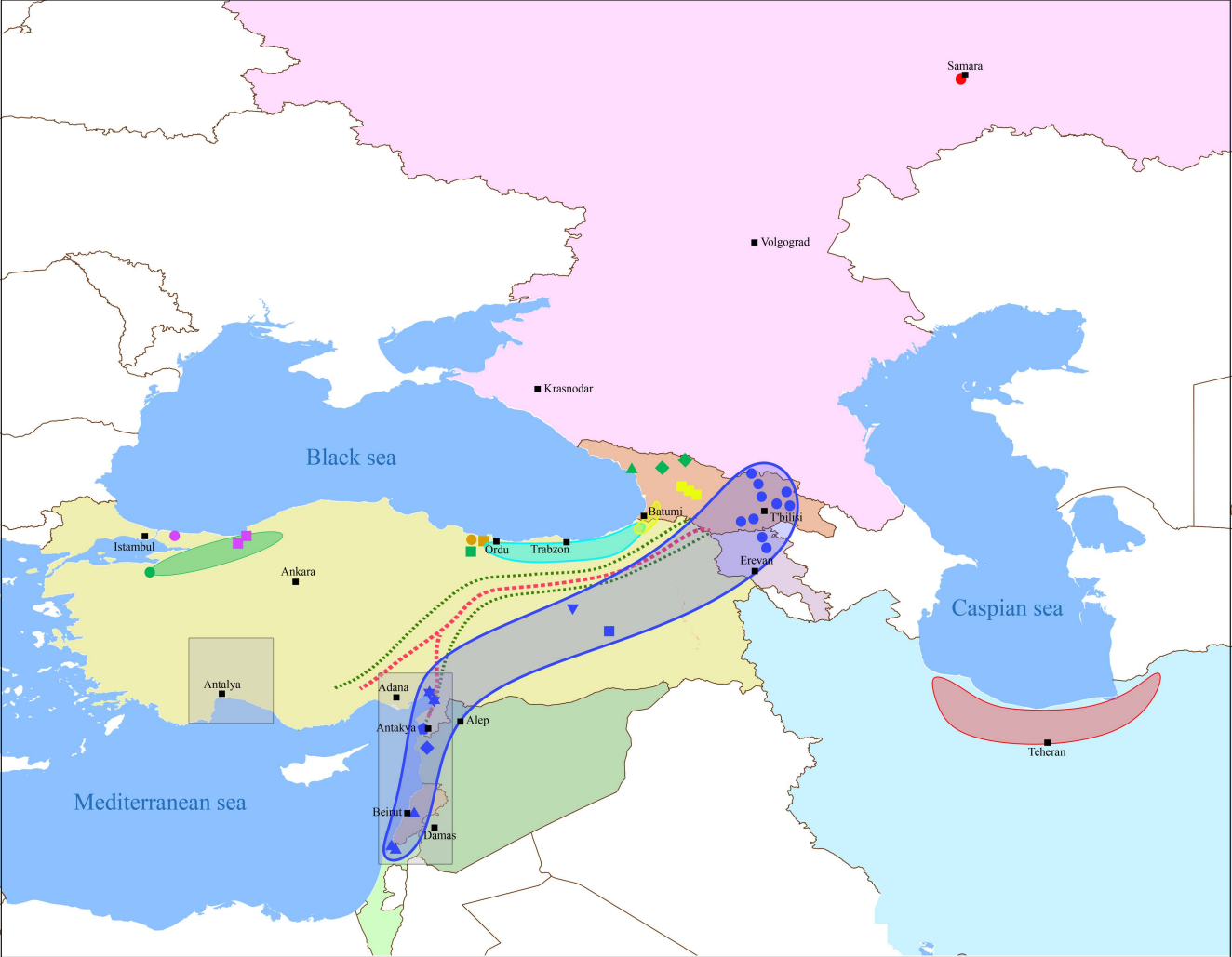


100  $\mu\text{m}$  (a)  
50  $\mu\text{m}$  (b,c)









The Anatolian diagonal (from Kuzucuoglu et al. 2019):

axis ..... average boundaries .....





- |                               |                                  |                                   |                                |                               |
|-------------------------------|----------------------------------|-----------------------------------|--------------------------------|-------------------------------|
| ◆ <i>Pisiidiella ovoidea</i>  | ■ <i>Pisiidiella spatulifera</i> | ■ <i>Huetheriella maximiliani</i> | ■ <i>Coiffaitiella rudis</i>   | ◆ <i>Bathysciola patrizii</i> |
| ● <i>Pisiidiella kosswigi</i> | ▲ <i>Pisiidiella minuscula</i>   | ● <i>Huetheriella notenboomi</i>  | ■ <i>Cavazzutiella taurica</i> | ■ <i>Mixanigia faillei</i>    |
|                               |                                  | ▲ <i>Huetheriella pinargozu</i>   |                                |                               |



◆ *C. hlavaci* ★ *C. loebli* ⬠ *C. meybohmi* ▲ *C. peyronis*



