Acta Soc. Zool. Bohem. **66**: 279–289, 2002
ISSN 1211-376X

Distribution and taxonomy of some *Synapsis* species, with description of *S. strnadi* sp. n. from Vietnam (Coleoptera: Scarabaeidae)

David KRÁL

Department of Zoology, Charles University, Viničná 7, CZ–128 44 Praha 2, Czech Republic;
e–mail: kraldavid@centrum.cz

Received February 4, 2002; *accepted September 3, 2002*
Published December 16, 2002

Abstract. *Synapsis strnadi* sp. n., discovered in primary forest of northern Vietnam, is described and illustrated. The new species belongs to the *S. ovalis* Boucomont, 1920 species aggregate. It can be separated from the three so far known species of this species aggregate mainly by the pronotum outline obliquelly cut off anterolaterally and the rugopunctate ventral surface of metafemur. The *S. ovalis* species aggregate is keyed. *S. yunnanus* is removed from synonymy with *S. tridens*, considered a valid species, and separated from closely related *S. brahminus* (Hope in Gray, 1831), *S. davidis* and *S. tridens*. Lectotype designation is provided for *S. batesi* Sharp, 1875; *S. davidis* Fairmaire in Deyrolle et Fairmaire, 1878; *S. ovalis* Boucomont, 1920; *S. tridens* Sharp, 1881 and *S. yunnanus* Arrow, 1933. Known distribution areas of several species are extended.

Taxonomy, new species, revalidized status, lectotype designation, key, distribution, Scarabaeoidea, Scarabaeinae, Coprini, *Synapsis ovalis* species aggregate, Palaearctic region, Oriental region

INDROTUCTION

During last years alpha taxonomy of the coprine genus *Synapsis* Bates, 1868 has been quite more intensively studied. Fifteen years ago Krikken (1987) knew only 12 species. Currently the genus comprises surprisingly 20 species (Ochi 1992, Masumoto 1996, Hanboonsong & Masumoto 1999, Král & Rejsek 2000) including one newly described and one revalidized species in this paper. Recently, first attempts at classification within the genus were suggested by Hanboonsong & Masumoto (1999). They have proposed the following three species aggregates: *Synapsis birmanicus* Gillet, 1907; *S. ovalis* and *S. simplex* Sharp, 1875 species aggregate. However, this classification does not cover all described representatives. Distribution areas of majority of predominantly oriental species remain still very poorly known. This is probably caused by lack of material from large regions and by highly secretive way of life of some species.

MATERIAL AND METHODS

The following codes (after Arnett et al. 1993) identify the collections housing the material examined:
BMNH – United Kingdom, London, Natural History Museum (Martin Brendell, Malcolm Kerley);
DKCP – Czech Republic, Praha, Charles University, David Král collection;
ISNB – Belgique, Bruxelles, Institut Royal des Sciences naturelles de Belgique (Didier Drugmand);
JSCP – Czech Republic, Praha, Jan Schneider collection;
MNHN – France, Paris, Muséum national d'Histoire naturelle (Yves Cambefort, Olivier Montreuil);
NMPC – Czech Republic, Praha, National Museum, Natural History (Josef Jelínek);
SJCP – Czech Republic, Praha, Stanley Jakl collection;
SMTD – Germany, Dresden, Staatliches Museum für Tierkunde (Dirk Ahrens, Olaf Jäger);

ZMAS – Russia, St. Petersburg, Zoological Museum, Russian Academy of Sciences (Boris M. Kataev, Mark G. Volkovich);
ZMHB – Germany, Berlin, Museum für Naturkunde der Humboldt Universität (Fritz Hieke, Manfred Uhlig).

Specimens of the newly described species are provided with one red printed label: "Synapsis strnadi sp. n., HOLOTYPUS or PARATYPUS with No., and sex symbol for female, David Král det. 2002". In the case of lectotype and/or paralectotype designations, each specimen bears a red printed label: "Name of the taxon in original combination, LECTOTYPUS or PARALECTOTYPUS with No., and sex symbol for male or female, David Král des. 2002".

Exact label data are cited for the type material only. Authors' remarks and addenda are found in square brackets, [p] – the preceding data within a quotation are printed, [hw] - the same, but handwritten, separate labels are indicated by double slash "//".

The lectotype and paralectotypes are designated in order to preserve stability of nomenclature in this group, according to the Article 74.7.3 of the Code (ICZN 1999).

TAXONOMY AND DISTRIBUTION

Synapsis boonlongi Hanboonsong et Masumoto, 1999

Synapsis boonlongi Hanboonsong et Masumoto, 1999: 460, 461, figs 6, 9.

TYPE LOCALITY. Phukieo, 800 m alt., Chaiyaphum prov., NE Thailand.

MATERIAL EXAMINED. **Thailand**: Thaïlande, Khao Yai, viii. 1986, Dr. F. Garnier lgt., 1 male in DKCP; Thaïlande, Chiang Mai, viii.1986, Dr. F. Garnier lgt., 2 spec. in SJCP.

DISTRIBUTION. Thailand.

Synapsis brahminus (Hope in Gray, 1831)

Copris brahminus Hope in Gray, 1831: 22.
Synapsis brahminus: Bates, 1868: 89 (note); Sharp, 1875: 45 (note, distribution); Gillet, 1911b: 63 (catalogue); Arrow, 1931: 81, 82, pl. 7: fig. 9 (diagnosis, key); Balthasar, 1963: 290, 292 (diagnosis, key).
Synapsis Batesi Sharp, 1875: 43 (type locality: India bor.); Gillet, 1911b: 63 (catalogue); (syn. by Arrow, 1931: 82); Balthasar, 1963: 292 (as syn. to *S. brahminus*).

TYPE LOCALITY. India or.

TYPE MATERIAL EXAMINED (5 specimens). **India**: lectotype (male), by present designation, labelled: North India [hw] Synapsis Batesi Type D. S. [David Sharp] [Sharp's hand] // Ex. Musaeo D. Sharp 1890 [p] // G.J. Arrow vidit 1928 [p]; paralectotypes Nos 1–4 (not sexed), labelled: North India [hw] Synapsis Batesi Sharp [probably Sharp's hand] // Ex. Musaeo D. Sharp 1892 [p]; all in MNHN.
ADDITIONAL MATERIAL EXAMINED (62 specimens). **Bhutan**: British Bootang, Maria Basti, 1899, 1 spec. in MNHN; Bootan Indep., Native Collect., 1913, 39 spec. in MNHN, 1 spec. in NMPC; British Bootan, Padong, L. Durel 1914, 8 spec. in MNHN; Pedong, Desgodins, Muséum Paris 1936 A. Boucomont, 1 spec. in MNHN; **India, Assam**: India or., Assam, 1 spec. in MNHN; **India, Meghalaya**: Shillong, Assam // Ex Musaeo D. Sharp 1890, 2 spec. in MNHN; Khasi Hills, 2 spec. in MNHN; **India, West Bengal (district Darjeeling)**: Kurseong, Inde, Verschraegen, 1904, 1 spec. in MNHN; Darjeeling, A. Desgodins, 2 spec. in MNHN; Kurseong, 1 spec. in MNHN; **Nepal**: E – Nepal, Koshi, Gorza, 2100m, 5.–6.vi.1985, C. Holzschuh lgt. // coll. Jan Schneider (Praha), 1 male in JSCP; Nepal, Bagmati, Ganjwal, 2700 m, 6.[19]87, coll. Tietze, 1 spec. in DKCP; East Nepal, 1.VI.1992, Jiri – Dolakha D., 2200 m, (Janakpur), leg. J. Limbu, 1 spec. in DKCP.

DISTRIBUTION. A relatively rarely collected Himalayan species, so far known from Bhutan, Nepal and Sikkim (Arrow 1931, Balthasar 1963). First records from India: Assam, Darjeeling and Meghalaya.

Synapsis cambeforti Krikken, 1987

Synapsis cambeforti Krikken, 1987: 321, figs 1–3.

TYPE LOCALITY. Brunei: 5 km E Telisai / 4°44'N–114°36'E, + 20 m.

TYPE MATERIAL EXAMINED. **Brunei**: 5 km E Telisai / (4°44'N – 114°36'E, + 20 m) / 12–30.XI.1980 / forest: human feces W.D. Edmonds., col. [p] // Paratype [p, red] // Synapsis cambeforti / J. Krikken 1986 [Krikken's hand], 1 spec. in MNHN.
ADDITIONAL MATERIAL EXAMINED. **Indonesia, Kalimantan**: Indonesia, S Kalimantan, Kandangan district, 17 km NE Loksado, 15. 11. 1997 – 15.1.1998, St. Jakl lgt., 4 spec. in DKCP, 9 spec. in SJCP.

DISTRIBUTION. Species restricted probably only to Borneo, known so far from Brunei, Indonesia (Kalimantan) and Malaysia (Sabah) (Krikken 1987).

Synapsis davidis Fairmaire in Deyrolle et Fairmaire, 1878

Synapsis Davidis Fairmaire in Deyrolle et Fairmaire, 1878: 96, tab. 4, fig. 5; Gillet, 1907: 600; 1911b: 63 (catalogue);
Synapsis davidi: Boucomont, 1929: 762 (distribution), Balthasar, 1935: 58 (key, distribution); 1942: 115 (distribution); 1963: 290, 293 (diagnosis, key).

TYPE LOCALITY. Chine centrale [= Central China].

TYPE MATERIAL EXAMINED (3 specimens). **China, Sichuan**: lectotype (male) and paralectotype No. 1 (not sexed), both by present designation, labelled: Muséum Paris Moupin A. David 1870 [p] // Synapsis Davidis Frm. China [Fairmaire's hand] // Synapsis Davidi (forma typica) [h] J. Gillet det. 1907 [p]; paralectotype No. 2 (not sexed), labelled: China A. David [p] // Synapsis Davidii nsp. [Fairmaire's hand, black ink]; all in MNHN.
ADDITIONAL MATERIAL EXAMINED (57 specimens). **China, Fujian**: Kuatun [= Huaqiao], Fukien [= Fujian], China, 14. 5. [19]46, leg. Tschung-Sen [lgt.], 1 spec. in NMPC; **China, Gansu**: China, S Gansu, Tochizi, S Wudu, 21.–24.5.[19]97, h–2400m, leg. S. Murzin, 3 spec. in DKCP, 1 spec. in SJCP; **China, Shaanxi**: China – Shaanxi, 1600m, 15/8–15/10.1999, Qinling mts., S. Taibai mts., Houzhenzi vill. env., 35°53'N / 107°49'E, loc. coll., 2 spec., DKCP, SJCP; **China, Sichuan**: Thibet, Sé-Pin [28 km S of Kangding], Chasseurs indigénes, Éte 1892, 2 spec. in MNHN; Se Pin – Lou Chan, Ya Tscheou [not identified], Chasseurs indigènes, 1893, 15 spec. in MNHN, 1 spec. in NMPC; Thibet, Chasseurs de Ta-tsien-lou [= Kangding], 1895, 2 spec. in MNHN; Thibet, Ta-Ho [Dadu He river], Chasseurs indigenès, Printemps 1895, 1 spec. in MNHN; Siao-Lou-Lou-Chan [probably "small way" between Ya'an and Kangding], 1896, 1 spec. in MNHN; Su Tchuen [= Sichuan], Siao Lou, 1897, 6 spec. in MNHN; Chasseurs Indigènes des Missionaires de Ta-tsien-Lou, R.P. Dejean, 1901, 6 spec. in MNHN; Siao Lou, Chasseurs du P. Dejean 1904, 1 spec. in MNHN; Chasseurs Indigènes des Missionaires de Ta-tsien-Lou, 1906, 1 spec. in MNHN; C Sichuan (Kangding), Gongga Shan massive, ca 1000 m, Moxi village (SSW of Luding), 29°40'N 102°06'E, 24.5.–7.6.1993, B. Březina lgt., 1 spec. in DKCP; W Sichuan, 2, 6.VII.1984, 29.36N 102.06E, Gonggashan – Hailuogou [valley], lgt. D. Král & J. Farkač, 1 spec. in cow dung, DKCP; China: Sichuan, Moxi [village], 29°13'N 102°10'E, 1600 m, 2.VII.1998, D. Král lgt. // 1998 China Expedition J. Farkač, D. Král, J. Schneider & A. Smetana, 1 spec. attracted at light in the village, DKCP; C China, N-Sichuan, Venchuan env., 2000m, v – 1999, leg. Dr. M. Häckel, 2 spec.in SJCP; China – Sechuan, Wenchuan, 18.6.–19.6.2001, 3 spec. in DKCP; China, N Sichuan, Shangliang, 24.–29.5.2002, legt. E. Kučera, 2 spec. in DKCP; Szechuan [= Sichuan], China, 400m, E. Reitter, 2 spec. in NMPC; Chine, A. David, Ex. Musaeo Mniszech, 1 spec. in MNHN.

DISTRIBUTION. So far recorded from the Chinese provinces of Sichuan and Fujian only (Boucomont 1929, Balthasar 1942, 1963), first records from Gansu and Shaanxi.

Synapsis gilleti Arrow, 1931
(Fig. 6)

Synapsis gilleti Arrow, 1931: 81, 83, pl. 7: fig. 10; Balthasar, 1963: 291, 297 (diagnosis, key); Bacchus, 1978: 103 (lectotype designation).

TYPE LOCALITY. Bengal: Darjeeling District, 1500 ft.

TYPE MATERIAL EXAMINED. **India, West Bengal (Darjeeling district)**: lectotype (female), labelled: Singla Darjiling Bengal 1,500 ft – June B.M. [= British Museum] 1930–1 [p] // Synapsis Gilleti Arrow Type [Arrow's hand, black ink] // Lectotype [p, circle label with blue margin] // Synapsis gilleti Arrow [Bacchus's hand, black ink] // M.E. Bacchus det 1976. Lectotype [p], in BMNH; paralectotype (female), labelled: India [p] // Paraectotype [p, circle label with blue margin] // Synapsis gilleti Arrow [Bacchus's hand, black ink] // M.E. Bacchus det 1976. Paralectotype [p], in ISNB.
ADDITIONAL MATERIAL EXAMINED. **Bhutan**: Bhutan, 17.–20.VI.1988, Paro Distr., Gedu, 2100m, leg. Carolus Holzschuh, 1 female in DKCP; **India, Sikkim**: Sikkim, März – April, H. Fruhstorfer, 1 female in ZMHB.

DISTRIBUTION. Very rarely collected species (probably only 4 specimens, all females, known so far); India, West Bengal: Darjeeling (Arrow 1931, Balthasar 1963); first records from Bhutan and Sikkim.

Synapsis masumotoi Ochi, 1992

Synapsis masumotoi Ochi, 1992: 10; Král & Rejsek, 2000: 270 (list).
Synapsis davidi: Miwa, 1931: 278 (list); Masumoto, 1973: 60, figs 1–6 (breeding habits).

TYPE LOCALITY. Taiwan.

MATERIAL EXAMINED. **China, Taiwan**: Formosa, Chip Chip, H. Sauter, '09 // 1911 14// Staatl. Museum für Tierkunde Dresden, 1 spec. in SMTD.

DISTRIBUTION. Restricted to Taiwan (Miwa 1931, Masumoto 1973, Ochi 1992).

Synapsis ovalis Boucomont, 1920
(Fig. 3)

Synapsis ovalis Boucomont, 1920: 307; Paulian, 1945: 65, fig. 45 (diagnosis, key); Balthasar, 1963: 291, 296 (diagnosis, key); Kabakov & Napolov, 1999: 65 (distribution).

TYPE LOCALITY. Laos, Tran Ninh.

TYPE MATERIAL EXAMINED. **Laos**: Lectotype (male), by present designation, labelled: LAOS prov. / Tran Ninh / VITALIS 1917 [p] // TYPUS [p, red] // Boucomont det. [p] 1920 Synapsis ovalis B. [Boucomont's hand], in MNHN.
ADDITIONAL MATERIAL EXAMINED. **Vietnam**: Museum Paris, Annam Sept., Keng Trap près Cuarao, Vitalis de Salvaza, M^{me} A. Vuillet 1920, 1 spec. in MNHN.

DISTRIBUTION. Laos, Vietnam (Paulian 1945, Kabakov & Napolov 1999).

Synapsis ritsemae Lansberge, 1874

Synapsis Ritsemae Lansberge, 1874: 143; Ritsema, 1875: 211 (note); Sharp, 1875: 211 (note); Gillet, 1911b: 63 (catalogue).
Synapsis ritsemae: Balthasar, 1963: 291, 296 (diagnosis, key); Krikken, 1987: 321 (key, lectotype designation).

TYPE LOCALITY. Sumatra.

MATERIAL EXAMINED. **Indonesia, Sumatra**: Bindjey-Estate, Deli, Ost Sumatra, V. Burchard leg., ded. 28.IV. 1894 / / Coll. C. Felsche, Kauf 20, 1918 // Thoas Sharp // sumatrensis Frm., 1 spec. in SMTD; Palenbang, Sumatra // Coll. C. Felsche, Kauf 20, 1918 // sumatrensis Fairm., 1 spec. in SMTD; Indonesia, Sumatra, March 1992, Mts Leuser Nat. Park, Ketambe, local collector lgt., 1 spec. in DKCP; Indonesia, 10–14/ii.1999, West Sumatra prov., 600m, Mt. Singgalang – Annai vall., fish trap, Stanley Jakl lgt., 1 spec. in DKCP, 1 spec in SJCP; Sumatra occ., Fort Su Kok // sumatrensis Frm., 1 spec. in ZMHB.

DISTRIBUTION. Restricted to Sumatra and Java (Balthasar 1963, Krikken 1987).

Synapsis strnadi sp. n.
(Figs 1, 4, 7)

Type material. **Vietnam**: holotype and paratype No 1 (both females), labelled: VIETNAM N. TamDao – 900 m 16.–23.V.1991 Strnad Jan lgt. [p]; paratype No 2 (female), labelled: VIETNAM N. 1990 SaPa 11.–19.VI. 1800 m Hoang Lien Son prov. Strnad Jan lgt. Holotype and paratype No. 2 in DKCP, paratype No. 1 in JSCP.

Description of holotype. Body length 29 mm. Oval, dorsoventrally depressed; whole surface black, semialutaceous; setation reddish brown; habitus in dorsal aspect as in Fig. 1.

Head. Clypeus with apex sharply triangularly emarginate, lobe either side of emargination straight, then broadly sinuate and slightly notched between clypeus and gena. Frons feebly elevated, tubercle absent. Clypeogenal suture distinct. Gena almost rectangular laterally, not projecting posterolaterad. Clypeus and genae distinctly bordered, border of clypeus with row of long, dense setae. Surface of clypeus coarsely and densely rugopunctate; frons and gena distinctly, densely and evenly punctate, punctures separated by less than their diameter.

Pronotum moderately convex, transversal, broadest at level of anterior quarter of pronotal length, entirely bordered except of basal border distinctly interrupted laterally; anterior margin

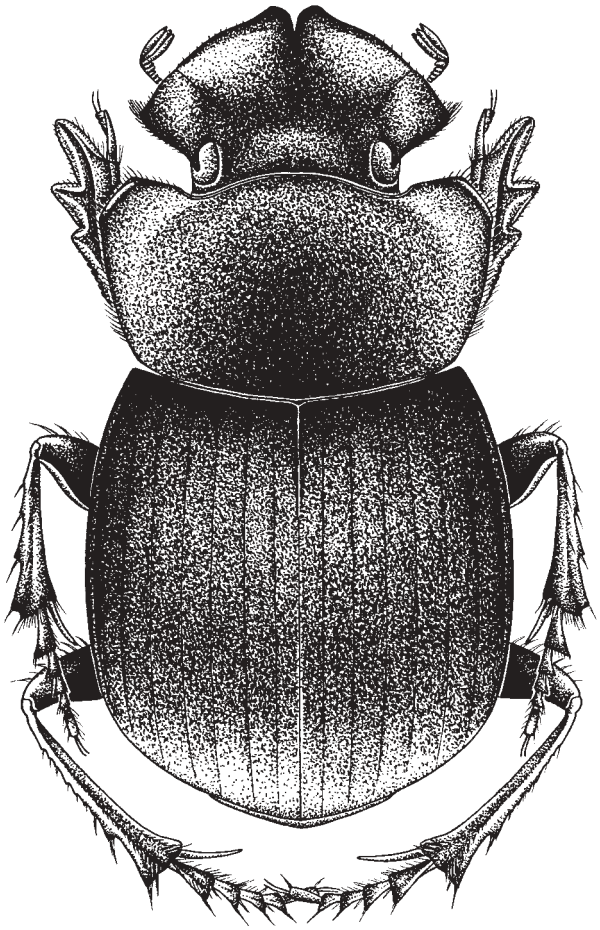


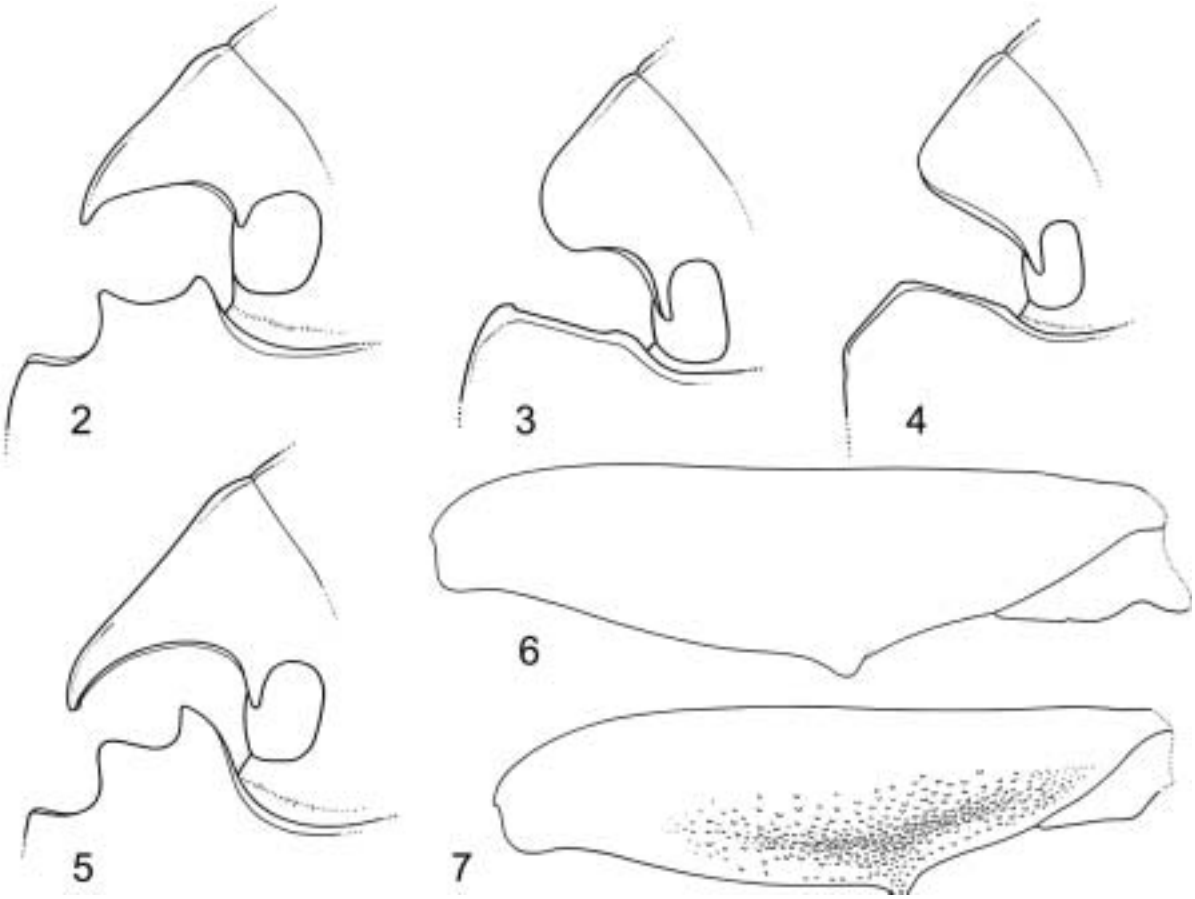
Fig. 1. Habitus of *Synapsis strnadi* sp. n., dorsal view of holotype.

broadly bisinuate, straight and slightly crenate laterally; anterolateral angles obliquelly cut off (with two obtuse angles) (Fig. 4); sides broadly arcuate to broadly arcuate posterolateral angles; lateral supplementary carina and basal margin broadly arcuate. Surface finely and almost evenly punctate discally, punctures separated by approximately 2–3 their diamters, punctation becoming denser and coarser laterad and basad; microsculpture almost absent.

Scutellum absent.

Elytra moderately convex, broadly arcuate laterally, ten striate, seven striae between suture and humerus distinctly impressed, only very finely and irregularly punctate, strial margins not crenate; intervals flat, all of approximately same width discally, except of sutural interval distinctly angustate and slightly convex, interval 2 not swollen basally, surface impunctate, remarkably microsculptured.

Pygidium entirely bordered, finely transversally scabrous.



Figs 2–7. Left side of head and pronotum, dorsal aspect (2–5); right metafemur, ventral aspect (6, 7). *Synapsis tridens* Sharp (Thailand: Chiang Mai) (2); *S. ovalis* Boucomont (lectotype) (3); *S. strnadi* sp. n. (holotype) (4, 7); *S. yunnanus* Arrow (Yunnan: Yulong Mts: Ganhaizi) (5); *S. gilleti* Arrow (lectotype) (6).

Proepisternum coarsely and densely punctate, acarodomatia absent; mesosternum finely microsculptured, mesepisternal acarodomatia present; metasternal plate distinctly concave posteriorly, with longitudinal furrow in posterior half, surface almost glabrous, metepisternum slightly granulate.

Mesocoxae widely separated and parallel, glabrous; meso- and metatrochanter glabrous and with tuft of several setae posteriorly; profemur sparsely, irregularly punctate, with complete anterior transversal edge; mesofemur remarkably rugopunctate posteriorly; metafemur with slightly serrate and setose medial transversal edge, posterior edge with distinct sharp denticle situated in basal third of metafemur (Fig. 7), surface remarkably rugopunctate posteriorly (Fig. 7); protibia tridentate, meso- and metatibia slender basally, gradually slightly expanded apicad, metatibia not marketly thickened and curved.

Abdominal sternites slightly narrowed medially, finely microsculptured and finely, sparsely and irregularly punctate.

Variability. Body length of paratypes: No. 1 – 28 mm, No. 2 – 30 mm.

Differential diagnosis. *Synapsis strnadi* sp. n. is classified to the *Synapsis ovalis* species-aggregate (Hanboonsong & Masumoto 1999) characterized by mesepisternum hollowed and setaceous (acarodomatia present), and lateral angles of clypeus not slendery produced. For differential diagnosis among species of the species aggregate refer to the key below.

Collection circumstances. All type specimens were found in human faeces in a forest habitat.

Distribution. Vietnam (Hoang Lien Son and Vinh Phu provinces).

Name derivation. Patronymic, named in honour of my friend Jan Strnad (Emberiza, Praha), the collector of the new species, and an excellent expert of Vietnamese nature.

Key to the *Synapsis ovalis* species-aggregate

1 (4) Pronotum outline sharply angulate anterolaterally (Fig. 3).
2 (3) Lateral angles of clypeus almost not hooked posteriad (Fig. 3). Laos, Vietnam. ..... *S. ovalis* Boucomont
3 (2) Lateral angles of clypeus remarkably hooked posteriad. Thailand. .... *S. boonlongi* Hanboonsong et Masumoto
4 (1) Pronotum outline obliquelly cut off (with two obtuse angles) anterolaterally (Fig. 4).
5 (6) Ventral surface of meso- and metafemur entirely smooth (Fig. 6); dorsal surface alutaceous, that of pronotum finely microsculptured. Bhutan, Darjeeling, Sikkim. ..... *S. gilleti* Arrow
6 (5) Ventral surface of meso- and metafemur densely and coarsely rugopunctate (Fig. 7); dorsal surface semialutaceous (Fig. 1), pronotum microreticulation almost absent. Northern Vietnam. ..... *S. strnadi* **sp. n.**

Synapsis thoas Sharp, 1875

Synapsis Thoas Sharp, 1875: 44; Gillet, 1907: 602; 1911b: 63 (catalogue).
Synapsis thoas: Balthasar, 1963: 291, 296 (diagnosis, key); Krikken, 1987: 321, fig. 5. (key).
Synapsis sumatranus Fairmaire, 1897a: 25; 1897b: 117 (type locality: Sumatra; syn by Gillet, 1907: 602).
Synapsis sumatrensis[sic!] Gillet, 1907: 602; 1911b: 63 (catalogue); Balthasar, 1963: 296 (as syn. to *S. thoas*).
Synapsis thoas ?ssp. *sumatranus*: Krikken, 1987: 321 (key).

Type locality. Java.

Material examined. **Indonesia, Java**: Java, Mt. Kawi, Reg. Pasuruan, V. M. Duchoň // Coll. C. Felsche, Kauf 20, 1918, 1 spec. in SMTD; Indonesia, East Java prov., 18.–23.ii.1996, Baluran N. P., 400m, St. Jakl lgt., 2 spec. in SJCP; Indonesia, S Java, Sukamade, 300–400m, i.1997, Stanley Jakl lgt.; 1 spec. in DKCP, 2 spec. in SJCP; E Java, Argopuro, 7.1998, native collector., 1 spec. SJCP; Java // Ritsemae Lansb., 1 spec. in ZMHB; Java // Synapsis Thoas H. 25, 1 spec. in ZMHB.

Distribution. Restricted to Java and Sumatra (Balthasar 1963, Krikken 1987).

Synapsis tridens Sharp, 1881
(Fig. 2)

Synapsis tridens Sharp, 1881: 92; Gillet, 1907: 600 (distribution); 1911b: 63 (catalogue); Boucomont & Gillet, 1921: 6 (distribution); Boucomont, 1929: 762 (distribution); Arrow, 1931: 81, pl. 7: fig. 8; Balthasar, 1932: 97 (distribution) 1935: 58, 1963: 291, 294; Paulian, 1945: 66, fig. 44B (diagnosis, key, distribution); Masumoto, 1987: 128 (distribution); Hanboonsong & Masumoto, 1999: 461, fig. 1 (key, distribution); Kabakov & Napolov, 1999: 65 (distribution).

Type locality. India, Assam.

Type material examined (1 specimen). **India, Assam**: lectotype (male), by present designation, labelled: Assam [p] // Mus. A. Murray [p] // tridens Type D. S. [David Sharp] [Sharp's hand] // Ex. Musaeo D. Sharp 1890 [p] // G.J. Arrow vidit 1928 [p], in MNHN.
Additional material examined (19 specimens). **India, Meghalaya**: Khassia Hills // Ex Musaeo Fred. Moore, acq. 1891, 1 spec. in MNHN; N.E. India, W. Meghalaya, Garo Hills, Nokrek Nat. Park, 25°25'N 90°20'E, 13.–22.7.1997, 1150 m, T = 5–9°C, leg. V. Siniaev & V. & S. & M. Mursin, 4 spec. in DKCP; **India, Nagaland / Myanmar border**: Assam, Naga, Aout 1893, W. Doherty, 1 spec. in MNHN; **Myanmar**: Carin Ghecû [= Karen Hills], 1300–1400m, L. Fea, II.–III.[18]88 // Muséum Paris Collection Léon Fairmaire1906, 9 spec. in MNHN; **Thailand**: Thailand, Chiang Mai, 6.5.1985, 3 spec. in DKCP; Thaïlande, Doi Pui, Chiang Dao, 8.V.[19]85, Dr. F. Garnier, 1 spec. in SJCP.

Synapsis yama Gillet, 1911

Synapsis Yama Gillet, 1911a: 313, fig. 10; 1911b: 63 (catalogue); Boucomont & Gillet, 1921: 5; Paulian, 1945: 65 (diagnosis, key, distribution);
Synapsis yama: Balthasar, 1963: 291, 295; Kabakov & Napolov, 1999: 65 (distribution); Král & Rejsek, 2000: 270 (list).

Type locality. Tonkin central, environs de Tuyen-Quan.

Type material examined. **Vietnam**: holotype (male), labelled: Museum Paris / Tonkin centr. / Env. de Tuyen-Quan / A. Weiss, 1906 [p] // TYPE [red, p] // Juill. – Sept. [h] // Synapsis " / Yama Gillet, n. sp. [Gillet's hand], in MNHN.
Additional material examined. **Vietnam**: N. Vietnam, Vinh Phu Distr., 6.–10.5.1990, Tam Dao, 900 m, Jan Horák leg., 1 male in DKCP; Vietnam N., TamDao, 900m, 14.–23.5.1991, Strnad Jan lgt., 1 male in SJCP.

Distribution. Hitherto recorded from Vietnam and Laos only (Paulian 1945, Balthasar 1963, Kabakov & Napolov 1999).

Synapsis yunnanus Arrow, 1933 (stat. rev.)
(Fig. 5)

Synapsis yunnanus Arrow, 1933: 428; Bacchus, 1978: 108 (lectotype designation);
Synapsis yunnanus: Balthasar, 1935: 22; 1963: 294; Paulian, 1945: 66 (all as syn. to *S. tridens*).

Type locality. Yunnan, Tengyueh [= Tengchong].

Type material examined (7 specimens). **China, Yunnan**: lectotype (male) and paralectotypes (3 males, 1 female), labelled: Yunnan Tengyueh, J. C. Brown [p] // Synapsis Yunnanus Arrow Type [Arrow's hand, black ink] // Lectotype, resp. Paralectotype [p, circle label with blue margin] // Synapsis yunnanus Arrow [Bacchus's hand, black ink] // M.E. Bacchus det 1976; paralectotypes (2 males, 1 female), labelled: Tali [= Dali] H$^{t.}$ [= Haute] Yunnan // Paralectotype [p, circle label with blue margin] // Synapsis yunnanus Arrow [Bacchus's hand, black ink] // M.E. Bacchus det 1976; all in BMNH.
Additional material examined (192 specimens). **China, Guizhou**: Kouy-Tchéou [= Guizhou], R.P.J.R. Chaffanjou, 1903, 3 spec. in MNHN; Kouy-Tchéou, R. Marchand, 1904, 1 spec. in MNHN; Muséum Paris, Kouy-Tchéou // Père Cavalaire 1905, 24 spec. in MNHN; Muséum Paris, Kouy-Tchéou, Kouytang [= Guiyang] // Père Cavalaire 1906, 1 spec. in MNHN; Kouy-Tchéou, Abbé Largeteau, 2 spec. in MNHN; **China, Sichuan**: Lou-tse-Kiang [=

not identified], 1901, R.P. Genestier // Muséum Paris Collection Léon Fairmaire 1906, 31 spec. in MNHN; Sutchuen [= Sichuan], Ouy-Sy [not identified], R.P. Mombelg, 12 spec. in MNHN; **China, Yunnan**: Tse Kou [= Yanmen], R.P. Dubenard, 1895, 6 spec. in MNHN; Yunnan-Sen [= Kunming], Mgr. Excoffier, 1896, 4 spec. in MNHN; N. Yunnan, Tsékou [= Yanmen], 1896, 7 spec. in MNHN; N. Yunnan, Tsékou, 1897, 13 spec. in MNHN; Tsékou, 1902, R.P.J. Dubenard // Muséum Paris, 1936, A. Boucomont, 4 spec. in MNHN; Tsé-kou, P. Dubenard, 1903, 12 spec. in MNHN, 1 spec. in NMPC; Tali [= Dali], H$^{t.}$ [= Haute] Yunnan // Muséum Paris 1936 A. Boucomont, 1 spec. in MNHN; Yunnan, Okr. Tsinpina [= env. of Tsinpin], 1700 m., 13.V.1956, Khuan Ke-zhen [lgt.] i dr. [and the other] [orig. in Cyrillic script], 4 spec. in ZMAS; China, N-Yunnan, 14.7.[19]90, 27°13'N 100°16'E, Lijiang env., Yufeng monastery, 2500 m, D. Král lgt., 3 spec. in DKCP; China, N-Yunnan, 7.–12.7.[19]90, 27°08'N 100°14'E, Yulongshan mts., Baishui vill., 3500 m, D. Král lgt., 15 spec. in DKCP; China, N-Yunnan, 13.7.[19]90, Lijiang env., Xiangshan, 2400 m, D. Král lgt., 1 spec. in DKCP; China, N-Yunnan, 14.7.[19]90, 27°13'N 100°16'E, Yulongshan mts., E slope, 3200 m, D. Král lgt., 2 spec. in DKCP; China, N-Yunnan, 18.–23.7.[19]90, Yulongshan mts., 3000–3500m, Ganhaizi pass, 27°06'N 100°15'E, D. Král lgt., 22 spec. in DKCP; China, N-Yunnan, 24.–26.7.[19]90, Yulongshan mts., 2500–2800m, Ganhaizi/Lijiang road, D. Král lgt., 1 spec. in DKCP; China, Yunnan prov., Lijiang distr., 2500–2800m, Ganhaizi / Lijiang road, Yulongshan mts., 24.–26.7.1990, Vít Kubáň leg., 1 spec., SJCP; Yunnan, 2000–2500m, 25.42N 100.08E, Cangshan mts., E slope, 21/6.1992, D. Král lgt., 3 spec. in DKCP; Yunnan, 1800–2500m, 25.10N 100.21E, Weishan mt., 22–25/6.1992, 1 spec in DKCP; Yunnan, 2800–3000m, 25.12N 100.24E, Weibaoshan mts., 29–30/6.1992, D. Král lgt., 2 spec. in DKCP; Yunnan, 3300–2500m, 27.14N 100.15E, Yulongshan mts., N slope, 5/7.1992, D. Král lgt., 1 spec. in DKCP; Yunnan, 2000–3000 m, 27.20N 100.11E, Habashan Mts., SE slope, 10.–13.7.1992, D. Král lgt., 6 spec. in DKCP; Yunnan, 3000–3800 m, 27.20N 100.09E, Habashan Mts., E slope, 13.–17.7.1992, D. Král lgt., 2 spec. in DKCP; Yunnan, cca 2000m, 27.15N 100.09E, Hutiao [= Tiger leaping] gorge, Jinsha r., 18–22/7.1992, D. Král lgt., 7 spec. in DKCP; Yunnan, 24–26 May 1993, 27.01N 100.42E, Yulong Mts., 3200m, Bolm lgt., 1 spec., DKCP; Yunnan, 3200–2700m, Yulongshan mts., 27.00 / 100.12, 23–24/6.1993, Vít Kubáň lgt., 1 spec., SJCP; China, Yunnan prov., 29.10.1999, 4km SW Ancient Dali, Chang Shan [= Cang Shan], 3000m, J. Šťastný lgt., 1 spec. in DKCP; Yunnan, Pe-Yen-Tsin [= Yanfeng], 1 spec. in MNHN; Thibet, Tsékou, R.P. Dubenard, 2 spec. in MNHN; Yunnan, R.P. Delavay, Ex. Musaeo Armand David, 3 spec. in MNHN; Yunnan, 2 spec. in NMPC; **Vietnam**: H$^{t.}$ Tonkin, Dong-Van, Cap^{ne} Cadel, 1898, 1 spec. in NMPC; N Vietnam, Mt. Fan-si-pan, N-Seite, Chapa (= Sapa), 22.17N 103.44E, prim. Urwald, 28.x.–3.xi.1994, leg. Sinjaev & einh. Sammler, 1 spec. in DKCP; Chapa, Tonkin, H. Perrot, 1 spec. in SJCP.

Distribution. So far confirmed from China (Guizhou, Sichuan, Yunnan) and Vietnam. Literature data from different regions are confuse because of synonymization with *S. tridens* (see e.g., Boucomont 1929, Arrow 1931, Balthasar 1932, 1935, 1963, Kabakov & Napolov, 1999, above distribution of *S. tridens* and comments below).

Comments. *Synapsis yunnanus* was described by Arrow (1933) based on material from Yunnan. Later on, Balthasar (1935, 1963) synonymized the species erroneously with *S. tridens*. Based on study of the type specimens and relatively rich additional material of related species, I consider *S. yunnanus* a valid species. The revalidized species is closely related to *S. brahminus*, *S. davidis* and *S. tridens* possessing all the following set of synapomorphies: clypeus with distinct tubercle, gena produced into acuminate process, both episternum acarodomatia absent. They can be clearly separated from each other using the key below. In addition, at least *S. davidis*, *S. tridens* and *S. yunnanus* seem to have allopatric distribution areas.

1 (2) Pronotum outline bidentate anterolaterally, with inner anterior angle rounded; body length 28–30 mm. Bhutan; India: Assam, Darjeeling, Meghalaya, Sikkim; Nepal. ..... *S. brahminus* (Hope in Gray)
2 (1) Pronotum outline tridentate anterolaterally, with inner anterior angle sharp (Figs 2, 5).
3 (4) Elytron remarkably alutaceous, with striae only vaguely impressed, and intervals flat, finely coriaceous; body length 29–34 mm. China: Fujian, Gansu, Shaanxi, Sichuan. .... *S. davidis* Fairmaire in Deyrolle et Fairmaire
4 (3) Elytron remarkably shiny, with striae distinctly impressed, and intervals feebly convex, not coriaceous, only finely punctate.
5 (6) Emargination between inner and middle anterolateral pronotum tooth shallow (Fig. 2); acuminate process of gena less produced (Fig. 2); smaller in size, body length 30–36 mm. India: Assam, Meghalaya, Nagaland, West Bengal; Myanmar, Thailand. ..... *S. tridens* Sharp

6 (5) Emargination between inner and middle anterolateral pronotum tooth remarkably deep (Fig. 5); acuminate process of gena more produced (Fig. 5); larger in size, body length 34–43 mm. China: Guizhou, Sichuan, Yunnan; Vietnam. ..... *S. yunnanus* Arrow

A c k n o w l e d g e m e n t s

I wish to thank to the following persons and institutions: all colleagues and institutions listed in the Material and Methods section enabled me to study the material in their care, Miss Zuzana Čadová (scientific illustrator, Charles University, Praha) executed the drawings, and Jan Růžička (Czech Agricultural University, Praha) very kindly read and commented the preliminary version of this paper. The study was supported in part by grants from the Charles University Grant Agency (GAUK 135/2002) and the Ministry of Education (MŠMT ČR J13/9811300004).

REFERENCES

ARNETT H. R., Jr., SAMUELSON G. A. & NISHIDA G. M. 1993: *The insect and spider collections of the world*. *Flora and Fauna Handbook No*. *11*, *Second Edition*. Gainesville: Sandhill Crane Press, 308 pp.

ARROW G. J. 1931: *Coleoptera*, *Lamellicornia*, *part 3*, *Coprinae*. *Fauna of British India*, *including Ceylon and Burma*. London: Taylor & Francis, 428 pp.

ARROW G. J. 1933: Notes on Coprid Coleoptera, with descriptions of a new genus and a few new species. *Ann*. *Mag*. *Natur*. *Histor* (*Ser*. *10*) **12**: 421–430.

BACCHUS M. E. 1978: A catalogue of the type-specimens of the Scarabaeinae (Scarabaeidae) and the smaller Lamellicorn families (Coleoptera) described by G. J. Arrow. *Bull*. *Br*. *Mus*. *Natur*. *Histor*. (*Entomol*. *Ser*.) **37**: 97–115.

BALTHASAR V. 1932: Ein Verzechnis der neuen oder wenig bekannten Coprophagen des chinesischen Reiches. *Entomol*. *Nachrichtenbl*. **6**: 97–99.

BALTHASAR V. 1935: Scarabaeidae des palaärktischen Faunengebietes. Monographische Bestimmungstabelle I, Coprinae 1. *Bestimmungstab*. *Europ*. *Col*. [Troppau] **115**: 1–112.

BALTHASAR V. 1942: Die Coprophagen der chinesischen Provinz Fukien. *Entomol*. *Blätter* **38**: 113–125.

BALTHASAR V. 1963: *Monographie der Scarabaeidae und Aphodiidae der palaearktischen und orientalischen Region*. *Bd*. *2*. Prag: Verlag der Tschechoslowakischen Akademie der Wissenschaften, 628 pp.

BATES H. W. 1868: Notes on genera and species of Copridae. *Coeopterol*. *Hefte* **4**: 87–91.

BOUCOMONT A. 1920: Coléoptères coprophages nouveaux d'Asie et de Malaisie. *Ann*. *Soc*. *Entomol*. *Fr*. **88**[1919]: 307–320.

BOUCOMONT A. 1929: A list of the coprophagous Coleoptera of China. *Lingnan Sci*. *J*. **7**: 759–794.

BOUCOMONT A. & GILLET G.[sic!] 1921: *Faune entomologique de l'Indochine française*. *Fam*. *Scarabaeidae* (*Laparosticti*). Saigon, 76 pp.

DEYROLLE H. & FAIRMAIRE L. 1878: Descriptions de Coléoptères recueilles par M. l'abbé David dans la Chine Centrale. *Ann*. *Soc*. *Entomol*. *Fr*. **1878**: 88–140.

FAIRMAIRE L. 1897a: Note sur le genre Synapsis et description d'une espèce nouvelle (Col.). *Bull*. *Soc*. *Entomol*. *Fr*. **1897**: 25–26.

FAIRMAIRE L. 1897b: Note complementaire sur le genre Synapsis (Col.). *Bull*. *Soc*. *Entomol*. *Fr*. **1897**: 117–118.

GILLET J. J. A. 1907: Remarques sur les quelques Coprides du Museo Civico de Gènes et description d'espèces nouvelles. *Ann*. *Mus*. *Civ*. *Stor*. *Natur*. *Genova* **3**: 587–603.

GILLET J. J. A. 1911a: Coprides nouveaux de la region orientale. *Ann*. *Soc*. *Entomol*. *Belg*. **55**: 313–314.

GILLET J. J. A. 1911b: Fam. Scarabaeidae, Subfam. Coprinae. In: JUNK W. & SCHENKLING S. (eds): *Coleopterorum Catalogus*, *Pars 38*. Berlin: W. Junk, 100 pp.

HANBOONSONG Y. & MASUMOTO K. 1999: Dung Beetles (Coleoptera, Scarabaeidae) of Thailand. Part 1. Genus Synapsis. *Elytra* **27**: 453–462.

HOPE F. W. 1831: Synopsis of the new species of Nepaul insects in the collection of Major General Hardwicke. Pp. 21–32. In: GRAY J. E. (ed.): *Zoological Miscellany*. *Vol*. *1*. London: Treuttel, Wurtz & Co., 40 pp., 4 pls.

ICZN 1999: *International Code of Zoological Nomenclature*, *Fourth Edition*, *adopted by the International Union of Biological Sciences*. London: International Trust for Zoological Nomenclature, xxix + 305 pp.

KABAKOV O. N. & NAPOLOV A. 1999: Fauna and ecology of Lamellicornia of subfamily Scarabaeinae (Coleoptera, Scarabaeidae) of Vietnam and some parts of adjacent countries: South China, Laos and Thailand. *Latvijas Entomologs* **37**: 58–96.

KRÁL D. & REJSEK J. 2000: Synapsis naxiorum sp. n. from Yunnan (Coleoptera: Scarabaeidae). *Acta Soc*. *Zool*. *Bohem*. **64**: 267–270.

KRIKKEN J. 1987: A new species of the dung beetle genus Synapsis Bates from Borneo, with notes on its relatives (Coleoptera: Scarabaeidae). *Zool. Meded.* 61: 319–325.
LANSBERGE J. W. VAN 1874: Deux espèces remarkables de Lamellicornes exotiques. *Annls Soc. Entomol. Belg.* **17**: 143–144.
MASUMOTO K: 1973: Observation of the Nidification of Synapsis davidi Fairmaire. *Entomol. Rev. Japan* **25**: 60–63.
MASUMOTO K. 1987: Coprophagid-beetles from Northwest Thailand (I). *Entomol. Rev. Japan* **42**: 125–131.
MIWA Y. 1931: A systematic catalogue of Formosan Coleoptera. Formosa, Taihoku: Department of Agriculture, Government Research Institute (Report No. 55), xi + 359 pp.
OCHI T. 1992: Studies on the coprophagous scarab beetles from East Asia. 1. (Coleoptera: Scarabaeidae). *Giorn. Ital. Entomol.* **6**: 9–14.
PAULIAN R. 1945: *Faune de l'Empire Français III. Coléoptčres Scarabéides de l'Indochine. Première partie*. Paris: Libraire Larose, 225 pp.
RITSEMA C. 1875: Synapsis Ritsemae Lansb. *Coleopterol. Hefte* **14**: 211–212.
SHARP D. 1875: Descriptions of some new genera and species of Scarabaeidae from tropical Asia and Malaisia. *Coleopterol. Hefte* **13**: 33–54.
SHARP D. 1881: Note sur le genre Synapsis. *C. R. Soc. Entomol. Belg.* **25**: 92.

Acta Soc. Zool. Bohem. **66**: 291-292, 2002
ISSN 1211-376X

The provenance of *Lychas buchari* (Scorpiones: Buthidae)

František Kovařík

P. O. Box 27, CZ–145 01 Praha 45, Czech Republic

Received July 15, 2002; accepted September 3, 2002
Published December 16, 2002

Abstract. *Lychas buchari* Kovařík, 1997 is recorded from Western Australia.

Distribution, Scorpiones, Buthidae, *Lychas buchari*, Australia

Lychas buchari has hitherto been known only from the holotype without precise locality data. I am thus delighted to be able to report on a new specimen that to some extent clarifies the occurrence of this species. It was collected together with *Isometroides vescus* (Karsch, 1880) in Malee bush under the bark of *Eucalyptus* by Svatopluk Bílý of the National Museum in Prague (Czech Republic), and I am grateful to him for making these specimens available.

Lychas buchari Kovařík, 1997

Lychas buchari Kovařík, 1997: 320, 1998: 112; Fet et al. 2000: 160.

Material examined. Holotype, female: Australia, more precise locality and collector unknown, deposited in Muséum national d'Histoire naturelle, Paris (no. RS 4416); Immature female: Western Australia, 24 km north of Coolgardie, leg. S. Bílý, 18.x.2001, deposited in author's collection.

Diagnostic characters. The newly collected immature female is 32 mm long and, like the holotype has 26 pectinal teeth. The base colour is uniformly yellow to yellowish brown. The carapace is without keels but bears large granules. The femur, patella, manus and fingers of pedipalps are dorsally and laterally uniformly yellow to yellowish brown. The sixth cutting edge on the movable and fixed fingers of pedipalps bears one external and no internal granule. The mesosoma has an elevated median keel and large granules. The ventral surface of the seventh segment bears four conspicuous keels. The metasoma is dominantly yellowish brown, with the anterior parts of the second through fourth segments brown and the anterior three-quarters of the fifth segment black and the posterior quarter yellowish brown. The telson is yellowish brown in anterior half and black around the subaculear tooth. The first and second segments bear 10 keels; the third and fourth segments bear eight keels. The subaculear tooth is terminally rounded, without granules.

REFERENCES

Fet V., Sissom W. D., Lowe G. & Braunwalder M. E. 2000: *Catalogue of the Scorpions of the World* (*1758–1998*). New York: New York Entomol. Soc., 689 pp.

KOVAŘÍK F. 1997: Revision of the genera Lychas and Hemilychas, with descriptions of six new species (Scorpiones: Buthidae). *Acta Soc. Zool. Bohem.* **61**: 311–371.
KOVAŘÍK F. 1998: *Štíři* [*Scorpiones*]. Jihlava (Czech Republic): Publ. House Madagaskar, 176 pp (in Czech).

Acta Soc. Zool. Bohem. **66**: 293–302, 2002
ISSN 1211-376X

Nauticiella stygivaga gen. n. et sp. n., a new amphibiontic cavernicolous beetle from the Vjetrenica Cave, Herzegovina (Coleoptera: Leiodidae: Cholevinae: Leptodirini)

Josef MORAVEC[1)] & Roman MLEJNEK[2)]

[1)] Smetanovo náměstí 320, CZ–285 71 Vrdy, Czech Republic
[2)] Jana Zajíce 865, CZ–530 12 Pardubice, Czech Republic; e-mail: antroherpon@atlas.cz

Received April 8, 2002; accepted September 3, 2002
Published December 16, 2002

Abstract. A monobasic leptodirine genus *Nauticiella* gen. n. and species *N. stygivaga* sp. n. from the Vjetrenica Cave near Zavala in southern Herzegovina (Bosnia and Herzegovina) are described. *Nauticiella* gen. n. is keyed and its generic classification is discussed. The holotype habitus (male) and some adaptive morphological characters of *N. stygivaga* sp. n. are illustrated. It can be separated from other strictly cave dwelling species of the related troglomorphic leptodiroid genera *Hadesia* J. Müller, 1911, *Radziella* Casale et Jalžić, 1988 and *Croatodirus* Casale, Giachino et Jalžić, 2000 by its small body-size, moderately dilated basal protarsomeres and the peculiar form of the apical portion of its aedeagus. A description of the habitat and brief notes on the biology of *N. stygivaga* sp. n. are provided.

Taxonomy, descriptions, new genus, new species, key, Coleoptera, Leiodidae, Cholevinae, Leptodirini, Palaearctic region

INTRODUCTION

The subterranean cholevid beetles, especially the leptodirines are pre-eminently pre-adapted for cave life (see Peck 1998). Above all, Jeannel's monograph (1924) stimulated an intensive study of highly specialized cave dwelling Leptodirini (see, e.g. Casale & Jalžić 1988, Giachino & Guéorguiev 1993, Giachino & Etonti 1995, Nonveiller & Pavičević 1999, Casale et al. 2000). Guéorguiev (1976) formalized Jeannel's system of mostly informal groups into a system of subtribes. The biospeleological history of the world acclaimed cave Vjetrenica (= Wind Cave) near Zavala in Herzegovina is more than 100 years old (Absolon 1913, 1916a, b, Absolon & Hrabě 1930, Hadži 1932, 1933, Stammer 1936, Strouhal 1939, Buturović 1951, Karaman 1953, 1954, Matjašić 1960, Vandel 1965, etc.). Because of the rich species diversity of cave-limited terrestrial animals in the Vjetrenica Cave it is a potential hotbed of evolution in miniature (Culver 2001). Some of the important records, which made this cave famous, are for example the finding of new taxa of cavernicolous Coleoptera, namely, two ultra-evolved leptodirines, *Antroherpon apfelbecki apfelbecki* J. Müller, 1910 and *Hadesia vasiceki vasiceki* J. Müller, 1911 and the remarkable blind trechine carabids, *Scotoplanetes arenstorffianus* (Absolon, 1913) and *Adriaphaenops pretneri* (Scheibel, 1935).

In 1998, the junior author made an entomological search of the whole cave. It was primarily aimed at surveying the invertebrate fauna after a long period during which Vjetrenica was inaccessible to tourists (Růžehak 1965), because of the civil war that stated in 1991. The most notable achievement of these collecting trips to Herzegovina was without question the discovery of a new

Dedicated to the memory of Prof. Dr Karel Absolon (1877–1960), well-known Czech biospeleologist, who initiated the pioneering zoological research of the caves in the Popovo polje karst region of Herzegovina.

genus and a new species of cave dwelling cholevine beetle, *Nauticiella stygivaga* gen. n. et sp. n., which is described below.

The suprageneric nomenclature of the family Leiodidae used here is that of Newton (1998), and the morphological terms follow Giachino et al. (1998) and Newton (1998).

TAXONOMIC PART

Nauticiella gen. n.

(Figs 1, 4–6, 12–14, 17–24)

TYPE SPECIES. *Nauticiella stygivaga* sp. n., by monotypy.

DESCRIPTION. Male (Fig. 1). Body small, flattened, scaphoid-shaped, semi-lustrous, yellowish-brown, sternites somewhat dark. Head and pronotum with very short, rather sparse yellow pubescence, elytra with relatively dense, short, decumbent, hydrophobous, yellow pubescence.

Head relatively large, not retractile, slightly convex and narrower than pronotum; preantennal part of head distinctly longer than the postantennal part. Mouthparts eminently preadapted to detritus filtering in a liquid medium. This degree of development of the mouthparts is similar to the general degree of specialization of cave species (see Figs 4, 5, 7–11; cf. Peck 1998). Labrum (Fig. 4) enlarged and rounded distally, densely covered with short, conspicuous hairs on its anterior edge. Epistoma transverse, uncurved anteriorly. Mandible (Fig. 5) subsymmetrical, its preapical part relatively short, sharply bent, with three distal teeth. Maxilla well-developed, stipes with minute setulae, galea membranous, lacinia very finely ciliate; maxillary palpus (Fig. 6) with three palpomeres, penultimate palpomere 1.6 times longer than ultimate, short, conical one. Labium truncate, covered with rather long bristles. Frons slightly convex, fronto-epistomal suture evident. Eyes totally absent. Antennal insertion on posterior quarter of head. Antennae (Fig. 12) rather long and slender, filiform, 1.7 times longer than length of elytra, distinctly longer than the body; the antennal segment I rhomboid, antennomere I longer than II (Fig. 13), antennomere VII and VIII dilated distally, apical segment subconical. Sculpture on head indistinct, very finely punctate.

Pronotum slightly convex, 1.5 times longer than its maximum width. Lateral pronotal margins bisinuate, only narrowly beeded, regularly arcuate in one half and very slightly curved in posterior third. Posterior angles subrectangular, not prominent laterally. Base of pronotum almost straight. Disc flatly vaulted, with medial depressions shallowly indicated. Pronotal sculpture similar to that on head, with fine, dense puncturation.

Scutellum small, triangular.

Elytra elongate, moderately convex, 2.1 times longer than their combined width, fully covering the apex of abdomen. Lateral margins regularly rounded, gradually tapering posteriorly, bordered, separately obtusely rounded at the apex. Sutural striae absent. Surface of elytra coarser than that of pronotum, without regular transverse striae, punctures somewhat rougher and denser. Mesosternum not pedunculate; mesosternal carina atrophic.

Legs rather long and slender. Anterior femora robust, expanded, thickened proximally. Protibiae moderately bent inwards, extended premedially, without apical comb of short spines, apical protibial basket or external and internal spurs (see Fig. 14). Protarsus pentamerous, basiprotarsomere long, moderately dilated, almost as wide as distal part of protibia (Fig. 14). Mesocoxal cavities confluent. Meso- and metatibiae slightly sinuous, with very small and short inner spurs. Basimesotarsomere simple, not dilated. Metacoxae free, separated by a large, broadly arcuate intercoxal apophysis. Tarsal claws simple.

Sternum VIII as in Fig. 19. Genital segment as in Fig. 20.

Fig. 1. *Nauticiella stygivaga* gen. n. et sp. n., holotype (male). Dorsal view. Oil-painting by Jan Kobylák.

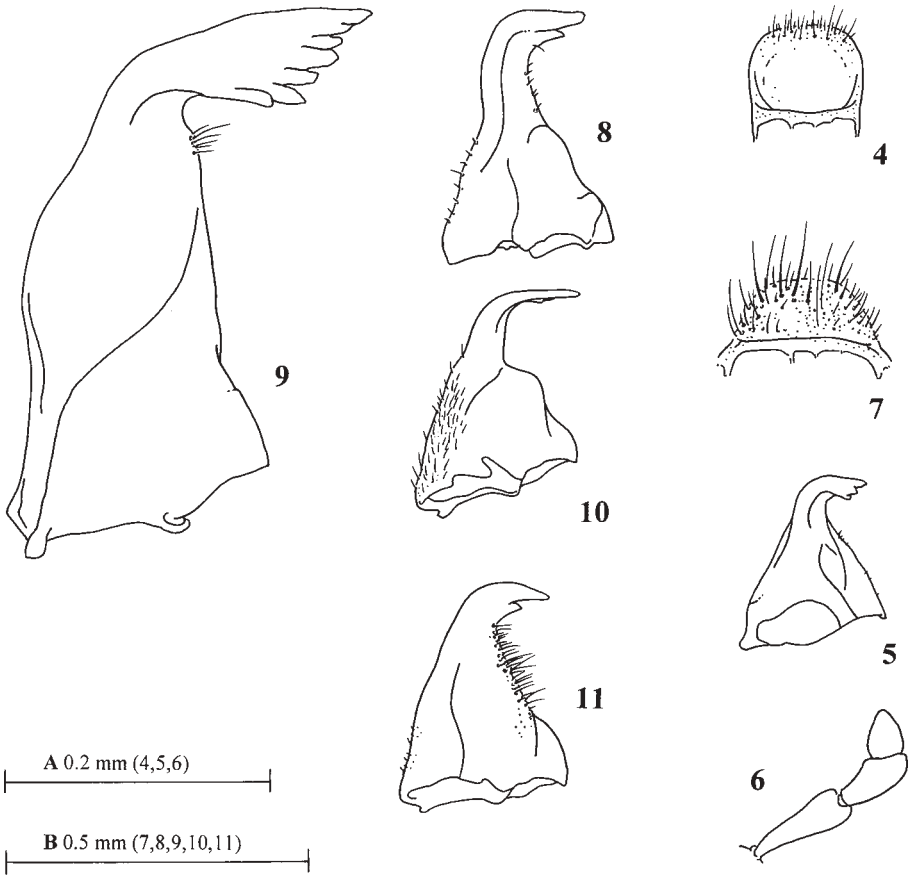
Figs 2, 3. 2 – Popovo polje karst-plateau surrounding the Vjetrenica Cave. Photo by Alena Hanelová. 3 – A sinter lake close to the waterfall in the Vjetrenica Cave. Photo by Ivan M. Jančok.

Male genitalia (Figs 20–24). Aedeagus relatively large, strongly sclerotized. Tegmen short. Median lobe of aedeagus subparallel-sided, enlarged medially, at apex distinctly bilobed in dorsal view (Fig. 21), regularly arched in lateral view (Fig. 22). Basal lamina of median lobe short, moderately expanded proximally. Apical portion of aedeagus modified as in Figs 21 and 23 (all males were dissected), widely dilated, bilobed and arcuately emarginate. Parameres long and very thin, never reaching the aedeagal apex, preapically sinuous, only slightly thickened caudally, armed with 3 setae (Fig. 24). Internal sac of aedeagus feebly indicated, without basal sclerites, hyaline.

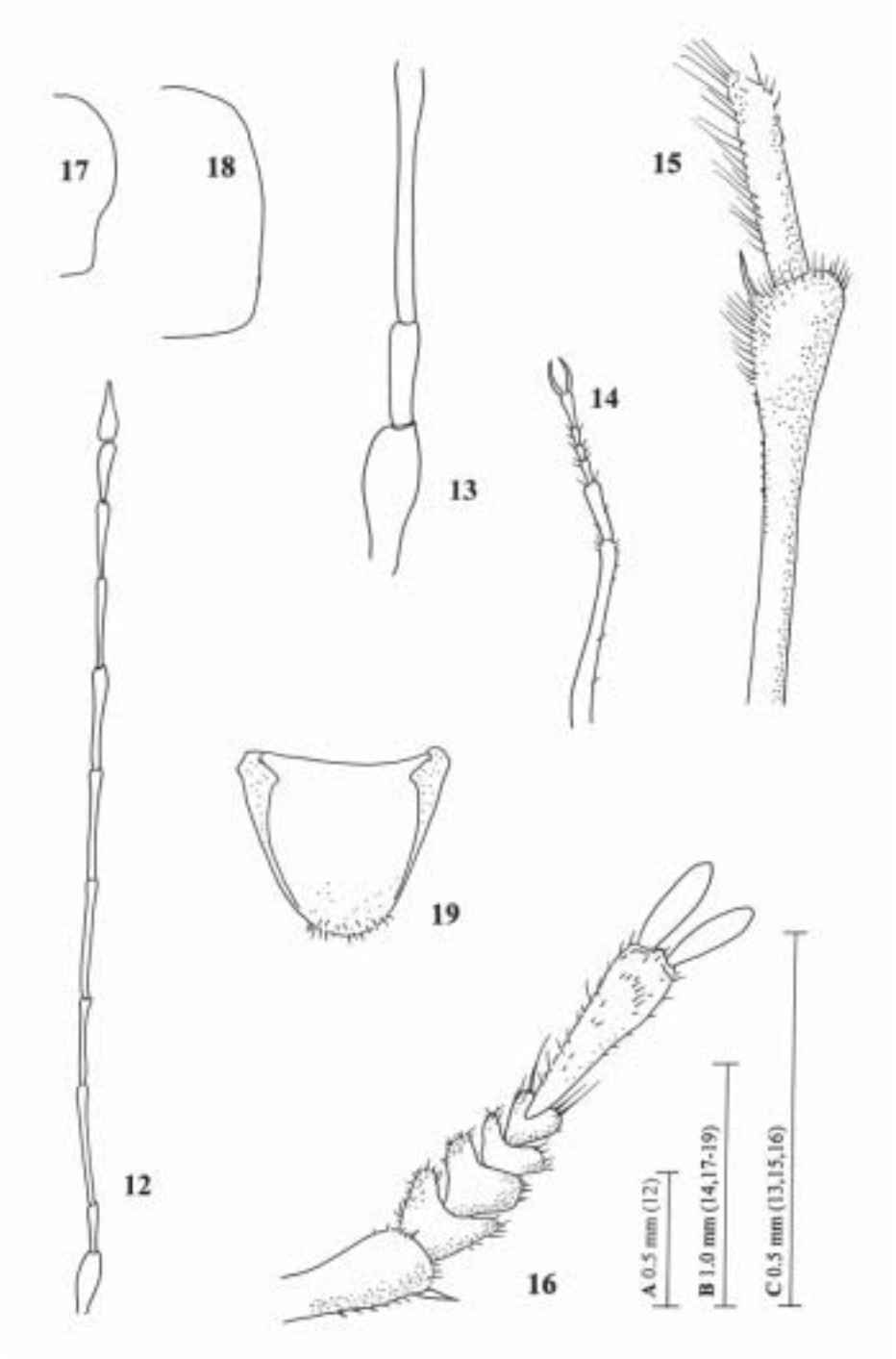
Female unknown.

Derivation of name. The generic name *Nauticiella* gen. n. (feminine in gender) is derived from the Latin noun "nautici" (= the swimmers) in apposition, referring to the amphibiontic way of life of the new species in various cave habitats.

Differential diagnosis. According to the generic classification of the world Leioidae by Newton (1998) the tribe Leptodirini consists of seven subtribes. Its morphological modifications and way

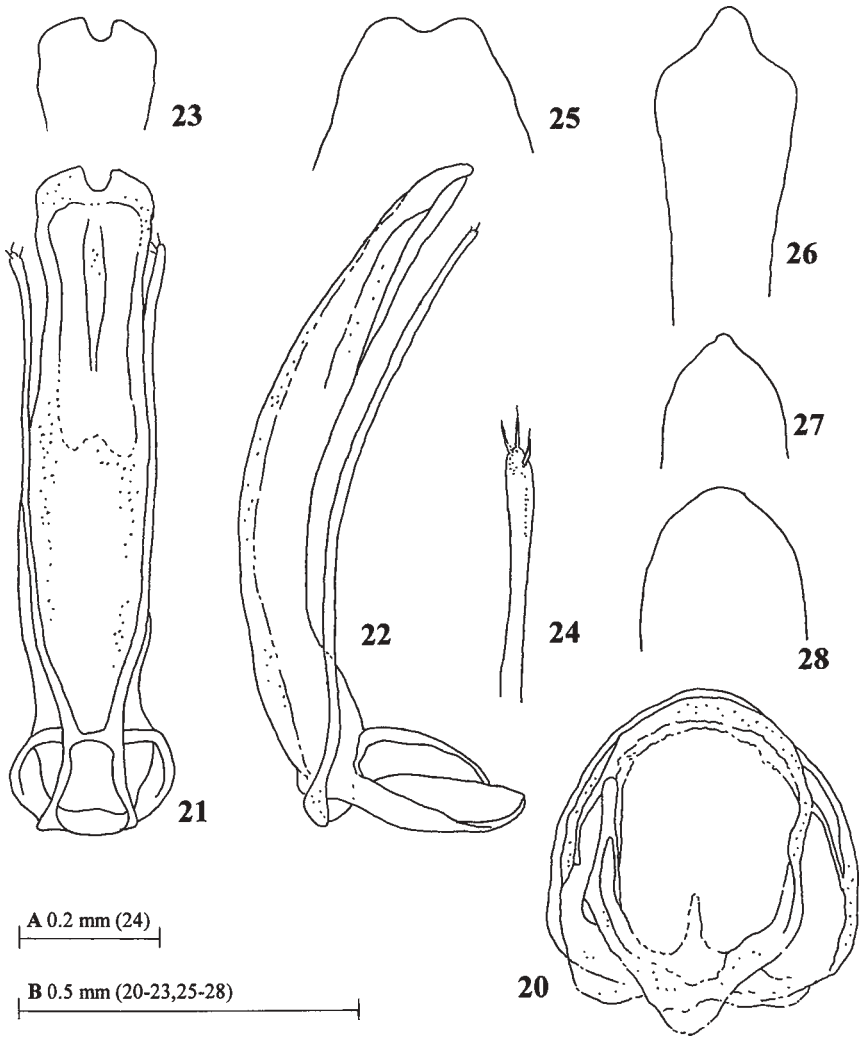


Figs 4–11. 4–6. *Nauticiella stygivaga* gen. n. et sp. n., paratype (male). 4 – labrum ventral view; 5 – mandible ventral view; 6 – maxillary palpus dorsal vierw; 7–8. *Radziella styx* Casale et Jalžić, 1988; 7 – labrum dorsal view; 8 – mandible dorsal view; 9–11. Mandibles of: 9 – *Hadesia vasiceki vasiceki* J. Müller, 1911; 10 – *Cansiliella servadeii* M. G. Paoletti, 1980; 11 – *Tartariella d. durmitorensis* Nonveiller & Pavičević, 1999. Scale 0.2 mm (A: Figs 4–6), 0.5 (B: Figs 7–11).



Figs 12–19. 12–14, 17, 19. *Nauticiella stygivaga* gen. n. et sp. n., paratype (male); 12 – antenna dorsal view; 13 – antennomeres I–III dorsal view; 14 – protarsus and apical part of protibia dorsal view; 15 – apical portion of protibia of *Hadesia vasiceki vasiceki* J. Müller; 16 – protarsus and apical part of protibia of *Radziella styx* Casale et Jalžić; 17 – outline of pronotum of *Nauticiella stygivaga* gen. n. et sp. n.; 18 – outline of pronotum of *Croatodirus bozicevici* Casale, Giachino et Jalžić; 19 – ventral view of sternum VIII of *Nauticiella stygivaga* gen. nov. and sp. n. Scale 0.5 mm (A: Fig. 12, C: Figs 13, 15, 16), 1.0 mm (B: Figs 14, 17–19).

of life are similar to those of *Radziella* Casale et Jalžić, 1988, which belongs to the large subtribe Leptodirina, characterized by antennae inserted on the middle third of the head. The genera *Antroherpon* Reitter, 1889 with 30 species (with *Leptomeson* Jeannel, 1924) and the monotypic *Hadesia* J. Müller, 1911, *Parantrophilon* Noesske, 1914, *Remyella* Jeannel, 1931, and *Nauticiella* gen. n., and evidently also *Croatodirus* Casale, Giachino et Jalžić, described in 2000, belong to the subtribe Antroherponina with antennae inserted on posterior third of the head, and males having five protarsomeres and a mesosternum without a carina.



Figs 20–28. 20–24. *Nauticiella stygivaga* gen. n. et sp. n., paratype (male); 20 – genital segment ventral view; 21 – aedeagus dorsal view; 22 – aedeagus lateral view; 23 – apical portion of aedeagus dorsal view; 24 – paramera dorsal view. 25–28 apex of aedeagus of: 25 – *Albanodirus trezzii* Giachino et Vailati, 1998; 26 – *Hadesia vasiceki vasiceki* J. Müller; 27 – *Croatodirus bozicevici* Casale, Giachino et Jalžić, 2000; 28 – *Radziella styx* Casale et Jalžić. Scale 0.2 mm (A: Fig. 24), 0.5 mm (B: Figs 20–23, 25–28).

New ultra-evolved troglobite, *Nauticiella stygivaga* sp. n., is distinguished by its smaller body, moderately dilated basal protarsomeres and the extraordinary apical portion of its aedeagus. The genera *Antroherpon*, *Croatodirus*, *Hadesia*, *Parantrophilon* and *Remyella* can be distinguished from *Nauticiella* gen. n. by using the following key:

1 (12) Antennal insertion on posterior third of head; mesosternal carina absent; protarsomere IV not bilobed. ... . Antroherponina
2 (3) Antennomere I as long as antennomere II. Serbia. ..... *Remyella* Jeannel
3 (2) Antennomere I evidently longer than antennomere II.
4 (5) Head widely oval, clearly wider than pronotum. Length 3.3–3.5 mm. Herzegovina. .... *Parantrophilon* Noesske
5 (4) Head subcylindrical, elongate, at most slightly wider than pronotum. Length 2.5–9.1 mm.
6 (9) Pronotum glabrous or with widely spaced long setae.
7 (8) Labrum covered with numerous long bristles. Length about 7.5 mm. Herzegovina. ..... *Hadesia* J. Müller
8 (7) Labrum with normal chaetotaxy. Length about 4.0–9.1 mm. Croatia, Bosnia, Herzegovina, Montenegro, Albania. ..... *Antroherpon* Reitter, *Leptomeson* Jeannel
9 (6) Pronotum covered with dense decumbent pubescence.
10 (11) Lateral margin of pronotum slightly convex (Fig. 18); apex of aedeagus acuminate (Fig. 27); parameres reaching apex of median lobe. Length 3.5–3.7 mm. Croatia. ..... *Croatodirus* Casale, Giachino et Jalžić
11 (10) Lateral margin of pronotum anterior to posterior angles emarginate (Fig. 17); apex of aedeagus bilobed and dilated (Fig. 23); parameres not reaching apex of median lobe (Fig. 21, 22). Length 2.5–2.9 mm. Herzegovina. ..... *Nauticiella* gen. n.
12 (1) Antennal insertion on posterior third of head; mesosternal carina reduced, forming a small triangular plate; protarsomere IV deeply bilobed (Fig. 16). Croatia. ..... Leptodirina, *Radziella* Casale et Jalžić

In its ecological requirements and the convergent adaptable morphological modifications of its mouthparts, especially the shape of the labrum and maxillae and dentate mandibles *N. stygivaga* gen. n. et sp. n. is similar to species of *Cansiliella* Paoletti, 1972 from Italy (see Fig. 10) and both taxa of *Tartariella* Nonveiller et Pavičević, 1999 from the Durmitor Mts (Montenegro) (see Fig. 11, cf. Nonveiller & Pavičević 1999: 323). The shape of the apex of the aedeagus of *Albanodirus trezzii* Giachino et Vailati, 1998, from Cave of Mt. Didja and Hali Salites (Oroshi, N. Albania) is also bilobed, but shallowly emarginate in dorsal view (Fig. 22).

***Nauticiella stygivaga* sp. n.**

(Figs 1, 4–6, 12–14, 17–24)

Type material. Holotype (male), labelled. "S Herzegovina, Popovo polje-plateau, Zavala Env., Pećina Vjetrenica Cave, 268 m a.s.l., 2.3 km from entrance, 27.viii.2001, R. Mlejnek lgt.". Deposited in the collection of R. Mlejnek (Pardubice). Paratypes (4 males), the same data as holotype. In the collections of J. Moravec (Vrdy), M. Perreau (Paris) and R. Udržal (Pardubice).

Description. Male (habitus of holotype as in Fig. 1). Length of body (measured from anterior margin of epistoma to apex of elytra) 2.5–2.9 mm (in holotype 2.7 mm).

Head relatively large, narrower than pronotum; length/width ratio 1.17. Antenna (Fig. 12) rather long and slender, exceeding the apex of elytra; ratio of length of antenna/length of elytron 1.66–1.83 (in holotype 1.68); antennomere I longer than antennomere II (Fig. 13). Lengths of individual antennomeres I to XI (in mm) as follows: 0.20:0.16:0.32:0.29:0.39:0.34:1.02:0.27:0.27:0.18:0.22.

Pronotum: length/width ratio 1.44–1.75 (in holotype 1.74). Lateral margins regularly arcuate in anterior half and sinuate in posterior third.

Elytra elongate, moderately convex; length/width ratio 2.14–2.46 (in holotype 2.14). Lateral margins regularly rounded, bordered.

Legs rather long and slender. Protibiae considerablely extended distally; length of protibia/length of protarsus ratio 1.7–1.79 (in holotype 1.78). Protarsus pentamerous, tarsomere I long,

moderately dilated (Fig. 14). Mesocoxal cavities confluent. Meso- and metatibiae slightly sinuous, with very small and short inner spurs. Tarsal claws simple.

Sternum VIII (Fig. 19). Genital segment (Fig. 20).

Aedeagus (Figs 21–24) relatively large, well-sclerotized, 1.0 mm long (measured from apex of median lobe to apex of tegmen). Length of elytron/length of aedeagus ratio 1.64–1.88 (in holotype 1.76). Tegmen short. Median lobe of aedeagus subparallel-sided, the apex dilated and bilobed in dorsal view (Fig. 21), regularly arched in lateral view (Fig. 22). Parameres long and thin, never reaching the aedeagal apex, with 3 setae apically – Fig. 24. Internal sac of aedeagus without basal sclerites, hyaline.

Female unknown.

Derivation of Name. The specific name "*stygivaga*" is from the Latin stygius (underground water) and vagus (running) indicates the extreme ecological conditions this new species lives in.

Collection circumstances and Biology. All specimens of *N. stygivaga* gen. n. et sp. n. were collected in the Vjetrenica Cave, 2.3 km from the entrance (268 m in altitude), on the wall under a waterfall. Calcareous deposits form water reservoirs (rimstone pools), which surround the waterfall (Fig. 3). During the study, air temperature (measured on 27.viii.2001) was 11.5°C, and water temperature (in waterfall) about 11.2 °C. The type locality is Zavala village (Popovo polje-plateau, S Herzegovina – see Fig. 2, for details of geomorphology and cave hydrography – see e.g., Radovanović 1929). Adults were collected in association with the troglobiontic *Hadesia vasiceki vasiceki* J. Müller, 1911 (Leptodirini: Antroherponina) (det. R. Mlejnek, 2001). Adults of *N. stygivaga* gen. n. et sp. n. inhabit the limnic (sinter lakes) and/or lotic habitats in the cave, where water is relatively fast flowing in a film layer under waterfalls. It clearly prefers dripstone deposits (flowstone) and vertical walls of other sinters, where flowing detritus is probably available – stenohygrobiontic species according to Remy (1940), cf. Jeannel (1924), Casale & Jalžić (1988), Nonveiller & Pavićević (1999) and Casale et al. (2000).

A c k n o w l e d g e m e n t s

We are deeply indebted to Professor Dr Karel Hůrka and Dr David Král (both Department of Zoology, Charles University, Praha) and Dr Jan Růžička (Faculty of Forestry, Agricultural University, Praha), for reading and critically commenting on the manuscript. We especially wish to thank Mr Jan Kobylák (Praha) for the coloured dorsal habitus figure of the type specimen. We thank also our colleague Mr Radek Udržal (Pardubice) for his assistance with the male genitalia preparation and Dr Michel Perreau (Paris) for his support of our work. We are grateful to Professor A. F. G. Dixon for his correction of the early English version.

REFERENCES

Absolon K. 1913: [Results of explorational trips to Balkans. Next part]. *Čas. Morav. Mus. Zemského* **13**: 361–366 (in Czech).

Absolon K. 1916a: [Results of explorational trips to Balkans. Part 4]. *Čas. Morav. Mus. Zemského* **15**: 242–309 (in Czech).

Absolon K. 1916b: [From the explorational trips over the Balkan karst]. *Zlatá Praha* **33**: 574–576, 586–588, 597–600, 609–612, 622–624 (in Czech).

Absolon K. & Hrabě J. 1930: Ueber einen neuen Süsswasser-Polychaeten aus den Höhlengewässern der Herzegowina. *Zool. Anz.* **88**: 249–264.

Buturović A. 1951: [Bibliography of caves and the cave animals of Bosnia and Herzegovina]. *Godišn. Biol. Inst. Sarajevo* **4**: 95–114 (in Serbo-Croatian).

Casale A. & Jalžić B. 1988: Radziella (new genus) styx n. sp., a new exceptional troglobitic Bathysciinae (Coleoptera, Catopidae) from the Dinaric Region, Jugoslavia. *Boll. Mus. Regional. Sci. Natur. Torino* **6**: 349–358.

Casale A., Giachino P. M. & Jalžić B. 2000: Croatodirus (nov. gen.) bozicevici n. sp., an enigmatic new leptodirine beetle from Croatia (Coleoptera, Cholevidae). *Natura Croatica* **9**: 83–92.

CULVER D. C. 2001: The dark zone. Caves offer biologists the chance to study how darkness, famine and isolation have forced the hand of evolution. *Science* **41**: 30–35.
GIACHINO P. M. & GUÉORGUIEV V. B. 1993: Note sul genere Antroherpon Reitter (Coleoptera Cholevidae Leptodirinae). *Natura Bresciana*, *Ann. Mus. Civ. Sci. Natur. Brescia* **28**(1992): 287–329.
GIACHINO P. M. & ETONTI M. 1995: Il genere Remyella Jeannel, 1931 (Coleoptera Cholevidae Leptodirinae). *Atti Mus. Civ. Stor. Natur. Trieste* **46**: 77–98.
GIACHINO P. M. & VAILATI D. 1998: Albanodirus trezzii nuovo genere nuova specie di Leptodirinae dell'Albania settentrionale (Coleoptera Cholevidae). *Natura Bresciana*, *Ann. Mus. Civ. Sci. Natur. Brescia* **31**(1995): 113–119.
GIACHINO P. M., VAILATI D. & CASALE A. 1998: Major questions in the phylogeny and biogeography of Cholevidae (Coleoptera), with emphasis on the subfamily Leptodirinae. Pp.: 179–209. In: GIACHINO P. M. & PECK S. B. (eds): *Phylogeny and Evolution of Subterranean and Endogean Cholevidae* (= *Leiodidae Cholevinae*). *Proc. Symp.* (*30 August*, *1996*, *Florence*, *Italy*) *XX Int. Congr. Entomol. Atti Mus. Reg. Sci. Natur.*, *Torino* **1998**: 1–295.
GUÉORGUIEV V. B. 1976: Recherches sur la taxonomie, la classification et la phylogénie des Bathysciinae (Coleoptera: Catopidae). *Razprave Slovenska Akademija Znanosti in Umetnosti* **19**: 89–147.
HADŽI J. 1932: [Contribution to the knowledge of the cave fauna of Vjetrenica (Pseudoscorpionidea: Neobisium (Blothrus) vjetrenicae sp. n., Opilionidea: Travunia vjetrenicae sp. n., Nelima troglodytes Roewer)] *Glasn. Srpske Kraljev. Akad. Nauka* **61**: 103–157 (in Slovenian).
HADŽI J. 1933: Beitrag zur Kenntnis der Fauna der Höhle Vjetrenica. *Bull. Acad. Serbe*, *Sect. B*, *Sci. Natur.* **1**: 49–79.
JEANNEL R. 1924: Monographie des Bathysciinae. Biospeologica No L. *Arch. Zool. Exp. Génér.* **63**: 1–436.
KARAMAN S. L. 1953: Über subterrane Amphipoden und Isopoden des Karstes von Dubrovnik und seines Hinterlandes. *Acta Mus. Macedon. Sci. Natur.* **1**: 137–167.
KARAMAN S. L. 1954: Über unsere unterirdische Fauna. *Acta Mus. Macedon. Sci. Natur.* **2**: 195–216 (in Serbo-Croatian, German abstr.).
MATJAŠIĆ J. 1960: [Cave animals of Vjetrenica]. *Biol. Vestnik* **7**: 75–80 (in Slovenian).
NEWTON A. F. JR. 1998: Phylogenetic problems, current classification and generic catalog of world Leiodidae (including Cholevidae). Pp.: 41–177. In: GIACHINO P. M. & PECK S. B. (eds): *Phylogeny and Evolution of Subterranean and Endogean Cholevidae* (=*Leiodidae Cholevinae*). *Proc. Symp.* (*30 August*, *1996*, *Florence*, *Italy*) *XX Int. Congr. Entomol. Atti Mus. Reg. Sci. Natur.*, *Torino* **1998**: 1–295.
NONVEILLER G. & PAVIĆEVIĆ D. 1999: Tartariella durmitorensis n. gen. et n. sp., troisičme Leptodirini de la chaîne Dinariquef moeurs hadésiennes (Coleoptera, Leiodidae). *Bull. Soc. Entomol. France* **104**: 315–326.
PECK S. B. (1998): Phylogeny and evolution of subterranean and endogean Cholevidae (=Leiodidae, Cholevinae): an introduction. Pp.: 11–40. In: GIACHINO P. M. & PECK S. B. (eds): *Phylogeny and Evolution of Subterranean and Endogean Cholevidae* (=*Leiodidae Cholevinae*). *Proc. Symp.* (*30 August*, *1996*, *Florence*, *Italy*) *XX Int. Congr. Entomol. Atti Mus. Reg. Sci. Natur.*, *Torino* **1998**: 1–295.
RADOVANOVIĆ S. M. 1929: [The cave Pećina Vjetrenica in Herzegovina. Morphological-hydrographical study]. *Spomenik Srpske Kraljev. Akad. Nauka* **67**(15): 1–113 (in Serbo-Croatian).
REMY P. 1940: Sur le mode de vie des Hadesia dans la grotte Vjetrenica (Col. Bathysciinae). *Rev. Fr. Entomol.* **7**: 1–8.
RŽEHAK V. 1965: The Arrangement and Opening of the Cave Vjetrenica in Zavala (Hercegovina – Yugoslavia). Pp.: 209–210. In: ŠTELCL O. (ed.): *Problems of the Speleological Research. Section 3 – Speleology. Proc. Int. Speleol. Confer. held in Brno June 29 – July 4*, *1964*. Prague: Academia, 220 pp.
STAMMER H.-J. 1936: Ein neuer Höhlenschizopode, Troglomysis vjetrenicensis n. g. n. sp. *Zool. Jahrb.*, *Abt. Syst. Ökol. Geogr. Tiere* **68**: 53–104.
STROUHAL H. 1939: Titanethes Schiödte. (Landasseln aus Balkanhöhlen in der Kollektion "Biospeologica balcanica" von Prof. Dr. Absolon. 6. Mitteilung). *Studien aus dem Gebiete der allgemeinen Karstforschung*, *der wissenschaftlichen Höhlenkunde*, *der Eiszeitforschung und den Nachbargebieten* (*Brünn*), *Biol. Ser.* (*B*) **5**: 1–34.
VANDEL A. 1965: *Biospeleology*, *the biology of cavernicolous animals*. Oxford, London, Edinburgh, New York, Paris, Frankfurt a. Main: Pergamon Press, xxiv +524 pp.

Acta Soc. Zool. Bohem. **66**: 303–320, 2002
ISSN 1211-376X

Taxonomic and nomenclatorial notes on Palaearctic Silphinae (Coleoptera: Silphidae)

Jan RŮŽIČKA

Department of Ecology, Faculty of Forestry, Czech Agricultural University,
CZ–165 21 Praha 6, Czech Republic; e-mail: ruzicka@lf.czu.cz

Received June 30, 2002; accepted September 3, 2002
Published December 16, 2002

Abstract. Taxonomic and nomenclatorial notes on 16 valid species of Silphinae distributed in the Palaearctic region are provided. The following 37 names are treated as junior subjective synonyms of the species given in round brackets: *Blitophaga velutina* Portevin, 1943 (syn. of *Aclypea daurica* (Gebler, 1832)); *Blitophaga opaca* var. *samnitica* Fiori, 1899 (syn. of *Aclypea opaca* (Linnaeus, 1758)); *Silpha quadripunctata* var. *hexapunctata* Gerhardt, 1897 (syn. of *Dendroxena quadrimaculata* (Scopoli, 1772)); *Phosphuga cassidea* Kraatz, 1876, *Peltis atrata* var. *subparalella* Reitter, 1884, *Peltis* (*Phosphuga*) *atrata* var. *rostrata* Reitter, 1888, *Phosphuga atrata borsodensis* Depoli, 1931 and *Phosphuga atrata lombarda* Depoli, 1931 (all syn. of *Phosphuga atrata atrata* (Linnaeus, 1758)); *Silpha italica* Küster, 1851, *Silpha lunata* var. *austriaca* Otto, 1891 and *Silpha carinata* var. *blattiformis* Reitter, 1901 (all syn. of *Silpha carinata* Herbst, 1783); *Silpha nakanei* Emetz et Schawaller, 1975 (syn. of *Silpha melanura* Hope, 1831); *Silpha costata* Ménétries, 1832 (non Brullé, 1836), *Silpha striola* Ménétries, 1832, *Silpha godarti* Reiche, 1861, *Silpha nitida* Portevin, 1907 (non Faldermann, 1835), *Silpha obscura* var. *simplex* Semenov, 1891, *Silpha obscura latialis* Depoli, 1931, *Silpha obscura ablattaroides* Portevin, 1943 and *Silpha obscura mongolica* Schawaller, 1980 (non Faldermann, 1835) (all syn. of *Silpha obscura obscura* Linnaeus, 1758); *Silpha olivieri aquilana* Depoli, 1931 and *Silpha olivieri sardoa* Depoli, 1931 (both syn. of *Silpha olivieri* Bedel, 1887); *Silpha venatoria* Harold, 1877, *Silpha perforata* var. *lateralis* Portevin, 1926, *Silpha perforata mandli* Portevin, 1932 and *Silpha perforata elongata* Portevin, 1943 (all syn. of *Silpha perforata* Gebler, 1832); *Silpha puncticollis* var. *lucasi* Portevin, 1926 (syn. of *Silpha puncticollis* Lucas, 1846); *Silpha tyrolensis* var. *externa* Portevin, 1926, *Silpha tyrolensis cottia* Depoli, 1931, *Silpha tyrolensis pennina* Depoli, 1931 and *Silpha tyrolensis* var. *pyrenaica* Portevin, 1943 (all syn. of *Silpha tyrolensis* Laicharting, 1781); *Thanatophilus rugosus tuberculatus* Depoli, 1931 and *Thanatophilus rubripes* Portevin, 1943 (both syn. of *Thanatophilus rugosus* (Linnaeus, 1758)); *Thanatophilus sinuatus* var. *obscurior* Portevin, 1926, *Thanatophilus sinuatus* var. *scutellatus* Portevin, 1926, *Thanatophilus sinuatus* var. *cyanescens* Portevin, 1943 and *Thanatophilus sinuatus cypriotus* Portevin, 1943 (all syn. of *Thanatophilus sinuatus* (Fabricius, 1775)). Lectotypes are designated for the following taxa: *Silpha daurica* Gebler, 1832, *Blitophaga velutina* Portevin, 1943, *Blitophaga opaca* var. *samnitica* Fiori, 1899, *Peltis atrata* var. *subparalella* Reitter, 1884, *Peltis* (*Phosphuga*) *atrata* var. *rostrata* Reitter, 1888, *Silpha costata* Ménétries, 1832, *Silpha nitida* Portevin, 1907, *Silpha obscura latialis* Depoli, 1931, *Silpha olivieri aquilana* Depoli, 1931, *Silpha olivieri sardoa* Depoli, 1931, *Silpha striola* Ménétries, 1832, *Silpha venatoria* Harold, 1877, *Silpha perforata mandli* Portevin, 1932, *Thanatophilus rugosus tuberculatus* Depoli, 1931 and *Thanatophilus rubripes* Portevin, 1943. The binomen *Silpha hirta* is attributed to Herbst, 1783 (instead of Schaeffer, 1769). The publication dates of relevant parts of the text and plates of Brullé (1836–1840) were determined, which affects the priority of names described in this publication. *Silpha costata* Brullé, 1836 (described by indication; and being a junior primary homonym of *Silpha costata* Ménétries, 1832) is treated as an objective synonym of the valid name *Heterotemna figurata* (Brullé, 1839). *Silpha simplicicornis* Brullé, 1839 is treated as a junior objective synonym of *Heterotemna tenuicornis* (Brullé, 1836) (the latter being described by indication, newly treated as valid species). *Oiceoptoma collaris* of Motschulsky (1859) is considered as a nomen nudum. *Silpha cassidea* of Dahl (1823) is considered as a nomen nudum, the species should be treated as *Phosphuga cassidea* Kraatz, 1876.

Taxonomy, nomenclature, new synonymy, nomen nudum, lectotype designation, Insecta, Coleoptera, Silphidae, Silphinae, Palaearctic region

INTRODUCTION

During the compilation of the Silphidae portion of the forthcoming Catalogue of Palaearctic Coleoptera (edited by Ivan Löbl and Aleš Smetana), I found several species-group names, which are treated as valid in the literature, but were intended only to describe individual or local variation. For most of them I was able to study the type material and decided to treat them as junior subjective synonyms of other more widely distributed species. Furthermore, several names are nomina nuda or junior primary homonyms and should be replaced by other names. These changes are made in the text below.

MATERIAL AND METHODS

The following collection acronyms are used throughout the text (according to Arnett et al. 1993): BMNH – Natural History Museum, London (M. J. D. Brendell, H. Mendel); DEIC – Deutsches Entomologisches Institut, Eberswalde (D. Ahrens, L. Zerche); IEUS – Dipartimento di scienze e tecnologie agroambientali, Università di Bologna, Bologna (G. Burgio, F. Santi); JRUC – private collection of J. Růžička, Praha; JSCC – private collection of J. Schneider, Praha; MNHN – Museum national d'Histoire naturelle, Paris (Nicole Berti); NMPC – Národní museum, Praha (J. Jelínek); ZISP – Zoological Institute, Russian Academy of Sciences, St. Petersburg (M. G. Volkovitsh); ZMHB – Zoologisches Museum der Humboldt-Universität, Berlin (B. Jäger, M. Uhlig).

Exact label data are cited only for type material, using the following set of abbreviations: coll. – collection of (not collector), design. – designated by, leg. – collected by, MS – manuscript, HT – holotype, LT – lectotype, PLT – paralectotype(s). Authors' remarks and addenda are found in square brackets; [p] – the preceding data within a quotation are printed; [hw] – the same but hand-written. Separate lines are indicated by slash "/", separate labels by double slash "//". The lectotype and paralectotypes are designated in order to preserve stability of nomenclature in this group, according to Article 74.7.3 of the Code (ICZN 1999).

RESULTS

Aclypea daurica (Gebler, 1832)

Silpha daurica Gebler, 1832: 48.
Blitophaga velutina Portevin, 1943: 47; **syn. n.**

Type material examined. **LT** female of *Silpha daurica* (MNHN, coll. generale; here designated), labelled "Daurica / Gebler / Daourie Type [hw; according to N. Berti (personal communication), not original label of Gebler, but later re-written by an anonymous person] // TYPE [p, red label] // MUSEUM PARIS / Coll. A. Grouvelle 1917 [p] // LECTOTYPE (female symbol) / Silpha / daurica Gebler, 1832 / Jan Růžička design. 2002 [p, red label] // Aclypea / daurica / (Gebler, 1832) / Jan Růžička det. 2002"; **PLT** male (MNHN, coll. generale), labelled "TYPE [p, red label] // MUSEUM PARIS / Coll. A. Grouvelle 1917 [p] // PARALECTOTYPE (male symbol) / Silpha / daurica Gebler, 1832 / Jan Růžička design. 2002 [p, red label] // Aclypea / daurica / (Gebler, 1832) / Jan Růžička det. 2002".

LT male of *Blitophaga velutina* (MNHN, coll. generale; here designated), labelled "[small square red label] // Inn Shan / Mongol. [p] // B. velutina / nov. sp. [hw, Portevin's MS] // TYPE [p, red label] // Museum Paris [p] / Coll. Grouvelle [hw] // LECTOTYPE (male symbol) // Blitophaga / velutina Portevin, 1943 / Jan Růžička design. 2002 [p, red label] // Aclypea / daurica (Gebler, 1932) / Jan Růžička det. 2002 [p]"; **PLT** female (MNHN, coll. generale), labelled "[small square red label] // Inn Shan / Mongol. [p] // daurica / Gebler [hw] / compare au TYPE [p, red characters] // TYPE [p, red label] // Museum Paris [p] / Coll. / Grouvelle [hw] // PARALECTOTYPE (female symbol) // Blitophaga / velutina Portevin, 1943 / Jan Růžička design. 2002 [p, red label] // Aclypea / daurica (Gebler, 1932) / Jan Růžička det. 2002 [p]"; **PLT** male (MNHN, coll. generale), labelled "[small square red label] // Inn Shan / Mongolei [p] // daurica / Gebl. [hw] // TYPE [p, red label] // MUSEUM PARIS / Coll. A. GROUVELLE 1915 [p] // PARALECTOTYPE (male symbol) // Blitophaga / velutina Portevin, 1943 / Jan Růžička design. 2002 [p, red label] // Aclypea / daurica (Gebler, 1932) / Jan Růžička det. 2002 [p]"; **PLT** 2 females (MNHN, coll. generale), labelled "[small square red label] // TYPE [p, red label] // Museum Paris [p] / Iun Sthan / Mongolie / Coll. Grouvelle [hw] // PARALECTOTYPE (female symbol) // Blitophaga / velutina Portevin, 1943 / Jan Růžička design. 2002 [p, red label] // Aclypea / daurica (Gebler, 1932) / Jan Růžička det. 2002 [p]"; **PLT** 4 males, 2 females (MNHN, coll. generale), labelled "TYPE [p, red label] // MUSEUM PARIS [p] / Iun Sthan / Mongolie [hw] / Coll. A. Grouvelle 1915 [p] // PARALECTOTYPE (male or female symbol) // Blitophaga /

velutina Portevin, 1943 / Jan Růžička design. 2002 [p, red label] // Aclypea / daurica (Gebler, 1932) / Jan Růžička det. 2002 [p]"; other material: 1 male, 2 females (NMPC), labelled "Inn Shan / Mongolei [p]".

Comments. *Aclypea daurica* is known from Eastern Siberia to Far East of Russia, China and Korea (Cho & Lee 1992, Schawaller 1996).

Portevin (1943) described *Blitophaga velutina* from "Mongolie: Iun Sthan", printed locality labels bears also "Inn Shan". According to Schütze & Kleinfeld (1997), this locality is In Shan north of Baotou, a part of Yin Shan mountains in China: Nei Mongol autonomous region. Portevin (1943) described this species based on an unknown number of specimens, and differs from similar *Aclypea daurica* (treated as *Blitophaga daurica* in Portevin 1943) by larger body size, long yellowish pubescence of upper surface and sparser and more superficial punctation of elytra. In the same paper, Portevin (1943) included a note, concerning the identity of *A. daurica* and mentioned that he studied two syntypes from coll. Mniszech, and that the description of this species in his previous revision (Portevin 1926) was that of his newly described *Blitophaga velutina*. Schawaller (1996) did not study types of *B. velutina* and only noted (on p. 9) the possible synonymy of this species with *Aclypea opaca* (Linnaeus, 1758).

I have studied two syntypes of *Aclypea daurica* (probably those mentioned by Portevin 1943), the specimen bearing the locality label is designated here as a lectotype, the second specimen as a paralectotype. Further, I have examined a series of syntype specimens of *Blitophaga velutina*, the first specimen bearing Portevin's original determination label is designated here as a lectotype, the remaining ten specimens as paralectotypes. Further, syntopic specimens (bearing identical printed locality labels as the lectotype and two of the paralectotypes) probably not belonging to the original syntype series were found also in NMPC. Types of *Aclypea daurica* are identical in my opinion with *Blitophaga velutina*, having similar habitus and bearing four glabrous spots on pronotum and similar punctation of elytra. All specimens of *B. velutina* are covered dorsally with dense, recumbent, yellow setation; which is sparser and dark brown in both types of *Aclypea daurica*. In my opinion, these changes have been caused by handling both these very old specimens, further specimens of *A. daurica* studied from Far East of Russia, Korea and China from JRUC, JSCC, MNHN and NMPC have dorsum covered with dense, yellow setation similar to that of the types of *Blitophaga velutina*. These differences, which reflect in my opinion only different handling of the material, probably led Portevin (1943) to describe *B. velutina*.

Consequently, I consider *Blitophaga velutina* Portevin, 1943 as a junior subjective synonym of *Aclypea daurica* (Gebler, 1832).

Aclypea opaca (Linnaeus, 1758)

Silpha opaca Linnaeus, 1758: 361.
Silpha hirta Herbst, 1783: 34.
Blitophaga opaca var. *samnitica* Fiori, 1899: 161; **syn. n.**

Type material examined. **LT** male of *Blitophaga opaca* var. *samnitica* (ZMHB; here designated), labelled "ABRUZZO [p] / G. Sasso / VII. [18]94 [hw] / A. FIORI [p, label with black frame] // Blitophaga / v. samnitica [hw] // LECTOTYPE (male symbol) / Blitophaga opaca / var. samnitica Fiori, 1899 // Jan Růžička design. 2002 [p, red label] // Aclypea / opaca / (Linnaeus, 1758) / Jan Růžička det. 2002 [p]"; **PLT** female (ZMHB), labelled "ABRUZZO [p] / G. Sasso / VII. [18]94 [hw] / A. FIORI [p, label with black frame] // PARALECTOTYPE (female symbol) / Blitophaga opaca / var. samnitica Fiori, 1899 // Jan Růžička design. 2002 [p, red label] // Aclypea / opaca / (Linnaeus, 1758) / Jan Růžička det. 2002 [p]"; **PLT** female (ZMHB), labelled "ABRUZZO / GRAN SASSO / LUG. [18]9 [p] 6 [hw] / A. FIORI [p, label with black frame] // PARALECTOTYPE (female symbol) / Blitophaga opaca / var. samnitica Fiori, 1899 // Jan Růžička design. 2002 [p, red label] // Aclypea / opaca / (Linnaeus, 1758) / Jan Růžička det. 2002 [p]".

Additional material examined. 1 female (ZMHB), labelled "ABRUZZO [p] // C. [= Campo] pericoli / 18. VII. [1]907 [hw] / A. FIORI [p]"; 1 female (ZMHB), labelled "ABRUZZO [p] / C. [= Campo] imperiale / 20. VII. [1]907 [hw] / A. FIORI [p]"; 1 female (ZMHB), labelled "Italien, Abruzzen / Gran Sasso / Ing. Meschnigg [p] // Blitophaga / opaca / v. samnitica [hw] / det. / Ing. Meschnigg [p]".

Comments. *Aclypea opaca* is a widely distributed Holarctic species (Schawaller 1996).

The binomen *Silpha hirta* is attributed to Schaeffer (1769) in the literature (e.g., Hatch 1928). However, Schaeffer's paper does not cite a binominal and contains only trivial names and consecutively numbered (in Latin and German) species figured on plates. On plate 93, under figure VI, the name "Peltis octava. Achter Geißerkäfer." is provided. Herbst (1783) was first to use the binomen *Silpha hirta* to describe species of carrion beetle from Berlin with yellow pubescence on dorsum.

Consequently, Johann Friedrich Wilhelm Herbst should be treated as the author of *Silpha hirta*, and 1783 as the year of publication. Following Hatch (1928), I consider *Silpha hirta* Herbst, 1783 as a junior subjective synonym of *Aclypea opaca* (Linnaeus, 1758).

Fiori (1899) described *Blitophaga opaca* var. *samnitica*, based on an unknown number of specimens from Italy: Gran Sasso, differing mainly in smaller body size with shorter and more recumbent setation of the dorsum, and denser and finer punctation of elytra with larger punctures along costae. I have examined three syntypes from ZMHB (the male specimen is designated here as a lectotype, two females as paralectotypes) and additional topotypic specimens. Except for the small body size (9.0 – 10.0 mm, 9.0 mm in the lectotype), other characters mentioned by Fiori (1899) are very similar to specimens of *Aclypea opaca* from central Europe.

Consequently, I consider *Blitophaga opaca* var. *samnitica* Fiori, 1899 as a junior subjective synonym of *Aclypea opaca* (Linnaeus, 1758).

Dendroxena quadrimaculata (Scopoli, 1772)

Silpha quadrimaculata Scopoli, 1772: 86.
Silpha quadripunctata var. *hexapunctata* Gerhardt, 1897: 204; **syn. n.**

Comments. *Dendroxena quadrimaculata* is a widely distributed Palaearctic species, known from Europe to eastern Siberia (Portevin 1926 sub *Xylodrepa quadripunctata*, Nikolaev & Kozminykh 2002). Madge & Pope (1969) discussed the validity of *Dendroxena quadrimaculata* (Scopoli, 1772) over *Xylodrepa quadripunctata* (Schreber, 1759).

Gerhard (1897) mentioned, in a paper devoted mostly to the distribution of beetles in Silesia, two specimens of *Dendroxena quadrimaculata* from Stephansdorf near Neumarkt with aberrant coloration of elytra (apex bearing additional pair of brown-black, semilunar maculae) and named them as *Silpha quadripunctata* var. *hexapunctata*. His note clearly indicates he is commenting on individual colour variation.

Consequently, I consider *Silpha quadripunctata* var. *hexapunctata* Gerhardt, 1897 as a junior subjective synonym of *Dendroxena quadrimaculata* (Scopoli, 1772).

Heterotemna figurata (Brullé, 1839)

Silpha costata Brullé, 1836: pl. II, fig. 11.
Silpha figurata Brullé, 1839: 59.

Comments. Brullé (1836–1840) described *Silpha figurata* from Tenerife in the text on page 59. However, in a caption under plate II, Brullé used the name *Silpha costata* for fig. 11, illustrating the same species. Although the text concerning these insects was published in five parts between June and November 1839, plate II was published in November 1836 (both according to Stearn 1937:

55). The figure was not cited in the text, but following Article 12.2.7. of ICZN (1999), the taxon *S. costata* should be considered as described by indication.

Unfortunately, *Silpha costata* Brullé, 1836 is a junior primary homonym of *Silpha costata* Ménétries, 1832, treated here as a junior subjective synonym of *Silpha obscura obscura* Linnaeus, 1758 (see below under *Silpha obscura obscura* Linnaeus, 1758).

Consequently, I consider *Silpha figurata* Brullé, 1839 as the valid name (now in combination with *Heterotemna* Wollaston, 1864) for this species endemic to Canary Islands: Tenerife, and I consider the name *Silpha costata* Brullé, 1836 as its senior objective synonym, not available due to homonymy with *Silpha costata* Ménétries, 1832.

Heterotemna tenuicornis (Brullé, 1836), stat. n.

Silpha tenuicornis Brullé, 1836: pl. II, fig. 10.
Silpha simplicicornis Brullé, 1839: 59; **syn. n.**

Comments. Brullé (1836–1840) described *Silpha simplicicornis* from Tenerife in the text on page 59. However, in a caption under plate II, Brullé used the name *Silpha tenuicornis* for fig. 10, illustrating the same species. Although the text concerning these insects was published in five parts between June and November 1839, plate II was published in November 1836 (both according to Stearn 1937: 55). The figure was not cited in the text, but following Article 12.2.7. of ICZN (1999), the taxon *S. tenuicornis* should be considered as described by indication.

The name *S. simplicicornis* does not meet the condition of Article 23.9.1.2. of the ICZN (1999), i.e., not cited in 25 publications, and thus the Principle of priority should be followed.

Consequently, I consider *Silpha tenuicornis* Brullé, 1836 as the valid name (now in combination with *Heterotemna* Wollaston, 1864) for this species endemic to Canary Islands: Tenerife, and I consider the name *Silpha simplicicornis* Brullé, 1839 as its junior objective synonym.

Oiceoptoma thoracicum (Linnaeus, 1758)

Silpha thoracica Linnaeus, 1758: 360.
Oiceoptoma collaris: Motschulsky 1859: 491; **nomen nudum**.

Comments. *Oiceoptoma thoracicum* is a common species, distributed throughout the Palaearctic region (Portevin 1926, Nikolaev & Kozminykh 2002).

Motschulsky (1859) mentioned the name *O. collaris* as a possible junior synonym of *O. thoracicum* (Linnaeus, 1758) and attributed the name to "Esch." (i.e. to Johann Friedrich Eschscholtz), but without any description or indication.

Consequently, I consider the name *Oiceoptoma collaris* only as a nomen nudum, unavaible in terms of Article 12.1. of ICZN (1999), although listed as a variety of *Oiceoptoma thoracicum* in the literature (e.g., by Kraatz 1876: 372).

Phosphuga atrata atrata (Linnaeus, 1758)

Silpha atrata Linnaeus, 1758: 360.
Silpha cassidea: Dahl 1823: 27; **nomen nudum**.
Phosphuga cassidea Kraatz, 1876: 362; **syn. n.**
Peltis atrata var. *subparalella* Reitter, 1884: 76; **syn. n.**
Peltis (*Phosphuga*) *atrata* var. *rostrata* Reitter, 1888: 153; **syn. n.**
Phosphuga atrata borsodensis Depoli, 1931: 17; **syn. n.**
Phosphuga atrata lombarda Depoli, 1931: 17; **syn. n.**

Type material examined. **LT** male of *Peltis atrata* var. *subparalella* (MNHN, coll. generale; here designated), labelled "Caucas. [p, red label] // v. subparalella m. [hw, Reitter's MS] // TYPE [p, red label] // MUSEUM PARIS / Coll. A. GROUVELLE 1915 [p] // LECTOTYPE (male symbol) / Peltis atrata / var. subparalella Reitter, 1884 / Jan Růžička design. 2002 [p, red label] // Phosphuga / atrata atrata / (Linnaeus, 1758) / Jan Růžička det. 2002 [p]".

LT male of *Peltis atrata* var. *rostrata* (MNHN, coll. generale; here designated), labelled "Caucas. occ. / Circassien / Leder, Reitter [p] // Phos. atrata / v. rostrata / m. 1888 [hw, Reitter's MS] // 254 [p] // TYPE [p, red label] // MUSEUM PARIS / Coll. A. GROUVELLE 1915 [p] // LECTOTYPE (male symbol) / Peltis (Phosphuga) atrata / var. rostrata Reitter, 1888 / Jan Růžička design. 2002 [p, red label] // Phosphuga / atrata atrata / (Linnaeus, 1758) / Jan Růžička det. 2002 [p]".

Comments. *Phosphuga atrata atrata* is a widely distributed Palaearctic taxon (Portevin 1926, Nikolaev & Kozminykh 2002).

The name *Silpha cassidea* was only listed in Dahl (1823), with Dahl cited as author of this taxon. A locality "Ban." [= Banat] was attached, but without any description or further indication. Kraatz (1876) was the first who mentioned "die noch unbeschriebene [*Phosphuga*] *cassidea* Dahl" indicating Dahl as the author of this taxon. Further, he shortly described differences between *Phospuga atrata* (Linnaeus, 1758) and *P. cassidea*; the latter characterized as larger, with wide elytral epipleuron. He also mentioned the (unpublished) text on a label under one specimen of *P. cassidea* received from Georg Dahl, treating *P. cassidea* as a form very similar to *P. atrata*. Consequently, Gustav Kraatz should be treated as the author of *P. cassidea*, and 1876 as the year of publication (the second volume of Deutsche Entomologische Zeitschrift was published in "Februar 1876", according to the editorial note on p. III). Kraatz (1876) did not precisely state the systematic position of *P. cassidea*, and Reitter (1884) treated this taxon only as *Peltis atrata* var. *cassidea*. Later, Depoli (1931) changed its position and mentioned this name as a subspecies of *Phosphuga atrata*.

Reitter (1884) described *Peltis atrata* var. *subparalella* from "Caucasus, Sibirien", based on an unknown number of specimens each with a parallel, black and lustrous body. Mroczkowski (1955) changed position of this taxon and treated it as *Phosphuga atrata subparalella*. The syntype specimen examined (designated here as a lectotype) is parallel and distinctly flattened, large in size (combined length of pronotum and elytra 13.5 mm).

Reitter (1888) described *Peltis atrata* var. *rostrata* from "Circassien", based on an unknown number of small specimens each with distinctly vaulted body, with sparsely punctured and darkly setose abdomen. The syntype specimen examined (designated here as a lectotype) is distinctly vaulted and very small in size (combined length of pronotum and elytra only 8.5 mm).

Depoli (1931) described *Phosphuga atrata borsodensis* from Hungary: Borsod comitat: Miskolc, based on an unknown number of specimens similar to *P. atrata cassidea*, but differing in elytral epipleuron constricted basally, flattened and wide apically. According to personal communication of R. Fabbri and G. Burgio (curator of entomology at IEUS), no type specimen(s) of *P. atrata borsodensis* were found in the coll. G. Leoni, deposited in IEUS.

Depoli (1931) described *Phosphuga atrata lombarda* from Italy: Lombardia, based on an unknown number of specimens similar to *P. atrata* var. *subparalella*, mainly characterized by pronotum slightly wider than parallel, flattened elytra with coarse surface and reduced costae. Again, according to personal communication of R. Fabbri and G. Burgio (curator of entomology at IEUS), no type specimen(s) of *P. atrata lombarda* were found in the coll. G. Leoni, deposited in IEUS.

In my opinion, differences given by Reitter (1884, 1888) and Depoli (1931) describe only individual variation within the very variable *P. atrata atrata*, mixture of these characters occur sometimes in syntopic specimens within the same population (J. Růžička, unpublished observation). Consequently, I consider *Phosphuga cassidea* Kraatz, 1876, *Peltis atrata* var. *subparalella* Reitter, 1884, *Peltis atrata* var. *rostrata* Reitter, 1888, *Phosphuga atrata borsodensis* Depoli, 1931 and *Phos-*

phuga atrata lombarda Depoli, 1931 as junior objective synonyms of *Phosphuga atrata atrata* (Linnaeus, 1758).

Silpha carinata Herbst, 1783

Silpha carinata Herbst, 1783: 34.
Silpha italica Küster, 1851: no. 15; **syn. n.**
Silpha lunata var. *austriaca* Otto, 1891: 59; **syn. n.**
Silpha carinata var. *blattiformis* Reitter, 1901: 121; **syn. n.**

Comments. *Silpha carinata* is a widely distributed Palaearctic species, known from Europe to Siberia (Šustek 1983). This polymorphic species was reviewed by Šustek (1983), who treated several names as junior subjective synonyms of *S. carinata*, and discussed the variability of this species in relation to altitude and length of vegetation period within its distributional area.

Küster (1851) described a large, black, vaulted specimen from "Italia" as *Silpha italica*. Otto (1891) described small, black, vaulted specimens from "Ostalpen" as *Silpha lunata* var. *austriaca*. Šustek (1983) treated both these names as valid subspecies of *S. carinata*, although he argued that they are only ecomorphs of this species. Further, he introduced the following evolutionary scenario (however, without any exact chronology): montane populations of *S. carinata austriaca* (with small, black, vaulted body) from central European mountain systems penetrated into Italy, where they become *S. carinata italica* (with larger body, but still black and heavy vaulted in comparison to lowland populations of *S. carinata carinata* from the rest of Europe, also more flattened and usually with at least some brownish coloured individuals). In my opinion, it is not possible to distinguish morphologically both ecomorphs delimited by Šustek (1983) from *S. carinata carinata*. Moreover, the mountain populations of the Alps, Bohemian massif and the Carpathians are not reproductively isolated from populations from neighbouring areas; body size decreases with increase in altitude (as already demonstrated by Šustek 1983), and the vaulting of elytra in central European populations is not correlated with body size.

Reitter (1901) described large, elongate, black, distinctly flattened specimens with less developed costae from "Turkestan" (probably from the territory of nowadays Kazakhstan) as *Silpha carinata* var. *blattiformis*. Šustek (1983) treated it as a junior subjective synonym of *S. carinata carinata*, but Nikolaev & Kozminykh (2002) recently removed it from synonymy with *S. carinata carinata* and treated it as *S. carinata blattiformis*. I have examined specimens from Kazakhstan (deposited in JRUC and JSCC) and considered that except for the more flattened elytra with weakly developed costae, other characters mentioned by Reitter (1901) fall within the variation of European populations of *S. carinata*.

Consequently, I consider *Silpha carinata italica* Küster, 1851, *Silpha carinata austriaca* Otto, 1891 and *Silpha carinata blattiformis* Reitter, 1901 as junior subjective synonyms of *Silpha carinata* Herbst, 1783.

Silpha melanura Hope, 1831

Silpha melanura Hope, 1831: 21.
Silpha nakanei Emetz et Schawaller, 1975: 227; **syn. n.**

Type material examined. **HT** male of *Silpha melanura* (BMNH), labelled "Type [round label with red margin] // Nepal. [yellow label] // Hardw. / Bequest // melanura Hope [hw]".
Additional material examined. 1 male, 1 female (JRUC): "Nepal: Kathmandu distr., Siwapuri Dara, 2300–2550 m, 29.iv. –2.v.1985, A. Smetana leg."; 1 male, 1 female (JRUC): "Nepal: Bagmati, Sindhupalchok: Manegero, 2100–2500 m, 12. –14.vi.1989, C. Holzschuh leg.".

Comments. Hope (1831) briefly described *Silpha melanura* from "Nepaul". Portevin (1922) transferred *S. melanura* to *Eusilpha* Semenov, 1891, based on written comments on the type specimen received from M. H. E. Andrewes. Emetz & Schawaller (1975) described *Silpha nakanei* from Nepal: Khurumsang, based on a single male specimen. Later, Schawaller (1982) published further records of *S. nakanei* and commented that this species only occurs in the Kathmandu valley and Nuwakot distr., and compared this species with other three endemic Nepalese species of *Silpha* Linnaeus, 1758.

I have compared the holotype of *S. melanura* with recently collected material from Nepal and with the description of *S. nakanei*, and found both taxa identical in all diagnostic characters (according to the key in Schawaller 1982) – elongate body; heavily punctate head in the region between eyes; distinctly puncate median part of pronotum; elytra with distinctly developed ridges, separated by intervals of equal width.

Consequently, I consider *Silpha nakanei* Emetz et Schawaller, 1975 as a junior subjective synonym of *Silpha melanura* Hope, 1831.

Silpha obscura obscura Linnaeus, 1758

Silpha obscura Linnaeus, 1758: 361.
Silpha costata Ménétries, 1832: 167 (non Brullé, 1836: pl. II, fig. 11); **confirmed synonymy**.
Silpha striola Ménétries, 1832: 168; **confirmed synonymy**.
Silpha godarti Reiche, 1861: 369; **syn. n.**
Silpha obscura var. *simplex* Semenov, 1891: 297; **syn. n.**
Silpha nitida Portevin, 1907: 252 (non Faldermann, 1835a: 220); **syn. n.**
Silpha obscura latialis Depoli, 1931: 14; **syn. n.**
Silpha obscura ablattaroides Portevin, 1943: 48; **syn. n.**
Silpha obscura mongolica Schawaller, 1980: 9 (non Faldermann, 1835b: 365); **syn. n.**

Type material examined. **LT** male of *Silpha costata* (ZISP), labelled "Cauc. [p, orange paper] // costata / Ménétr. [hw, Ménétries's MS, label with printed double black frame] // ZOOLOGICAL INSTITUTE / Russian Academy / of Sciences, / ST. PETERSBURG, RUSSIA [p, yellow label] // LECTOTYPE (male symbol) / Silpha / costata Ménétries, 1832 / Jan Růžička det. 2002 [p, red label] // Silpha / obscura obscura / Linnaeus, 1758 / Jan Růžička det. 2002 [p]".

LT male of *Silpha striola* (ZISP), labelled "Cauc. [hw] // striola / Ménétr. [hw, Ménétries's MS, label with printed double black frame] // ZOOLOGICAL INSTITUTE / Russian Academy / of Sciences, / ST. PETERSBURG, RUSSIA [p, yellow label] // LECTOTYPE (male symbol) / Silpha / striola Ménétries, 1832 / Jan Růžička det. 2002 [p, red label] // Silpha / obscura obscura / Linnaeus, 1758 / Jan Růžička det. 2002 [p]".

HT male of *Silpha obscura* var. *simplex* (ZISP), labelled "Sibir. occ. [p] / Kolb [hw, green label] // Silpha obscura, var. / simplex m. (in litt.) / (male symbol) un. cAS.XI.[18]90 [hw, Semenov's MS, label with light blue lines and columns] // Coll. Semenov-Tian-Shansky [p] // ZOOLOGICAL INSTITUTE / Russian Academy / of Sciences, / ST. PETERSBURG, RUSSIA [p, yellow label] // HOLOTYPE (male symbol) / Silpha obscura / var. simplex Semenov, 1891 / label added by Jan Růžička, 2002 [p, red label] // Silpha / obscura obscura / Linnaeus, 1758 / Jan Růžička det. 2002 [p]".

LT male of *Silpha nitida* (MNHN, coll. M. Pic / G. Portevin; here designated), labelled "Kashmir [hw] // Silpha / nitida mihi (male symbol) [hw, Portevin's MS] // s. esp. de / obscura / L. [hw, Pic's MS] // LECTOTYPE (male symbol) / Silpha / nitida Portevin, 1907 / Jan Růžička design. 2002 [p, red label] // Silpha / obscura obscura / Linnaeus, 1758 / Jan Růžička det. 2002 [p]"; **PLT** 1 female (BMNH), labelled "Type [round label with red margin] // Kashmir [hw] // Silpha / nitida Port. [hw] // Andrewes / Request / B. M. 1922–221. [p] // PARALECTOTYPE (female symbol) / Silpha / nitida Portevin, 1907 / Jan Růžička design. 2002 [p, red label] // Silpha / obscura obscura / Linnaeus, 1758 / Jan Růžička det. 2002 [p]"; **PLT** 1 female (BMNH), the same labels except "Co- / type [round label with green margin]".

LT female of *Silpha obscura latialis* (IEUS; here designated), labelled "UMBRIA / Poggio Mirteto / G. Leoni [p] // v. [sic!] latialis / m. [hw, Depoli's MS] / G. Depoli det. [p] // LECTOTYPE (female symbol) / Silpha obscura / latialis Depoli, 1931 / Jan Růžička design. 2002 [p, red label] // Silpha / obscura obscura / Linnaeus, 1758 / Jan Růžička det. 2002 [p]".

HT male of *Silpha obscura ablattaroides* (MNHN, coll. generale), labelled "Utsch-Déré / Caucasus / STARCK DEDIT [p, label with black frame] // S. obscura / subsp. ablattaroides / m. [hw, Portevin's MS] // TYPE [p, red label] // Museum Paris [p] // Silpha / obscura obscura / Linnaeus, 1758 / Jan Růžička det. 2002 [p]".

Comments. *Silpha obscura* is a widely distributed Palaearctic species, known from Europe to eastern Siberia (Schawaller 1980). Schawaller (1980) reviewed this polymorphic species and recognized six valid subspecies; he treated other associated names as junior synonyms (see Schawaller 1980: 7–8 for details). Recently, Nikolaev & Kozminykh (2002) changed position of two names, established as valid by Schawaller (1980).

Ménétries (1832) described *Silpha costata* from Lenkoran, based on an unknown number of specimens. He characterized it as having distinctly punctured, flat elytra with distinctly marked costae. *S. costata* Ménétries, 1832 is a senior primary homonym of *S. costata* Brullé, 1836 (treated here as a objective synonym of *S. figurata* Brullé, 1839, see discussion under *Heterotemna figurata* above). *Silpha costata* Ménétries, 1832 was usually treated as a variety of *S. obscura* Linnaeus, 1758 (e.g. by Portevin 1926), Schawaller (1980) considered it as a junior synonym of *S. obscura obscura*. Recently, Nikolaev & Kozminykh (2002) followed the old meaning of Reitter (1884), and changed position of *S. costata* Ménétries, 1832 to that of a variety of *S. tristis* Illiger, 1789. I have examined the syntype of *S. costata* Ménétries, 1832 (designated here as a lectotype) and considered it identical with *S. obscura obscura* from central Europe.

Ménétries (1832) described *Silpha striola* from "Caucase", based on an unknown number of specimens. He characterized it as having a black body, finely punctate dorsum and only finely marked elytral costae. Portevin (1926) treated this taxon only as *S. obscura* var. *striola*. Schawaller (1980) considered this name as a junior subjective synonym of *S. obscura obscura*, naming populations from Caucasus and north-western Iran incorrectly as *S. obscura nitida* (described from Kashmir, see below). Nikolaev & Kozminykh (2002) pointed out this error, and changed position of *S. striola* to that of a valid subspecies of *S. obscura*, distributed in southern Russia, Caucasus and Transcaucasia. I examined a syntype of *S. striola* (designated here as a lectotype) and many specimens deposited in JRUC, JSSC and NMPC, coming from Caucasus and the Transcaucasia, and consider the variation in elytral structure similar to that of some specimens of *S. obscura obscura* from central Europe; also the curvature of the inner margin of the paramera and extent of preapical lateral constriction of aedeagus (character pointed out by Schawaller 1980) are variable, overlapping with some central European specimens of *S. obscura obscura*.

Reiche (1861) described *Silpha godarti* from Crimea, based on an unknown number of specimens. He distinguished it from similar *S. orientalis* Brullé, 1832 as having a larger body and denser and finer punctation of elytra. Later, Portevin (1926) treated this name only as a variety of *S. orientalis*. Schawaller (1980) changed position of *S. orientalis* to that of a subspecies of *S. obscura*, applied to populations from south Europe to Near East. He listed *S. godarti* as a junior synonym of *S. obscura orientalis*, but figured the presence of *S. obscura obscura* from Ukraine (incl. Crimea) on distributional map of *S. obscura*. I have examined a large specimen from Crimea (deposited in JRUC) and find no substantial differences between them and *S. obscura obscura* from central Europe.

Semenov (1891) described *Silpha obscura* var. *simplex*, based on a single specimen from "Altai mer., montes Kolbinenses". He distinguished it from the nominotypical form mainly by very slightly indicated elytral costae. Later, Schawaller (1980) treated this name as *S. obscura simplex* and applied it for populations from the environs of the Balkhash lake. Recently, Nikolaev & Kozminykh (2002) discussed briefly its status and speculated about its probable position as a junior synonym of *S. obscura obscura*. I have examined the holotype of *S. obscura* var. *simplex* and followed the

opinion of Nikolaev & Kozminykh (2002), as the holotype specimen is very similar to some specimens of *S. obscura obscura* from central Europe.

Portevin (1907) described specimens from Kashmir as *Silpha nitida*, based mostly on the punctation on pronotum and elytra. However, this name is a junior primary homonym of *Silpha nitida* Faldermann, 1835 (recently treated as a junior subjective synonym of *Phosphuga atrata atrata* (Linnaeus, 1758)). Portevin (1926) changed the status of *Silpha nitida* Portevin, 1907 to that of a subspecies of *S. obscura*. Schawaller (1980) followed the subspecies status of this name. However, he applied this name to populations of *S. obscura* from Caucasus, treating other material from Kashmir as belonging to *S. obscura obscura*. I have examined material of *S. obscura* from Kashmir (incl. syntypes of *S. nitida*; the male from MNHN bearing the original Portevin's determination label is designated here as a lectotype, two female syntypes from BMNH as paralectotypes). I have found no important differences between these populations and other material of *S. obscura obscura* from central Europe, Afghanistan and Pakistan (for material, see Růžička & Schneider 2002).

Depoli (1931) described *Silpha obscura latialis*, based on an unknown number of specimens from Italy: Roma and Poggio Mirteto. His description stressed the more rounded elytra with wider elytral epipleuron, and surface of elytra with larger punctures than in material from Piemonte. I have examined a single syntype specimen from coll. G. Leoni, coming from Poggio Mirteto (designated here as a lectotype). The specimen has distinctly rounded elytra, and slightly larger punctation on elytra, but otherwise is identical with *S. obscura obscura*.

Portevin (1943) described *Silpha obscura ablattaroides*, based on a single specimen from "Caucase: Utsch-Deré". He differentiated it from *S. obscura* var. *striola* by extremely smooth elytra, and fully reduced inner two pairs of costae. I have studied a holotype specimen, which has a distinctly smooth dorsal surface, with costae reduced only to marked lines on elytral surface, with large, densely arranged, round punctures. In my opinion, this specimen is only an extreme case of individual variation in *S. obscura obscura*.

Schawaller (1980) described *Silpha obscura mongolica*, based on a holotype specimen from Irkutsk and two paratypes from environs of Kuldscha. His taxon has a similar elytral surface as *S. oscura obscura*, but differs in the shape of aedeagus (subapically constricted median lobe and more curved apex of parameres). However, this name is a junior primary homonym of *S. mongolica* Faldermann, 1835 (recently treated as a junior subjective synonym of *S. perforata* Gebler, 1832). Recently, Nikolaev & Kozminykh (2002) discussed briefly status of *S. obscura mongolica* Schawaller, 1980 and speculated about its probable position as a junior synonym of *S. obscura obscura*. I have examined specimens (deposited in JRUC, JSSC and NMPC) of *S. obscura* from southwestern Siberia (Barnaul), eastern Siberia (Baikal lake) and China: Xinjiang Uygur autonomous region (incl. environs of Kuldscha, nowadays Yining; topotypic with paratypes of Schawaller 1980). The characters provided by Schawaller (1980) are variable, subapical constriction of median lobe of aedeagus is found also in some specimens of *S. obscura obscura* from central Europe.

Consequently, I consider *Silpha costata* Ménétries, 1832, *Silpha striola* Ménétries, 1832, *Silpha obscura* var. *simplex* Semenov, 1891, *Silpha nitida* Portevin, 1907 (applied to populations from Kashmir), *Silpha obscura latialis* Depoli, 1931 and *Silpha obscura ablattaroides* Portevin, 1943 as junior subjective synonyms of *Silpha obscura obscura* Linnaeus, 1758. Further, I remove *Silpha godarti* Reiche, 1861 from synonymy with *Silpha obscura orientalis* Brullé, 1832 and consider it as a junior subjective synonym of *Silpha obscura obscura* Linnaeus, 1758.

Silpha olivieri Bedel, 1887

Silpha olivieri Bedel, 1887: 196.
Silpha olivieri aquilana Depoli, 1931: 16; **syn. n.**
Silpha olivieri sardoa Depoli, 1931: 16; **syn. n.**

Type material examined. **LT** male of *Silpha olivieri aquilana* (IEUS; here designated), labelled "ABRUZZI / Cerchio / G. Leoni [p] // v. [sic!] aquilana / m. [hw, Depoli's MS] / G. Depoli det. [p] // LECTOTYPE (male symbol) / Silpha olivieri / aquilana Depoli, 1931 / Jan Růžička design. 2002 [p, red label] // Silpha / olivieri / Bedel, 1887 / Jan Růžička det. 2002 [p]"; **PLT** 2 females (IEUS), labelled "ABRUZZI / Cerchio / G. Leoni [p] // PARALECTOTYPE (female symbol) / Silpha olivieri / aquilana Depoli, 1931 / Jan Růžička design. 2002 [p, red label] // Silpha / olivieri / Bedel, 1887 / Jan Růžička det. 2002 [p]"; **PLT** female (IEUS), labelled "Cerchio / Abruzzo [p] // PARALECTOTYPE (female symbol) / Silpha olivieri / aquilana Depoli, 1931 / Jan Růžička design. 2002 [p, red label] // Silpha / olivieri / Bedel, 1887 / Jan Růžička det. 2002 [p]"; **PLT** male (IEUS), labelled "Cerchio / Abruzzo [hw] // PARALECTOTYPE (male symbol) / Silpha olivieri / aquilana Depoli, 1931 / Jan Růžička design. 2002 [p, red label] // Silpha / olivieri / Bedel, 1887 / Jan Růžička det. 2002 [p]".

LT female of *Silpha olivieri sardoa* (IEUS; here designated), labelled "ITALIA [p] / Sardegna [hw] / G. Leoni [p] // v. [sic!] sardoa / m. [hw, Depoli's MS] / G. Depoli det. [p] // LECTOTYPE (female symbol) / Silpha olivieri / sardoa Depoli, 1931 / Jan Růžička design. 2002 [p, red label] // Silpha / olivieri / Bedel, 1887 / Jan Růžička det. 2002 [p]"; **PLT** 2 males (IEUS), labelled "ITALIA [p] / Sardegna [hw] / G. Leoni [p] // PARALECTOTYPE (male symbol) / Silpha olivieri / sardoa Depoli, 1931 / Jan Růžička design. 2002 [p, red label] // Silpha / olivieri / Bedel, 1887 / Jan Růžička det. 2002 [p]"; **PLT** female (IEUS), labelled "ITALIA [p] / Sardegna / S. Lussurgiu [hw] / G. Leoni [p] // PARALECTOTYPE (female symbol) / Silpha olivieri / sardoa Depoli, 1931 / Jan Růžička design. 2002 [p, red label] // Silpha / olivieri / Bedel, 1887 / Jan Růžička det. 2002 [p]".

Comments. *Silpha olivieri* is a widely distributed Mediterranean species (Portevin 1926, Piłońa et al. 2002).

Depoli (1931) described *Silpha olivieri aquilana* based on an unknown number of specimens from Italy: Aquila: Cerchio. His description indicate a smaller and more flattened body and finer punctation on elytra in comparison with the nominotypical subspecies. I have studied a series of syntype specimens from coll. G. Leoni, the specimen bearing the original Depoli's determination label is designated here as a lectotype, the remaining four specimens as paralectotypes. All specimens are smaller (combined length of pronotum and elytra is 14–16 mm, 15 mm in the lectotype), but otherwise similar to specimens from coll. G. Leoni, determined by G. Depoli as *S. olivieri*.

Depoli (1931) described *Silpha olivieri sardoa* based on an unknown number of specimens from Italy: Sardinia. His description indicate paler coloration of elytra and more rugose interstries with more superficial punctation of elytra in comparison with the nominotypical form. I have studied a series of syntype specimens from coll. G. Leoni, the first specimen bearing the original Depoli's determination label is designated here as a lectotype, the remaining three specimens as paralectotypes. All specimens are black in colour, with similar punctation on elytra as specimens from coll. G. Leoni, determined by G. Depoli as *S. olivieri*. Three of the four specimens examined have slightly more rugose interstries on elytra (however, the fourth specimen, cited above as the last one, is similar the to nominotypical form).

In my opinion, all differences mentioned by Depoli (1931) for both subspecies fall within individual variation of *Silpha olivieri*. Reitter (1884) commented on the variation in rugosity and punctation of elytra within the distribution area of this species. Consequently, I consider *Silpha olivieri aquilana* Depoli, 1931 and *Silpha olivieri sardoa* Depoli, 1931 as junior subjective synonyms of *Silpha olivieri* Bedel, 1887.

Silpha perforata Gebler, 1832

Silpha perforata Gebler, 1832: 49.
Silpha venatoria Harold, 1877: 346; **syn. n.**
Silpha perforata var. *lateralis* Portevin, 1926: 70; **syn. n.**
Silpha perforata mandli Portevin, 1932: 48; **syn. n.**
Silpha perforata elongata Portevin, 1943: 48; **syn. n.**

Type material examined. **LT** male of *Silpha venatoria* (ZMHB; here designated), labelled "Mohezi / Hilgendorf [leg.] [hw, yellow label] // 59048 [p] // Type [p, orange label] // venatoria / (star symbol) / Harold [hw, yellow label] //

Hist.-Coll. (Coleoptera) / Nr. 59048 / Silpha venatoria Harold (star symbol) / Japonia, Hilgendorf / Zool. Mus. Berlin [p, label with black frame] // Zool. Mus. / Berlin [p, light yellow label] // Silpha / perforata [hw] / det. Schawaller [p] // LECTOTYPE (male symbol) // Silpha / venatoria Harold, 1877 / Jan Růžička design. 2002 [p, red label] // Silpha / perforata / Gebler, 1832 / Jan Růžička det. 2002 [p]"; **PLT** male (ZMHB), labelled "Silpha / venatoria / n. sp. Harold. [hw, yellow label] // Type [p, orange label] // Hist.-Coll. (Coleoptera) / Nr. 59048 / Silpha venatoria Harold (star symbol) / Japonia, Hilgendorf / Zool. Mus. Berlin [p, label with black frame] // Zool. Mus. / Berlin [p, light yellow label] // PARALECTOTYPE (male symbol) // Silpha / venatoria Harold, 1877 / Jan Růžička design. 2002 [p, red label] // Silpha / perforata / Gebler, 1832 / Jan Růžička det. 2002 [p]"; **PLT** female (ZMHB), labelled "Silpha / venatoria / n. sp. Hald. [hw, yellow label] // Type [p, orange label] // Hist.-Coll. (Coleoptera) / Nr. 59048 / Silpha venatoria Harold (star symbol) / Japonia, Hilgendorf / Zool. Mus. Berlin [p, label with black frame] // Zool. Mus. / Berlin [p, light yellow label] // PARALECTOTYPE (female symbol) // Silpha / venatoria Harold, 1877 / Jan Růžička design. 2002 [p, red label] // Silpha / perforata / Gebler, 1832 / Jan Růžička det. 2002 [p]".

LT male of *Silpha perforata mandli* (DEIC; here designated), labelled "Werchne-Udinsk / Transbaikal. Mandl [leg.] [p] // S. perforata Gebl. / subsp. mandli Port. / G. Portevin det. [hw, Portevin's MS] // LECTOTYPE (male symbol) / Silpha perforata / mandli Portevin, 1932 / Jan Růžička design. 2002 [p, red label] // Silpha / perforata / Gebler, 1832 / Jan Růžička det. 2002 [p]".

HT female of *Silpha perforata elongata* (MNHN, coll. generale), labelled "Soeul / Korea [p] // S. perforata / subsp. elongata / m. [hw, Portevin's MS] // TYPE [p, red label] // MUSEUM PARIS / Coll. A. GROUVELLE 1917 [p] // Silpha / perforata / Gebler, 1832 / Jan Růžička det. 2002 [p]".

Additional material examined. Authentic specimens or even syntypes of *Silpha perforata* Gebler (according to B. Jäger and M. Uhlig, personal communication): 1 female (ZMHB), labelled "7360 [p] // perforata / Gebl. / Fauna Gebl. [hw, green-brown label] // Hist.-Coll. (Coleoptera) / Nr. 7360 / Silpha perforata Gebl. / Dauria, Gebler / Zool. Mus. Berlin [p, label with black frame] // Zool. Mus. / Berlin [p, light yellow label] // Silpha / perforata [hw] / det. Schawaller [p]"; 2 females (ZMHB), labelled "Hist.-Coll. (Coleoptera) / Nr. 7360 / Silpha perforata Gebl. / Dauria, Gebler / Zool. Mus. Berlin [p, label with black frame] // Zool. Mus. / Berlin [p, light yellow label]".

Comments. *Silpha perforata* is a widely distributed, variable species, distributed through Mongolia, Eastern Siberia, Far East of Russia, China and Korea to Japan (Portevin 1926, Nikolaev & Kozminykh 2002). Gebler (1832) described this species from Siberia: Nertschinsk based on an unknown number of specimens.

Harold (1877) described an unknown number of specimens from Japan: Mohezi near Tokyo as *Silpha venatoria*, and distinguished it from *S. perforata* by shorter and more vaulted elytra and more lustrous surface. Later, this taxon was treated as a variety or a subspecies of *S. perforata* from Siberia and Mongolia (Reitter 1901, Kurosawa 1985). I have examined three syntypes of *S. venatoria* (the male specimen with original locality label is designated here as a lectotype, another two specimens as paralectotypes). Elytra of these syntypes are less vaulted and only little more elongated comparing with authentic specimens of *S. perforata* from "Dauria" – ratio of length to width of elytra is 1.20 – 1.30 in the syntypes of *S. venatoria* (1.20 in the lectotype) and 1.25 – 1.30 in the specimens from "Dauria", elytral surface in all these specimens is with similar lustre.

Portevin (1926) described *Silpha perforata* var. *lateralis* after probably seeing more specimens from "eastern Siberia, Mongolia and Japan", based on more elevate external costae on elytra. In MNHN collection there are no specimen(s) labelled as (syn)types, and Portevin probably did not formally label a type series.

Portevin (1932) described *Silpha perforata mandli* based on two specimens from Transbaikalia: Werchne Udinsk, which had reduced elytral costae. I have examined the syntype specimen (designated here as a lectotype), which is slender, with fully reduced costae on elytra.

Portevin (1943) described *Silpha perforata elongata* based on a single specimen from Korea: Soul (= Seoul), which had differences in surface microsculpture and elevate elytral costae. I have examined the holotype specimen, which is large, distinctly glabrous and with elevated elytral costae.

Silpha perforata is a variable species, in terms of body size, elongation and vaulting of elytra, elevation of elytral costae and lustre of surface throughout its distribution (similar to the related

and also apterous *S. carinata* Herbst, 1783). However, based on the rich material studied from DEIC, JRUC, JSCC, MNHN and NMPC, these variations are not geographically based. Consequently, I consider *Silpha venatoria* Harold, 1877, *Silpha perforata* var. *lateralis* Portevin, 1926, *Silpha perforata mandli* Portevin, 1932 and *Silpha perforata elongata* Portevin, 1943 as junior subjective synonyms of *Silpha perforata* Gebler, 1832.

Silpha puncticollis Lucas, 1846

Silpha puncticollis Lucas, 1846: 213.
Silpha puncticollis var. *lucasi* Portevin, 1926: 77; **syn. n.**

Comments. *Silpha puncticollis* is a widely distributed western Mediterranean species (Portevin 1926, Piłońa et al. 2002).

Portevin (1926) described *Silpha puncticollis* var. *lucasi*, based on the fine punctation on pronotum and elytral intervals. Portevin (1926) did not publish a type locality, and probably did not formally label a type series. I have studied a series of 12 specimens from Algeria, Morocco and Tunisia, with the hand-written label "var. Lucasi Port." (probably by Portevin) in MNHN (coll. generale). In fact, the specimens do not distinctly differ in punctuation of dorsum from specimens, designated in the same collection (again, probably by Portevin) as the nominotypical form. Consequently, I consider *Silpha puncticollis* var. *lucasi* Portevin, 1926 as a junior subjective synonym of *Silpha puncticollis* Lucas, 1846.

Silpha tyrolensis Laicharting, 1781

Silpha tyrolensis Laicharting, 1781: 98.
Silpha tyrolensis var. *externa* Portevin, 1926: 78; **syn. n.**
Silpha tyrolensis cottia Depoli, 1931: 15; **syn. n.**
Silpha tyrolensis pennina Depoli, 1931: 16; **syn. n.**
Silpha tyrolensis var. *pyrenaica* Portevin, 1943: 48; **syn. n.**

Type material examined. **HT** female of *Silpha tyrolensis* var. *pyrenaica* (MNHN, coll. M. Pic / G. Portevin), labelled "Foręt / d'Iraty [hw, by pencil] // var. pyrenaica m. / Type / ex coll. S$^{t.}$ Cl$^{r.}$ Deville [hw, Portevin's MS] // TYPE [p, red label] // Museum Paris [p] // Silpha / tyrolensis / Laicharting, 1781 / Jan Růžička det. 2002 [p]".

Comments. *Silpha tyrolensis* is a mountainous species, distributed in western and central Europe (Portevin 1926, Horion 1949, Piłońa et al. 2002).

Portevin (1926) described *Silpha tyrolensis* var. *externa* without giving a type locality; he probably did not formally label a type series. Portevin (1926) distinguished this variety based on its black colour and finer punctation of interstries on the elytra. I have studied a series of ten specimens from France and Germany, with the hand-written label "var. externa Port." (probably by Portevin) deposited in MNHN (coll. M. Pic / G. Portevin). In my opinion, these specimens fall within the individual variability of *S. tyrolensis*.

Depoli (1931) described *Silpha tyrolensis cottia* from Italy: eastern Piemonte, based on an unknown number of dark brown specimens with coarser punctation of elytra and external costae curved at 3/4 of elytral length. According to personal communication from R. Fabbri and G. Burgio (curator of entomology at IEUS), no type specimen(s) of *S. tyrolensis cottia* were found in coll. G. Leoni, deposited in IEUS. In my opinion, differences given by Depoli (1931) concern only individual variation within *S. tyrolensis*.

Depoli (1931) described *Silpha tyrolensis pennina* from Italy: Gressoney, based on a series of black specimens with external costae curved at 4/5 of elytral length. As in the previous taxon,

according to personal communication from R. Fabbri and G. Burgio (curator of entomology at IEUS), no type specimen(s) of *S. tyrolensis pennina* were found in coll. G. Leoni, deposited in IEUS. In my opinion, differences given by Depoli (1931) concern only individual variation within *S. tyrolensis*.

Portevin (1943) described *Silpha tyrolensis* var. *pyrenaica* from Basses-Pyrénées: Iraty. His description is based on a single, large specimen, wider and more vaulted than the nominotypical form, with finer punctation on pronotum. In my opinion, the holotype I studied is wider and more vaulted, but falls within individual variability of *S. tyrolensis*. Its pronotal punctation does not differ from that of other specimens of *S. tyrolensis* in MNHN.

Consequently, I consider *Silpha tyrolensis* var. *externa* Portevin, 1926, *Silpha tyrolensis cottia* Depoli, 1931, *Silpha tyrolensis pennina* Depoli, 1931 and *Silpha tyrolensis* var. *pyrenaica* Portevin, 1943 as junior subjective synonyms of *Silpha tyrolensis* Laicharting, 1781.

Thanatophilus rugosus (Linnaeus, 1758)

Silpha rugosa Linnaeus, 1758: 361.
Thanatophilus rugosus tuberculatus Depoli, 1931: 13; **syn. n.**
Thanatophilus rubripes Portevin, 1943: 47; **syn. n.**

Type material examined. **LT** female of *Thanatophilus rugosus tuberculatus* (IEUS; here designated), labelled "ITALIA [p] / Calabria [hw] / G. Leoni [p] // Thanatophilus / rugosus / tuberculosus [hw, Depoli's MS] / G. Depoli det. [p] // LECTOTYPE (female symbol) / Thanatophilus rugosus / tuberculosus Depoli, 1931 / Jan Růžička design. 2002 [p, red label] // Thanatophilus / rugosus / (Linnaeus, 1758) / Jan Růžička det. 2002 [p]".

LT female of *Thanatophilus rubripes* (MNHN, coll. generale; here designated), labelled "Minchow / China [p] // T. rubripes / type m. [hw, Portevin's MS] // TYPE [p, red label] // MUSÉUM PARIS [p, yellow label] // LECTOTYPE (female symbol) / THANATOPHILUS / RUBRIPES Portevin, 1943 / J. RŮŽIČKA design. 2002 [hw] // Thanatophilus / rugosus / (Linnaeus, 1758) / Jan Růžička det. 2002 [p]"; **PLT** female (MNHN, coll. generale), labelled "Minchow / China [p] // Th. rubripes [hw, recent label] // TYPE [p, red label] // MUSÉUM PARIS [p, yellow label] // PARALECTOTYPE (female symbol) / THANATOPHILUS / RUBRIPES Portevin, 1943 / J. RŮŽIČKA design. 2002 [hw] // Thanatophilus / rugosus / (Linnaeus, 1758) / Jan Růžička det. 2002 [p]".

Comments. *Thanatophilus rugosus* is a common species, distributed throughout the Palaearctic region (Schawaller 1981).

Depoli (1931) described *Thanatophilus rugosus tuberculosus* based on an unknown number of specimens from Italy. His description indicate reduced number of tubercles on elytra. The single specimen in coll. G. Leoni (designated here as a lectotype) is subteneral and thus reddish-brown in colour, having elytra with second interval more smooth and with less pronounced tubercles. However, I found a similar reduction both in number and size of tubercles on elytra of specimens from Central Europe, Uzbekistan and China (deposited in JRUC), always mixed with larger series of topotypic specimens with fully developed tubercles. In my opinion, the reduced tubercles on elytra represent only individual variability; the lectotype of *T. rugosus tuberculosus* is otherwise identical with *T. rugosus*, having tuberculate intervals on elytra and lacking denticle at humeral portion of elytra.

Portevin (1943) described *Thanatophilus rubripes*, based on two specimens from "Minchow" (according to Schütze & Kleinfeld 1997, nowadays Min Xian in Gansu province, China). Portevin's description is based on subteneral specimens with reddish-brown antennae, legs and lateral portions of pronotum and elytra. In my opinion, both specimens are identical with *T. rugosus*, judging from the identical combination of characters given in the diagnosis above.

Consequently, I consider *Thanatophilus rugosus tuberculatus* Depoli, 1931 and *Thanatophilus rubripes* Portevin, 1943 as junior subjective synonyms of *Thanatophilus rugosus* (Linnaeus, 1758).

Thanatophilus sinuatus (Fabricius, 1775)

Silpha sinuata Fabricius, 1775: 75.
Thanatophilus sinuatus var. *obscurior* Portevin, 1926: 40; **syn. n.**
Thanatophilus sinuatus var. *scutellatus* Portevin, 1926: 40; **syn. n.**
Thanatophilus sinuatus var. *cyanescens* Portevin, 1943: 47; **syn. n.**
Thanatophilus sinuatus cypriotus Portevin, 1943: 47; **syn. n.**

Type material examined. **HT** male of *Thanatophilus sinuatus* var. *obscurior* (MNHN, coll. M. Pic / G. Portevin), labelled "(male symbol) [hw] // Finlandia [hw] // Muséum Paris / Coll. M. Pic [p] // var. obscurior / m. [hw, Portevin's MS] // TYPE [p, red label] // Thanatophilus / sinuatus / (Fabricius, 1775) / Jan Růžička det. 2002 [p]".

HT male of *Thanatophilus sinuatus* var. *scutellatus* (MNHN, coll. M. Pic / G. Portevin), labelled "Colombes 23.7. [19]21 [hw] / G. Portevin [p] // Muséum Paris / Coll. M. Pic [p] // var. scutellaris [sic!] / m. [hw, Portevin's MS] // Thanatophilus / sinuatus / (Fabricius, 1775) / Jan Růžička det. 2002 [p]".

HT male of *Thanatophilus sinuatus* var. *cyanescens* (MNHN, coll. generale), labelled "Zagouan / Tunis centr. [p] // T. sinuatus / var. cyanescens / m. [hw, Portevin's MS] // TYPE [p, red label] // Museum Paris [p] // Thanatophilus / sinuatus / (Fabricius, 1775) / Jan Růžička det. 2002 [p]".

HT female of *Thanatophilus sinuatus cypriotus* (MNHN, coll. generale), labelled "Limassol / Cyprus [p] // Th. sinuatus / var. [sic!] cypriotus / Port. [hw, Portevin's MS] // TYPE [p, red label] // MUSÉUM PARIS [p] // Thanatophilus / sinuatus / (Fabricius, 1775) / Jan Růžička det. 2002 [p]".

Comments. *Thanatophilus sinuatus* is a common species, distributed throughout the Palaearctic region (Schawaller 1981).

Portevin (1926) described *Thanatophilus sinuatus* var. *obscurior* from Finland (without details of locality), based on a fine variation in colour (dark coloration of scutellum and its dark pubescence). The holotype specimen has greasy pubescence on scutellum and is identical with *T. sinuatus*, having black ultimate abdominal segments and a smooth elytral surface with three costae and a denticle present on humeral portion of elytra.

Portevin (1926) described *Thanatophilus sinuatus* var. *scutellatus* without mentioning a type locality. The holotype specimen bears a locality label with the name Colombes, which is a settlement west of Paris in the French department Haute de Seine (N. Berti, personal communication). Portevin (1926) distinguished this variety based on shape and colour of scutellum, which should be paler laterally, covered by pale setation. In fact, the holotype specimen is subteneral, but otherwise identical with *T. sinuatus*, with an identical combination of characters to those given above.

Portevin (1943) described *Thanatophilus sinuatus* var. *cyanescens* from western Tunisia, based on slight external differences (heavily punctured and glossy dorsal part of body with distinct blue metal reflection). The holotype specimen is little more glossy, but otherwise identical with *T. sinuatus*, with an identical combination of characters to those given above.

Finally, Portevin (1943) described *Thanatophilus sinuatus cypriotus* from Cyprus, based on a single specimen with large body, pale setation on pronotum and fine punctuation on elytra. The holotype specimen is larger (combined length of pronotum and elytra is 11.0 mm), with more elongate elytra, but otherwise identical to *T. sinuatus*, including the setation on pronotum and punctation on elytra, with an identical combination of characters to that given above.

Consequently, I consider *Thanatophilus sinuatus* var. *obscurior* Portevin, 1926, *Thanatophilus sinuatus* var. *scutellatus* Portevin, 1926, *Thanatophilus sinuatus* var. *cyanescens* Portevin, 1943 and *Thanatophilus sinuatus cypriotus* Portevin, 1943 as junior subjective synonyms of *Thanatophilus sinuatus* (Fabricius, 1775).

Acknowledgements

I am especially grateful to Nicole Berti (MNHN), M. J. D. Brendell and H. Mendel (both BMNH), G. Burgio and F. Santi (both IEUS), J. Jelínek (NMPC), J. Schneider (Mahakam, Praha) B. Jäger and M. Uhlig (ZMHB), M. G. Volkovitsh (ZISP) and L. Zerche and D. Ahrens (DEIC) who loaned me specimens. Nicole Berti (MNHN) and L.

Zerche (DEIC) are thanked also for help with resolving several problems concerning location of the historical localities of some types. R. Fabbri (Ferrara, Italy) kindly helped search for types of G. Depoli in IEUS. H. Mendel (BMNH) and L. Zerche (DEIC) valuably helped in obtaining some historical literature. D. Král (Charles University, Praha) is thanked for valuable comments on a previous version of this paper.

REFERENCES

ARNETT R. H. Jr, SAMUELSON G. A. & NISHIDA G. M. 1993: *The insect and spider collections of the world*, *2. edition*. Gainesville: Sandhill Crane Press, vi + 309 pp.

BEDEL L. 1887: Recherches sur les Coléoptères du nord de l'Afrique. *Annales de la Socété Entomologique de France* (*6e Série*) **7**: 195–202.

BERGSTRÄSSER J. A. B. 1778: *Nomenclatur und Beschreibung der Insecten in der Grafschaft Hanau-Münzenberg*, *wie auch der Wetterau und der angränzenden Nachbarschaft dies und jenseits des Mains*. *Erster Jahrgang*. Hanau: Verlage des Verfassers, (4) + 88 pp., 14 pls.

BRULLÉ G. A. 1836–1840: Entomologie. Pp. 53–95, pls 1–3. In: BARKER-WEBB P. & BERTHELOT S. (eds.): *Histoire Naturelle des Iles Canaries*, *Tome deuxième*, *Deuxième partie*. *Animaux articulés recueillis aux Îles Canaries par MM. Webb et Berthelot*. Paris: Béthune, 119 pp., 6 pls.

CHO Y. B. & LEE CH. E. 1992: Taxonomic Revision of the Family Silphidae (Coleoptera) from Korea Part I. Silphinae. *Nature and Life* (Taegu, Korea) **22**(2): 1–18.

DAHL G. 1823: *Coleoptera und Lepidoptera*. *Ein systematisches verzeichniss*, *mit beygesetzten Preisen der Vorräthe*. Wien: J. E. Akkermann, vi + 105 pp.

DEPOLI G. 1931. Revisione dei coleotteri della collezione Leoni. II. Silphinae. *Bollettino del Laboratorio di Entomologia del R. Istituto Superiore Agrario di Bologna* **4**: 13–17.

EMETZ V. & SCHAWALLER W. 1975: Silphidae aus dem Nepal-Himalaya (Ins.: Col.). *Senckenbergiana Biologica* **56**: 221–231.

FABRICIUS J. C. 1775: *Systema entomologiae*, *sistens insectorum classes*, *ordines*, *genera*, *species*, *adiectis synonymis*, *locis*, *descriptionibus*, *observationibus*. Flensburgi et Lipsiae: Libraria Kortii, (30) + 832 pp.

FALDERMANN F. 1835a: Additamenta entomologica ad faunam Rossicam in itineribus Jussu Imperatoris Augustissimi annis 1827–1834 a Cl. Ménétriés et Szovitz susceptis collecta, in lucem edita. *Nouveaux Mémoires de la Société Impériale des Naturalistes de Moscou* (*2e Série*) **4**: 1–314 + pls. 1–10.

FALDERMANN F. 1835b: Coleopterorum ab illustrissimo Bungio in China boreali, Mongolia, et montibus Altaicis collectorum, nec non ab ill. Turczaninoffio et Stchukino e provincia Irkutzk missorum illustrationes. *Mémoires Présentés à l'Académie Impériale de Sciences de St.-Pétersbourg* **2**: 337–464, pls. 1–5.

FIORI A. 1899: Fauna entomologica Italiana; Coleotteri nuovi o poco conosciuti. *Atti della Società dei Naturalisti di Modena* (*Serie III*) **16**: 153–164.

GEBLER F. 1832: Notice sur les Coléoptères qui se trouvent dans le district des mines de Nertchinsk, dans la Sibérie orientale, avec la description de quelques espèces nouvelles. *Nouveaux Mémoires de la Société Impériale des Naturalistes de Moscou* (*2e Série*) **2**: 23–78.

GERHARDT J. 1897: Neuheiten der schlesischen Käferfauna von 1896. *Deutsche Entomologische Zeitschrift* **1897**: 204–205.

HAROLD E. von 1877: Beiträge zur Käferfauna von Japan (Zweites Stück). Japanische Käfer des Berliner Königl. Museums. *Deutsche Entomologische Zeitschrift* **21**: 337–367.

HATCH M. H. 1928: Fam. Silphidae II. Pp.: 63–244. In: SCHENKLING S. (ed.): *Coleopterorum Catalogus*, *Pars 95*. Berlin: W. Junk, [182 pp.].

HERBST J. F. W. 1783: Kritisches Verzeichniss meiner Insektensammlung. *Archiv der Insectengeschichte* **4**: 1–72, pls. 19–24.

HOPE F. W. 1831: Synopsis of the new species of Nepaul insects in the collection of Major General Hardwicke. Pp.: 21–32. In: GRAY J. E. (ed.): *Zoological Miscellany*. *Vol. 1*. London: Treuttel, Wurtz & Co., 40 pp., 4 pls.

HORION A. 1949. *Faunistik der mitteleuropäischer Käfer 2*. Frankfurt am Main: Vittorio Klostermann, 375 pp.

ICZN 1999: *International Code of Zoological Nomenclature*, *Fourth Edition*, *adopted by the International Union of Biological Sciences*. London: International Trust for Zoological Nomenclature, xxix + 305 pp.

JAKOVLEV B. E. 1887b: Insecta in itinere Cl. N. Przewalskii in Asia centrali novissime lecta. VII. Coléoptčres nouveaux. *Tr. Russ. Entomol. Obsh.* **21**: 315–320.

KÜSTER H. C. 1851: *Die Käfer Europa's*. *Zweiundzwanzigstes Heft*. Nürnberg: Bauer & Raspe, (4) + Nos. 1–100 + 3 pls.

KRAATZ G. 1876: Ueber Systematik und geographische Verbreitung der Gattung Silpha L. und verwandten Genera. *Deutsche Entomologische Zeitschrift* **20**: 353–374.
KUROSAWA Y. 1985: Silphidae. Pp.: 247–252. In: UÉNO S.-I., KUROSAWA Y. & SATÔ M. (eds.): *The Coleoptera of Japan in Color*. *Vol*. *II*. Osaka: Hoikusha Publishing Co., viii + 514 pp (in Japanese).
LAICHARTING J. N. E. von 1781: *Verzeichniss und Beschreibung der Tyroler-Insecten*. *I*. *Theil*, *Käferartige Insecten*. Zürich: J. C. Füessly, xii + (1) + 248 pp.
LINNAEUS C. 1758: *Systema Naturae Per Regna Tria Naturae*, *Secundum Classes*, *Ordines*, *Genera*, *Species*, *Cum Characteribus*, *Differentiis*, *Synonymis*, *Locis*. *Editio Decima*, *Reformata*. *Tomus I*. Holmiae: L. Salvii, (4) + 824 + (1) pp.
MADGE R. B. & POPE R. D. 1969: The homonymy of Silpha quadripunctata Linnaeus (Col., Silphidae); a second appraisal. *Entomologist's Monthly Magazine* **105**: 182–183.
MÉNÉTRIES E. 1832: *Catalogue raisonné des objets de Zoologie recueillis dans un voyage au Caucase et jusqu'aux frontières actuelles de la Perse entrepris par ordre de S*. *M*. *l'Empereur*. St. Pétersbourg: Académie Impériale des Sciences, (2) + 271 + xxxii + (2) + iv + (1) pp.
MOTSCHULSKY V. 1859: Coléoptères du Gouvernement de Iakoutsk, recueillis par M. Pavlofski. *Mélanges Biologiques* **3**: 221–238.
MROCZKOWSKI M. 1955: *Klucze do oznaczania owadów Polski*, *Część XIX Chrząszcze – Coleoptera*, *Zeszyt 25 Omarlicowate – Silphidae* [*Keys to determination of Polish insects*, *Part XIX beetles – Coleoptera*, *Volume 25 carrion betles – Silphidae*].Warszawa: Państwowe wydawnictwo naukowe, 29 pp (in Polish).
NIKOLAEV G. V. & KOZMINYKH V. O. 2002: *The carrion beetles* (*Coleoptera: Agyrtidae*, *Silphidae*) *of Kazakhstan*, *Russia and adjacent countries*. Almaty: Kazak universiteti, 160 pp (in Russian, with English summary).
OTTO A. 1891: Coleopterologisches aus den Ostalpen. *Societas Entomologica* **6**: 59.
PILOŃA F. P., VALCÁRCEL J. P. & REY-DALUZ F. 2002: Catálogo de los Silphidae y Agyrtidae (Coleoptera) de la Península Ibérica e Islas Baleares. *Boletin de la Sociedad Entomologica Aragonesa* **30**: 1–32.
PORTEVIN G. 1907: Description de Silphides et Liodides nouveaux (Col.). *Bulletin de la Société Entomologique de France* **1907**: 251–255.
PORTEVIN G. 1922: Notes sur les Silphides (Col.). *Miscellanea Entomologica* **26**: 1–4.
PORTEVIN G. 1926: *Les Grands Nécrophages du Globe*. *Silphini – Necrodini – Necrophorini*. *Encyclopédie Entomologique* (*Série A*), *Vol*. *6*. Paris: Lechevalier, 269 pp.
PORTEVIN G. 1932: Note sur quelques Silphides du Deutsches Entomologisches Museum. *Bulletin Mensuel de la Société des Naturalistes Luxembourgois*, *Novelle Série* **26**: 58–60.
PORTEVIN G. 1943: Silphides nouveaux ou peu connus (Coleoptera). *Revue Française d'Entomologie* **10**: 47–48.
REICHE L. 1861: Espèces nouvelles de Coléoptères apparternant a la faune circa-méditerranéenne. *Annales de la Société Entomologique de France* (*Quatričme Série*) **1**: 361–374.
REITTER E. 1884: Bestimmungs-Tabellen der europäischen Coleopteren. XII. Necrophaga (Platypsyllidae, Leptinidae, Silphidae, Anisotomidae und Clambidae). *Verhandlungen des Naturforschenden Vereines in Brünn* **23**: 3–122.
REITTER E. 1887: Insecta in itinere Cl. N. Przewalskii in Asia contrali novissime lecta. VI. Clavicornia, Lamellicornia et Serricornia. *Trudy Russkogo Entomologicheskogo Obshchestva* **21**: 201–234.
REITTER E. 1888. Coleopteren aus Circassien, gesammelt von Hans Leder im Jahre 1887. III. Theil. *Wiener Entomologische Zeitung* **7**: 143–156.
REITTER E. 1901: Ueber die Silpha carinata Hrbst. und nächste Verwandte. *Wiener Entomologische Zeitung* **20**: 121–123.
RŮŽIČKA J. & SCHNEIDER J. 2002: Distribution records of carrion beetles (Coleoptera: Silphidae) from Iran, Afghanistan, Pakistan and north-western India. *Klapalekiana* **38**: in press.
SCHAEFFER J. C. 1769: *Icones insectorum circa Ratisbonam indigenorum coloribus naturam referentibus expressae*. *D*. *Iacob Christian Schäffers natürlich ausgemahlte Abbildungen Regensburgscher Insecten*. *Erstrer Band*. *Zweyter Theil*. Regensburg: Zunkel, vi + 50 + 12 pp., pls. 51–100.
SCHAWALLER W. 1980: Silpha obscura, ein Beispiel für Subspezies-Differenzierung bei Käfern (Coleoptera, Silphidae). *Stuttgarter Beiträge zur Naturkunde*, *Serie A* (*Biologie*) **334**: 1–11.
SCHAWALLER W. 1981: Taxonomie und Faunistik der Gattung Thanatophilus (Coleoptera: Silphidae). *Stuttgarter Beiträge zur Naturkunde*, *Serie A* (*Biologie*) **351**: 1–21.
SCHAWALLER W. 1982: Die Aaskäfer des Himalaya (Insecta: Coleoptera: Silphidae s. str.). *Senckenbergiana Biologica* **62**[1981]: 237–260.
SCHAWALLER W. 1996: Revision der Gattung Aclypea Reitter (Coleoptera: Silphidae). *Stuttgarter Beiträge zur Naturkunde*, *Serie A* (*Biologie*) **541**: 1–16.

Schütze H. & Kleinfeld F. 1997: Die Carabusformen Chinas mit dem ausführlichen Verzeichnis ihrer Fundorte. *Coleoptera*, *Schwanfelder Coleopterologische Mitteilungen*, Sondernheft **3**: 1–231.
Scopoli J. A. 1772: *Annus V. Historico-naturalis*. Lipsiae: C. G. Hilscher, pp. 70–128.
Semenov A. 1891: Diagnoses Coleopterorum novorum ex Asia Centrali et Orientali, III. *Trudy Russkogo Entomologicheskogo Obshchestva* **25**: 262–382.
Stearn W. T. 1937: On the dates of publication of Webb and Berthelot's "Histoire naturelle des Îles Canaries". *The Journal of the Socety for the Bibliography of Natural History* **1**: 49–63.
Šustek Z. 1983: Silpha bilineata Reitter, 1901 and Silpha tatrica Smetana, 1952 – new synonyms of Silpha carinata Herbst, 1783, and some ecological aspects of its intraspecific variability. *Annotationes Zoologicae et Botanicae* **153**: 1–33.

Acta Soc. Zool. Bohem. **66**: 321–328, 2002
ISSN 1211-376X

Spatial distribution of spiders (Araneae) on scree slopes in Křivoklátsko and Moravský Kras Protected Landscape Areas

Vlastimil RŮŽIČKA

Institute of Entomology, Branišovská 31, CZ–370 05 České Budějovice, Czech Republic;
e-mail: vruz@entu.cas.cz

Received October 19, 2001; accepted January 16, 2002
Published December 16, 2002

Abstract. Vegetation cover significantly affects ice formation at lower margin of scree slopes. Spiders were studied on three scree slopes in the Czech Republic. The non-uniform spatial distribution of the spiders reflected the temperature gradients within the scree slopes. Thermophilous species occured at the upper margin, and psychrophilous species at the lower margin of a scree slope. The species that occured at the dry upper margin of the scree slope tend to be the largest species.

Scree slopes, ice formation, spiders, spatial distribution, size distribution, Czech Republic

INTRODUCTION

Accumulations of stones in Central Europe constitute island ecosystems (Růžička 1990). Due to the difficulty of exploiting them, they are among the few ecosystems that have been little affected by man. The plant and animal communities there constitute edaphic climaxes.

In some accumulations, air can flow between the stones, which allows cold air to accumulate at the bottom of a scree slope. This can lead to the formation of ice, which may persist until late spring. Because of the specific substrate and microclimate, scree slopes are inhabited by specific plant and animal communities and thus contribute significantly to the biodiversity of the landscape (Christian 1993, Růžička 1993).

Spiders are well adapted to this type of habitat, and ants, probably their main competitors elsewhere, do not occur there (Růžička et al. 1989, Růžička & Zacharda 1994). Consequently spiders are relatively numerous and their communities relatively species rich (Růžička 1989). Spiders of various boulder and stone accumulations have been studied (e.g., Růžička & Kopecký 1994, Růžička & Zacharda 1994). This study is devoted to the spider fauna of scree slopes where the stone size is relatively small (10–20 cm).

MATERIALS AND METHODS

Sites

Two of the study sites (Týřov and Branov) were in the Křivoklátsko Biosphere Reserve and Protected Landscape Area, about 50 km west of Praha, and the third (Blansko-Skalní Mlýn) in the Moravský Kras (Moravian Karst) Protected Landscape Area, about 25 km north of Brno.

The Týřov National Nature Reserve is located on the west slope of the Berounka river valley, approximately 3 km upstream of the village of Branov, 280 m a. s. l. (Fig. 1). The lower part of the slope is covered by an *Aceri-Carpinetum* forest (Knížetová 1975). At the foot of the slope, inside the forest, there is a totally bare scree field about 120 m broad and 50 m high, consisting of andesite gravel 10 cm in size on average, with a slope angle of about 35°.

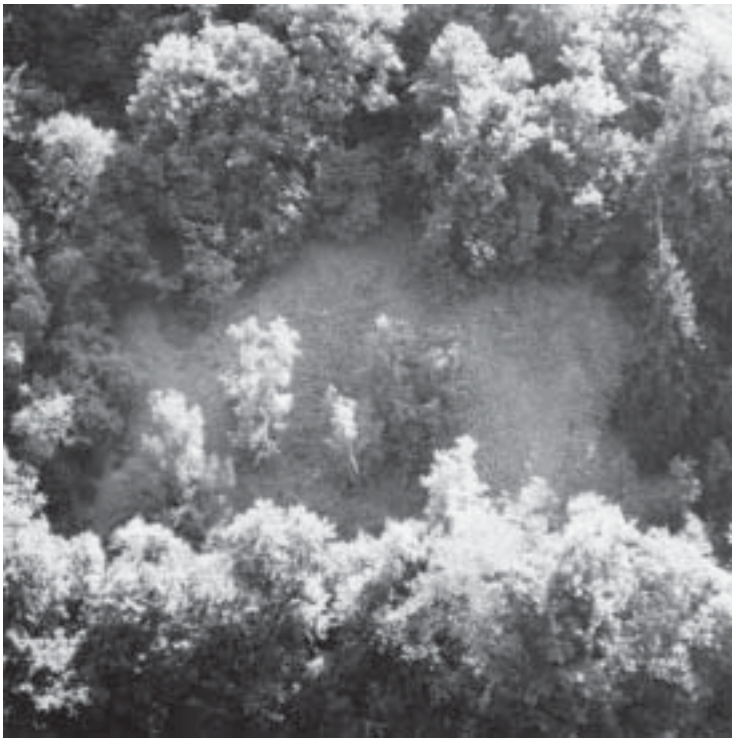
The Branov site has a scree slope located on the north slope of the Berounka river valley, near the village of Branov, 270 m a. s. l. (Fig. 2). This scree field is about 50 m broad and 20 m high. It consists of andesite stones about 15 cm in size on average, slope angle of 30–40°. The lower half of the scree slope is covered by a thick layer of vegetation. *Saxifraga rosacea* Moench and *Festuca ovina* L. predominate in the herb layer, *Polytrichum juniperinum* Hedw., *Bartramia pomiformis* Hedw., *Ptilidium ciliare* (L.) Ness, *Dicranum polysetum* Sw. and *Hylocomium splendens* (Hedw.) Br. Eur. predominate in the moss layer (Klika 1941, Kolbek 1983). The scree field is surrounded by an *Aceri-Carpinetum* forest community.

The scree field at Blansko-Skalní Mlýn is about 50 m broad and 30 m high, consists of limestone stones about 15 cm in size on average, and has a slope angle of 40°. It is situated on the northwest slope of the Punkva river valley, 350 m a. s. l. The upper part of the field is bare, the lower third is overgrown with mixed forest, while the transition zone between forest and bare debris is covered with moss.

Trapping

The spiders were trapped in pitfall traps made of rigid plastic, about 13 cm high and 10.5 cm in diameter. Each trap consisted of a cylindrical can with a board fitted above the upper opening of the can (Růžička 1982). The traps contained a water mixture of 7% formaldehyde and 10% glycerol with a few drops of a surfactant (Růžička 1988). In the scree consisting of boulders 15 cm and more in size the traps were positioned in pits up to 1 m deep. However, in the scree consisting of stones less than 20 cm in size constructing a pit proved impossible as the sides of the pit collapsed during construction. Therefore, in the Křivoklátsko Biosphere Reserve, a set of telescopic metal rings were used to prevent the walls of the pits from collapsing. Progressively smaller rings are inserted and the stones removed to a perpendicular depth of 1 m into the scree. A perforated plastic tube was inserted close to the pit wall, enabling the temperature within the scree to be measured throughout the year. The traps were installed and several stones placed on the board supporting the roof. The free space was then filled with stones and the rings removed (Fig. 3). Three traps were set in each pit, at depths of 100 cm, 70 cm, and 40 cm and one on the surface. Two sets of traps were installed at Týřov site, one on the upper and the other on the lower margin of the scree field. One set of traps was installed on the lower margin of the slope at the Branov site. Max/min thermometers were used to measure the maximum and minimum temperatures experienced during the experiment at the surface and at the depth of 1 m. Daily changes in temperature inside the scree was measured on 8 August 1994 using a digital thermometer. The whole experiment was started on 29 May 1994 and the traps were removed, and the experiment was terminated on 21 May 1995.

Fig. 3. Cross-section through an probe inserted in the scree slopes. Telescopic metal rings share up the sides of the hollow in the scree, in which pitfall traps with preserving fluid, and a roof are installed.



Figs 1, 2. A bird's eye view of the localities studied. 1. The sun exposed westerly sloping Týřov and 2. shadowy northerly sloping Branov screes; both photographed on 3 September 1997 at about midday.

Tab. 1. Number of spiders collected and temperatures measured at different depths (cms) at the upper and lower margins of the scree slopes at Týřov and Branov

	Týřov								Branov			
	upper margin				lower margin				lower margin			
depth (cms)	0	40	70	100	0	40	70	100	0	40	70	100
maximum temperature	+39			+23	+18			+13	+10			+7
minimum temperature	−5			+1	−16			−10	−14			−10
number of specimens												
Textrix denticulata (Olivier, 1789)	5	–	–	–	–	–	–	–	–	–	–	–
Drassodes lapidosus (Walckenaer, 1802)	2	–	–	–	–	–	–	–	–	–	–	–
Callilepis schuszteri (Hermann, 1879)	2	–	–	–	–	–	–	–	–	–	–	–
Heliophanus aeneus (Hahn, 1831)	1	–	–	–	–	–	–	–	–	–	–	–
Trochosa ruricola (Degeer, 1778)	1	–	–	–	–	–	–	–	–	–	–	–
Liocranum rupicola (Walckenaer, 1830)	1	–	–	–	–	–	–	–	–	–	–	–
Harpactea rubicunda (C. L. Koch, 1838)	3	1	–	–	–	–	–	–	–	–	–	–
Pholcomma gibbum (Westring, 1851)	–	1	–	–	–	–	–	–	–	–	–	–
Glyphesis servulus (Simon, 1881)	–	1	3	–	–	–	–	–	–	–	–	–
Pholcus opilionoides (Schrank, 1781)	–	1	1	–	–	–	–	–	–	–	–	–
Nesticus cellulanus (Clerck, 1757)	–	1	6	4	–	–	–	–	–	–	–	–
Tegenaria silvestris L. Koch, 1872	–	–	1	1	2	2	–	–	–	–	–	–
Pardosa lugubris (Walckenaer, 1802)	–	–	1	–	1	2	–	–	–	–	–	–
Walckenaeria capito (Westring, 1861)	–	–	–	1	–	–	–	–	–	–	–	–
Erigone atra Blackwall, 1833	–	–	–	–	1	–	–	–	–	–	–	–
Troxochrus scabriculus (Westring, 1851)	–	–	–	–	1	–	–	–	–	–	–	–
Walckenaeria simplex (Chyzer, 1894)	–	–	–	–	1	–	–	–	–	–	–	–
Zelotes erebeus (Thorell, 1870)	–	–	–	–	1	–	–	–	–	–	–	–
Harpactea lepida (C. L. Koch, 1838)	–	–	–	–	1	–	–	–	–	–	–	–
Lepthyphantes notabilis Kulczynski, 1887	1	–	–	–	12	1	–	–	–	–	–	–
Agraecina striata (Kulczynski, 1882)	–	–	–	1	–	1	1	1	–	–	–	–
Micrargus apertus (O. P.-Cambridge, 1871)	–	–	–	–	2	5	–	3	–	–	–	–
Porrhomma myops Simon, 1884	–	–	–	1	–	1	–	1	–	–	–	–
Porrhomma rosenhaueri (L. Koch, 1872)	–	–	–	–	–	–	–	–	–	–	2	1
Cicurina cicur (Fabricius, 1793)	–	–	–	–	–	–	–	–	1	–	–	–
Diplostyla concolor (Wider, 1834)	–	–	–	–	–	–	–	–	1	–	–	–
Centromerus sylvaticus (Blackwall, 1841)	–	–	–	–	–	–	–	–	1	–	–	–
Zelotes subterraneus (C. L. Koch, 1833)	–	–	–	–	–	–	–	–	1	–	–	–
Lepthyphantes tripartitus Miller et Svatoň, 1978	–	–	–	–	–	–	–	–	24	6	2	9
total	16	5	12	8	22	12	1	5	28	6	4	10

At the Blansko-Skalní Mlýn site the traps were positioned at a depth of 15–60 cm. One trap was positioned in the upper bare part, two in the middle part with the moss cover, and three in the lower forest covered part of the scree slope from 20 May 1993 to 11 May 1994. Spiders were also collected by hand.

The classification of the thermopreference is that of Buchar (1993). The spider species are divided in three categories: thermophilous species, which occured mainly in the Thermophyticum, mesophilous species, in the Mesophyticum, and psychrophilous species in the Oreophyticum. The nomenclature follows that in the check list of the spiders of the Czech Republic produced by Buchar et al. (1995). Material is deposited in author's collection.

RESULTS AND DISCUSSION

The temperature conditions and ice formation

There are two microclimatic gradients in aerated scree slopes. The first between the upper and lower margins, and the second between the scree surface and the sheltered inner space (Růžička et al.

1995). Brabec (1973) gives 25 cm as the minimal stone diameter required for air movement and ice formation in a scree. The three scree slopes studied consist of stones of about 10–15 cm in size.

On the bare west facing scree slope at the Týřov site, the temperature decreased with depth (Fig. 4). A colder microclimate occurred at the lower margin while the inner space of the upper margin did not freeze at all during the winter (Tab. 1). Ice formation was not observed.

The scree slopes at Branov and Blansko-Skalní Mlýn face north (northwest) and their lower parts are overgrown with vegetation. The temperature in the scree under the moss cover at Branov remained constant (Fig. 4). The temperature of the inner spaces in the scree at Branov did not exceed 7 °C (Tab. 1). At the Branov and Blansko-Skalní Mlýn sites the spaces between the stones in the lower part of the scree were full of ice both when the traps were installed and removed.

Cold air flows slowly down through the small spaces between the stones during winter at Týřov and the lower margin is colder than the upper margin, but the amount of cold air that accumulated there was not sufficient for supercooling of the stones and ice formation. The cold air flows slowly down through the bare upper parts of the screes at the other two localities and accumulates in the lower static part of the system, which is almost entierly enclosed by vegetation forming a "pouch". Up until late spring cold air cools the lower margin of the scree slope (Růžička 1999b).

It is generally accepted, that the occurrence of mountain plants on the lower margins of freezing scree slopes is due to the extraordinarily cold environments there. However, the relationship is not so simple. The conditions prevailing on the two freezing talus slopes were not only due to cold air currents, but also to the growth of vegetation. The vegetation retains cold air within the stone

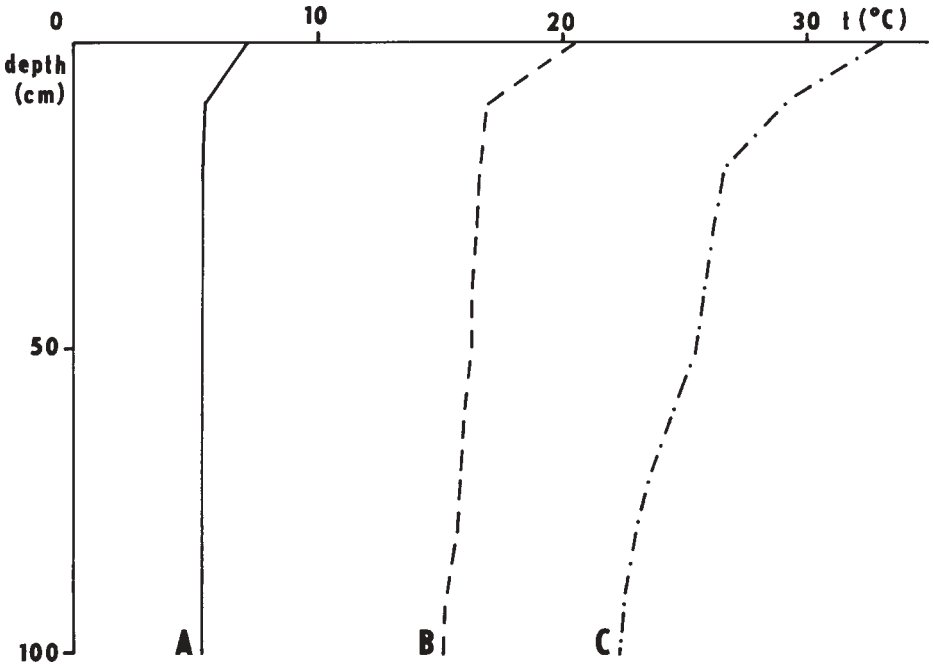


Fig. 4. Temperature in experimental probes on 8 August 1994. A – Branov, B – Týřov, lower margin, C – Týřov, upper margin.

Tab. 2. Number of spiders caught by pitfall traps and by hand collecting at the upper, middle and lower parts of the scree slope at Blansko-Skalní Mlýn

	upper margin	middle moss zone	lower margin
Dysdera ninnii Canestrini, 1868	1	–	–
Porrhomma myops Simon, 1884	1	–	–
Ceratinella brevis (Wider, 1834)	1	–	–
Lepthyphantes alutacius Simon, 1884	1	–	–
Rugathodes bellicosus (Simon, 1873)	3	1	–
Cybaeus angustiarum L. Koch, 1868	–	2	–
Lepthyphantes tripartitus Miller et Svatoň 1978	–	23	6
Cicurina cicur (Fabricius, 1793)	–	1	3
Lepthyphantes alacris (Blackwall, 1853)	–	–	1
Ceratinella major Kulczynski, 1894	–	–	1
Neon reticulatus (Blackwall, 1853)	–	–	1
total	7	27	12

accumulation and contributes significantly to the formation of an extraordinarily cold microclimate at the lower margin of the slope, resulting in the presence of psychrophilous plant and animal species. The mosses require high humidity and a shaded environment, and thus are expected to develop on north facing slopes. Shrubs and trees can grow at the lower margin of a debris field. The taller vegetation contributes to the lower temperature by shading the slope. The great importance of an insulating layer of vegetation and detritus, which forms over tens of years, is revealed when this insulating layer is destroyed during building activities (Špalek 1935, Christian 1993) or prospecting for underground spaces (Lhotský 1960) and the ice melts.

Spiders

A total of 129 spiders belonging to 28 species were collected from pitfall traps at localities in Křivoklátsko Biosphere Reserve (Tab. 1).

A total of 46 spiders belonging to 11 species were collected from pitfall traps and by hand collecting at Blansko-Skalní Mlýn (Tab. 2).

The samples collected at the Křivoklátsko Biosphere Reserve come from three parts of the continuous gradient, which develops in aerated scree slopes. The lower sample from Týřov, where ice does not form, is representative of the middle of this gradient, that from Branov, where ice forms, the bottom of the gradient (Tab. 1). The distribution of species on this gradient is very similar to that recorded for a basalt scree slope by Růžička et al. (1995). The thermophilous species of spiders, i.e. *Callilepis schuszteri* and *Pholcus opilionoides*, were only observed on the surface at top of the gradient, which experienced highest temperatures. *Lepthyphantes notabilis* and *Micrargus apertus* were trapped in the middle of the gradient. Species of the genus *Porrhomma* Simon, 1884 are characteristic colonizers of shallow underground spaces (Růžička 1999a). The scree slope at Týřov site is inhabited by *Porrhomma myops* (the ratio metatarsus I/carapce width: 1.34; cf. Thaler 1968), that at Branov by *Porrhomma rosenhaueri* (the ratio metatarsus I/carapace width: 1.62). *Lepthyphantes tripartitus*, a psychrophilous species, was dominant at the bottom of scree slopes, where the very cold microclimate is.

Results from Blansko-Skalní Mlýn confirm these conclusions. *Dysdera ninnii*, a thermophilous species, was collected on the dry upper margin of the scree, *Lepthyphantes tripartitus* occurs in the moss zone and at the bottom of the scree, where ice forms in spring.

High temperatures and a dry microclimate occur on the upper scree slopes. Larger species, e.g., those from the families Gnaphosidae and Lycosidae, seem to be more resistant to desiccation. The

Tab. 3. Average body lengths (in mm) ± SE of spiders inhabiting various parts of the aerated scree slopes at (A) three experimental stations (Branov-Týřov, see text) and at (B) Brná (Růžička et al. 1995)

site	dry upper margin	middle part	lower margin, where ice had formed
A – surface	7.6±2.5	2.7±1.9	2.4±1.1
B – surface	6.5±3.5	5.7±2.3	2.5±1.0
A – 40 cm	5.4±3.5	3.5±2.0	2.0±0.0
B – 50 cm	7.5±6.1	3.3±2.6	4.0±4.0
A – 70 cm	4.1±1.9	4.3±0.0	2.4±0.4
A – 100 cm	4.5±1.3	2.6±1.0	2.1±0.2
B – 100 cm	5.0±3.0	2.0±0.0	2.4±0.4

long legs of the species *Pholcus opilionoides* may be advantageous for living under hot stones. Small species of linyphiid spiders occur at the bottom of scree slopes. There were significant differences in the body length (tested by ANOVA, $p<0.05$) of spiders collected at top and bottom, and at the surface and inside the scree at Brná in North Bohemia (Růžička et al. 1995), and at the surface and inside the scree at the Křivoklátsko Biosphere Reserve (Tab. 3).

Uneven spatial distributions of spiders on scree slopes were observed by V. Růžička (1994) and of beetles by J. Růžička (1996). Comparing the field data presented here and that in the literature, it is concluded that this phenomenon is caused by air movement within scree slopes and the consequent formation of zones with different microclimatic conditions.

CONCLUSIONS

1. Vegetation cover can significantly contribute to the formation of an extremely cold microclimate at the lower margin of northerly exposed scree slopes.
2. The non-uniform spatial distribution of spiders was associated with temperature gradients within scree slopes. Thermophilous species occured on the surface at the upper margin of a scree slope. Psychrophilous species occured predominantly in the moss cover in the middle part and at the lower margin of scree slopes that froze.
3. Small spiders (mainly Linyphiidae) did not inhabit the surface at the upper margin of scree slopes where there was a danger of desiccation. This area was inhabited by larger species, e.g., from the families Gnaphosidae and Lycosidae.

A c k n o w l e d g e m e n t s

The author wishes to thank P. Antuš for developing the telescopic metal rings, which enabled us to penetrate into scree slopes, and for his help in the field, F. Pojer for assistance in collecting spiders, and temperature measurements, J. Rusek and R. Snazell for helpful comments on the manuscript, K. Thaler for determination of *P. rosenhaueri*, and the directorate of the Křivoklátsko and Moravský Kras Protected Landscape Areas for permission to do research there. This research was supported by the Grant Agency of the Czech Republic (Project No. 205/99/1307) and by the Institute of Entomology (Project No. Z 5007907).

REFERENCES

Brabec E. 1973: *Ekologie sutí Českého středohoří – druhé přiblížení* [*The ecology of stony debris in the České Středohoří Mts. – a second approximation*]. Unpublished MA thesis. Praha: Charles University, 95 pp (in Czech).

Buchar J. 1993: Komentierte Artenliste der Spinnen Böhmens (Araneida). *Acta Univ. Carol. – Biol.* **36**[1992]: 383–428.

BUCHAR J., RŮŽIČKA V. & KŮRKA A. 1995: Check list of spiders of the Czech Republic. Pp.: 35–53. In: RŮŽIČKA V. (ed.): *Proceedings of the 15th European Colloquium of Arachnology*. České Budějovice: Institute of Entomology, 240 pp.

CHRISTIAN E. 1993: Collembolen aus zwei Windröhren des Ötscherlandes (Niederösterreich). *Verh. Zool.-Bot. Ges. Wien* **130**: 157–169.

KLIKA J. 1941: Studie der Waldgesellschaften in der Umgebung von Křivoklát. *Věst. Král. Čes. Společ. Nauk, Tř. Mat.-Přír.* **1941**(3): 1–46.

KNÍŽETOVÁ L. 1975: Vegetační poměry Státní přírodní rezervace Týřov. Vegetationsverhältnisse des Naturschutzgebietes Týřov. *Bohemia Centr.* **4**: 151–162 (in Czech, German abstr.).

KOLBEK J. 1983: Geobotanické poznámky k výskytu Saxifraga rosacea v okolí ventarol na Křivoklátsku. Geobotanische Anmerkungen zum Vorkommen der Art Saxifraga rosacea bei den Ventarolen in der Umgebung von Křivoklát (Mittelböhmen). *Zpr. Čs. Bot. Společ.* **18**: 173–178 (in Czech, German abstr.).

LHOTSKÝ O. 1960: Záchrana jediné ledové jeskyně v Čechách. Die einzige Eishöhle der Böhmischen Länder. *Kras. Sbor.* (Karstbulletin) **1960**: 28–33 (in Czech, German abstr.).

RŮŽIČKA J. 1996: The beetles (Insecta: Coleoptera) in rock debris of the Plešivec hill (northern Bohemia, České středohoří Protected Landscape Area). *Klapalekiana* **32**: 229–235 (in Czech, English abstr.).

RŮŽIČKA V. 1982: Modifications to improve the efficiency of pitfall traps. *Newsl. Br. Arachnol. Soc.* **34**: 2–4.

RŮŽIČKA V. 1988: The longtimely exposed rock debris pitfalls. *Věst. Čs. Společ. Zool.* **52**: 238–240.

RŮŽIČKA V. 1989: Spider (Araneae) communities of rock debris on a typical hillside in the České Středohoří Mts. (North Bohemia). *Acta Entomol. Bohemoslov.* **86**: 419–431.

RŮŽIČKA V. 1990: The spiders of stony debris. *Acta Zool. Fennica* **190**: 333–337.

RŮŽIČKA V. 1993: Stony debris ecosystems – sources of landscape divesity. *Ekológia* (*Bratislava*) **12**: 291–298.

RŮŽIČKA V. 1994: Spiders of Průčelská Rokle defile, Klíč Mt. and Zlatník Mt. in North Bohemia. *Fauna Bohem. Septentr.* **19**: 129–138.

RŮŽIČKA V. 1999a: The first steps in subterranean evolution of spiders (Araneae) in Central Europe. *J. Natur. Histor.* **33**: 255–265.

RŮŽIČKA V. 1999b: The freezing scree slopes and their arachnofauna. In: MÖSELER B. M. & MOLENDA R. (eds): *Lebensraum Blockhlade. Decheniana-Beihefte* **37**: 141–147.

RŮŽIČKA V., BOHÁČ J., SYROVÁTKA O. & KLIMEŠ L. 1989: Invertebrates from rock debris in north Bohemia (Araneae, Opiliones, Coleoptera, Diptera). *Sborn. Severočes. Muz. – Přír. Vědy, Liberec* **17**: 25–36 (in Czech, English abstr.).

RŮŽIČKA V., HAJER J. & ZACHARDA M. 1995: Arachnid population patterns in underground cavities of a stony debris field (Araneae, Opiliones, Pseudoscorpionidea, Acari: Prostigmata, Rhagidiidae). *Pedobiologia* **39**: 42–51.

RŮŽIČKA V. & KOPECKÝ J. 1994: Spiders of pseudokarst caves in northeastern Bohemia. *Boll. Accad. Gioenia Sci. Natur.* **26**(345)[1993]: 299–309.

RŮŽIČKA V. & ZACHARDA M. 1994: Arthropods of stony debris in the Krkonoše Mountains, Czech Republic. *Arctic Alpine Res.* **26**(4): 332–338.

ŠPALEK V. 1935: Les grottes de glace de Vranov nad Dyjí. *Sbor. Čs. Společ. Zeměp.* **41**: 49–55 (in Czech, French abstr.).

THALER K. 1968: Zum Vorkommen von Porrhomma-Arten in Tirol und anderen Alpenländern (Arachn., Araneae, Linyphiidae). *Ber. Natur.-Med. Ver. Innsbruck* **56**: 361–388.

Acta Soc. Zool. Bohem. **66**: 329–330, 2002
ISSN 1211-376X

BOOK REVIEW

BERAN L.: **Vodní měkkýši ČR. Metodika Českého svazu ochránců přírody č. 17** [**Water molluscs of the Czech Republic. The methodics of the Czech Union for Nature Conservation – No. 17**]. ZO ČSOP Vlašim, Regional Centre of ČSOP for central Bohemia supported by MŽP in co-operation with the Central Executive Committee of ČSOP and its sponsors, 1998. 113 pages. Format 148×209 mm. Paperback, price not printed, nevertheless, the book is sold for 65,– CZK (approx. 2.00 USD) ISBN 80-902469-4-X

The book is divided into three main parts: general part, specialised part and literature. In the general part (pages 4–44) the author presents an updated check-list of water molluscs of the Czech Republic based on his findings including findings of zoo-geographically foreign species found in our countryside. The following chapters are dedicated to the nomenclature and the system, biology and ecology (including a description of body structures, reproduction and life-cycles patterns, site preferences etc.), zoo-geography, collecting, determination and conservation of molluscs, endangered species and their protection (including a proposed Red List of CZ). The most substantial component of this part is a pictorial determination key of all species presented in the introductory check-list. In the specialised part (pp. 45–111) there are descriptions of all species, including photos of them. Descriptions of some species are complemented with a net map of their occurrence in the Czech Republic. The book is closed by a list of literature (pp. 112–113). The edition of this manual is, doubtless, a valuable deed both authorial and editorial. We have missed such a book in Czech so far and maybe that was the reason for such a small interest in water molluscs. Therefore the knowledge of their occurrence in our countryside may be so fragmentary when compared to other countries. The German manual Glöer & Meier-Brook (1994), which has already experienced at least 11th edition, or comprehensive books by Piechocki (1979) and Piechocki & Dudych-Falniowska (1993) from Poland can be mentioned. They have stimulated other studies of water molluscs. Beran's manual is fully comparable to those. Unfortunately, in our opinion, there are also a few imperfections that we would like to point out to enable their removal in future re-editions. Above all, we cannot agree with the author's statement that the tribe *Sphaerium* has a completely toothless lock (p. 11), the teeth are used even in this case to diagnose the tribe (e. g. Ložek 1956). It may be a mere omission as the author himself uses the teeth for diagnosing separate species in the specialised part of the mentioned manual. Furthermore it would be better to enlarge the pictures in the key (pp. 34–44). Especially the cartoon locks of *Pisidium* are too small, which complicates the work with the key. Moreover, the preface does not say if the pictures are author's originals based on natural material or drawn according to other manuals, or whether the pictures of locks were taken over unchanged. We would appreciate the information concerning the sources of the presented lock pictures (it should be included in the Key preface). We recommend to quote two Czech authors – Brabenec (1973) and Mácha (1996). The comparison of many lock pictures may enable a more precise diagnosis. We consider the absence of photos of some species in the specialised part of the manual as a lack. We miss pictures of *Theodoxus fluviatilis* (page 45), *Lymnaea palustris* sensu stricto (page 64), *Ferrissia wautieri* (page 82) and *Sphaerium solidum* (page 96). All of these species belong among very scarce ones; e.g. *Ferrissia wautieri* occurs only in a few areas, *Theodoxus fluviatilis* and *Sphaerium solidum* were recorded in the past but not at present, *Lymnaea palustris* sensu stricto has not been documented in our country yet. As a future discovery of these species cannot be excluded, the author should have described them more carefully. When no photos were available, cartoons could be used. However, even photographs could be taken over for instance from Glöer & Meier-Brook (1994), Petrbok (1957) etc. To improve the lucidity of this part of the publication, it would be useful to point up the names of species in the text and also to put the scientific names of the species below the photos of their shells. Unfortunately, the descriptions of separate species do not include the information about a number of convolutions of adult shells, and also some other special conchological signs (e.g. "hammering" in Lymnaeidae) are omitted. The characteristics of the species in Beran's manual are derived from the key by Ložek (1956), but the reduction of original descriptions may complicate the species determination.

We may also reprehend the author for little carefulness in assembling the maps. It can be understood that some historical sources might have slipped from his attention and that is why they were not recorded. However, if the author's information is based mainly on recent findings, it is surprising that he has not recorded the occurrence of the significant species *Pisidium amnicum* in the National Park Podyjí (the map on page 98). It is rather surprising because the author himself revised the material taken from this locality and because the finding of the mentioned species has been recently published (Ložek & Vašátko 1997). There are also mistakes in quotations. For example in the specialised part in the species *Pisidium milium* (page 101) there is a false quotation Piechocki (1979),

which is an obvious mistake as this publication is dedicated to gastropoda. The right quotation is Piechocki & Dudych-Falniowska (1993).

The final list of literature in such an exceptional publication could have been surely a little more voluminous and should have involved more faunistic publications dedicated to water molluscs, both older as well as recent ones (we miss even such an important book as Uličný 1895). Unfortunately, some false quotations appear even in the mentioned publications. E.g. the author indicates wrong numbers of separate magazine volumes in Beran (1995, 1996) and Hruška (1992). However, we have to say that the situation is complicated by the fact that the magazine "Památky a příroda" has been devided into two different titles. The newly created "Ochrana přírody" magazine goes on using the same numbering of volumes as the former title, which may be confusing. Right quotations of the papers mentioned above are presented in the list of literature of this book review.

Despite of the mentioned remarks we have to recommend this book as a modern and basic source for studying water molluscs in the Czech Republic. This book is sure to help both Czech and foreign scientists. The edition of this manual has filled up an almost 50-year period during which such a publication was not available.

REFERENCES

Beran L. 1995: Proposed Red List of Molluscs in the Czech Republic, Part 1 – Water Molluscs. *Ochr. Přír.* **50**(2): 40–44 (in Czech, with English summary).

Beran L. 1996: Will the Pisidium amnicum survive in the Czech Republic? *Ochr. Přír.* **51**(2): 48–49 (in Czech with English summary).

Brabenec J. 1973: Die Tschechoslowakischen Arten der Gattung Pisidium C. PF. *Práce a Studie – Přír., Pardubice* **5**: 147–176 (in Czech with German summary).

Glöer P. & Meier-Brook C. 1994: *Süsswassermollusken*. Hamburg: Deutcher Jugendbund für Naturbeobachtung. 136 pp.

Hruška J. 1992: [Project „Rescue of freshwater pearl mussel in the Czech Republic". Part 3: Semi-natural breeding]. *Ochr. Přír.* **47**(1): 7–11 (in Czech).

Ložek V. 1956: *Klíč československých měkkýšů* [*Determination Key of Czechoslovak Molluscs*]. Bratislava: Vydavatelstvo SAV, 436 pp (in Czech).

Ložek V. & Vašátko J. 1997: *Mollusken des Nationalparks Thayatal*. Zlatý Kůň, Praha, 67 pp (in Czech with German summary).

Mácha S. 1996: Useful tips facilitating the study of Pisidium species (Bivalvia). *Čas. Slez. Muz. Opava* (*A*) **45**: 171–178 (in Czech with English abstract and German summary).

Petrbok J. 1957: [Sphaerium solidum Normand, 1844 a new mollusc for Bohemia]. *Čas. Nár. Mus.* **126**: 192–193 (in Czech).

Piechocki A. 1979: *Mieczaki* (*Mollusca*), *Slimaki* (*Gastropoda*). *Fauna Sladkowodna Polski* [*Molluscs. Slugs. Freshwater fauna in Poland*]. Warszawa-Poznań: Panstwowe Wydaw. Naukowe, 186 pp (in Polish).

Piechocki A. & Dudych-Falniowska A. 1993: *Mieczaki* (*Mollusca*), *Małże* (*Bivalvia*). *Fauna Sladkowodna Polski* [*Molluscs*, *Clams. Freshwater fauna in Poland*]. Warszawa: Panstwowe Wydaw. Naukowe, 200 pp (in Polish).

Uličný J. 1895: *Měkkýši čeští* [*Bohemian Molluscs*]. Praha: Nakl. Klubu přírodovědeckého, 208 pp (in Czech).

Vladimír Vrabec & Ivona Velecká