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Review of the Caucasian Species of the Subgenus *Peryphanes* Jeannel (Coleoptera: Carabidae: *Bembidion*)

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With 38 figures

Summary

A taxonomical review, based on re-examination of the types and extensive original materials of the Caucasian species of the subgenus *Peryphanes* Jeannel, 1941 (Coleoptera: Carabidae: *Bembidion* Latreille, 1802 is given. Altogether, 8 species are recognized as valid within the area in question, three of them being new to science: *Bembidion imereticum* n. sp., *B. phryganobium* n. sp., and *B. adygorum* n. sp. *B. zechneticum* Müller-Motzfeld, 1989 is considered as a junior synonym of *B. lirykense* Reitter, 1908. Both the latter taxon and *B. olegleonidovici* Fassati, 1990 are promoted to full specific status. A lectotype for *B. grandipenne* Schaum, 1862 is designated. Distributions of all species considered are mapped. A key is provided to all the hitherto known Caucasian species and some of their most close congeners from adjacent lands. Phylogenetic and ecological relationships between all species are briefly discussed.

Zusammenfassung

Eine taxonomische Revision (basierend auf Typenmaterial und umfangreichem neuen Material) der Untergattung *Peryphanes* Jeannel, 1941 (Coleoptera: Carabidae: *Bembidion* Latreille, 1802) aus dem Kaukasus wird vorgestellt. Insgesamt werden 8 Arten in der betreffenden Region als valid angesehen, davon 3 neu beschrieben: *Bembidion imereticum* n. sp., *B. phryganobium* n. sp. und *B. adygorum* n. sp. *B. zechneticum* Müller-Motzfeld, 1989 wird als jüngeres Synonym von *B. lirykense* Reitter, 1908 betrachtet. Das letzte Taxon ebenso wie *B. olegleonidovici* Fassati, 1990 werden in den Artrang erhoben. Ein Lectotypus für *B. grandipenne* Schaum, 1862 wird festgelegt. Die Verbreitungsgebiete aller betreffenden Arten werden in Karten zusammengefaßt. Ein Bestimmungsschlüssel für alle bekannten kaukasischen Arten sowie für die nächsten Gattungsverwandten aus den umliegenden Gebieten wurde erstellt. Phylogenetische und ökologische Beziehungen zwischen den Arten werden kurz diskutiert.

Contents

1. Introduction	2
2. Material	2
3. Acknowledgments	3
4. Characteristics of <i>Peryphanes</i>	3
5. Species list	6



5.1. <i>Bembidion fraxator</i> Ménériés	6
5.2. <i>Bembidion dalmatinum</i> Reitter	10
5.3. <i>Bembidion adygorum</i> n. sp.	14
5.4. <i>Bembidion grandipenne</i> Schaum	18
5.5. <i>Bembidion ogleonidovici</i> Fassati, stat. nov.	19
5.6. <i>Bembidion imereticum</i> n. sp.	22
5.7. <i>Bembidion phryganobium</i> n. sp.	24
5.8. <i>Bembidion brunnicornne</i> Dejean	25
5.9. <i>Bembidion lirykense</i> Reitter	28
6. Key to Caucasian species of the subgenus <i>Peryphanes</i>	30
7. Ecology	32
8. Zoogeography	33
9. References	38

1. Introduction

The present paper continues the authors' studies of Caucasian *Bembidion* Latreille, 1802, one of the most complex and species-rich genera of carabid beetles. This article aims at a clarification of the taxonomy, ecology, and distributions of all Caucasian species belonging to the subgenus *Peryphanes* Jeannel, 1941.

Seven *Peryphanes*-species or subspecies have hitherto been formally described from or recorded in the Caucasus. Interestingly, although we add here three species new to science, their number has scarcely increased after the present study, for one older name has become synonymized, and one more is rejected from the Caucasian list.

2. Material

This study is based on highly abundant materials deriving from various sources and covering the entire Caucasian region (Figs 34–37). The materials are housed in the following collections:

DPI = Pedagogical Institute of Daghestan, Makhachkala;
MPU = Pedagogical University of Moscow, Moscow;
MU = Department of Entomology, Moscow State University, Moscow;
TM = Természettudományi Múzeum, Budapest;
SMF = Senckenberg Museum, Frankfurt a. Main;
SMNS = Staatliches Museum für Naturkunde, Stuttgart;
ZIA = Zoological Institute of Armenia, Erevan;
ZIU = Zoological Institute of the Ukraine, Kiev;
ZISP = Zoological Institute, St. Petersburg;
ZMB = Zoologisches Museum der Humboldt-Universität, Berlin;
ZMUM = Zoological Museum of the Moscow University, Moscow.

AK = collection of A. KOVAL, St. Petersburg;
AR = collection of A. RUBTSHENIA, Minsk;
AZ = collection of A. ZAMOTAJLOV, Krasnodar;
EK = collection of E. KOMAROV, Volgograd;
IB = collection of I. BELOUSOV, St. Petersburg;
IK = collection of I. KABAK, Almaty;
IS = collection of I. SOKOLOV, St. Petersburg;
ISol = collection of I. SOLODOVNIKOV, Minsk;
SB = collection of S. BELOBORODOV, Krasnoflotsk, Moscow Area;
VG = collection of V. GREBENNIKOV, Rostov-on-Don.

The holotypes and some paratypes of the new species described below are deposited in ZISP, some paratypes have been shared between the remaining collections. The collections are

referred to in the text as being put in *square brackets* [] in the material section for each species involved. When necessary, the number of preparations of genitalia is put in *simple brackets* () immediately after the number of specimens examined. The *ml/mls* and *fm/fms* stand for male(s) and female(s), respectively.

3. Acknowledgments

Before going further, we wish to express our hearty appreciation to Dr. F. HIEKE (Berlin) and Dr. Gy. SZÉL (Budapest) who kindly sent us for study the type specimens of *B. grandipenne* Schaum and *B. lirykense* Reitter, respectively. The authors are very grateful to Prof. G. ABDURAKHMANOV (Makhachkala) and Messrs G. DAVIDIAN, B. KATAEV, V. PRASOLOV (St. Petersburg), S. ALEXEEV, S. BELOBORODOV, V. BELOV, S. GOLOVATCH, K. MAKAROV, M. & V. SAVITSKYI (Moscow), I. KABAK (Almaty), A. PUTSHKOV (Kiev), A. MIROSHNIKOV, A. SOLODOVNIKOV, V. STSHUROV, A. ZAMOTAJLOV (Krasnodar), V. GREBENNIKOV (Rostov/Don), E. KOMAROV (Volgograd), A. RUBTSHENIA, I. SOLODOVNIKOV (Minsk), D. LOGUNOV (Novosibirsk), M. KALASHIAN (Yerevan) who placed their materials at our disposal. Our special thanks go to our friend and colleague A. KOVAL (St. Petersburg) for his very rich collection of Caucasian *Bembidion* submitted to us for study. We are very grateful to Prof. G. MEDVEDEV (St. Petersburg) for the possibility to examine the ZISP collection, as well as to Prof. O. KRYZHANOVSKY (St. Petersburg) for his attention to and supervision of this work. Dr. S. GOLOVATCH (Moscow) most helpfully read an earlier draft of this paper. This study has been supported in part by Mr. SOROS' International Science Foundation, Biodiversity Project.

4. Characteristics of *Peryphanes*

The species of this subgenus are very different in size and body shape. The colour of the upperside is usually monochromatic with metallic blue or greenish lustre, the elytra and vertex are often tinged with reddish. At most, vaguely delimited apical spots are present on the elytra. The legs and antennae vary in colour, often even within a single population. The femora are usually more or less darkened in the basal part. The antennae are obscured beginning from the apical half of antennomere 3 or 4, sometimes entirely light. The hind part of the frontal furrows, and sometimes also the adjacent areas of the vertex, are very finely and sparsely punctured, but always considerably more weakly as compared e. g. to representatives of the subgenus *Ocydromus* Clairville, 1806 s. str. The pronotum is cordate, its sides are very strongly sinuate before the large, rectangular, apically pointed hind angles. The lateral gutter is wide or moderately wide, more rarely relatively narrow. The postangular carina of the pronotum is well-developed and comparatively straight, this being highly characteristic of the Caucasian consubgenera. Another feature of *Peryphanes* is a more or less strongly reduced microsculpture. The latter is completely obliterated on the disk of the pronotum and on the head (with the exception of the vertex), usually more or less strongly reduced on elytra.

However, the most important feature that allows to refer a species to the subgenus concerned is the aedeagal conformation. Its median lobe is more or less strongly swollen along the ventral margin, attenuating toward the ostium, and the endophallus armature is strongly hypertrophied, projecting beyond the basal orifice.

Special attention ought to be paid to the nomenclature of the endophallus armature. It is noteworthy that, in spite of the efforts of numerous authors, it remains far from being perfectly known. We do not pretend to further tackle the problem, being rather eclectic in adopting some terms taken from different sources that seem to be the most convenient. These correspond to the nomenclature of the previous authors in the following way (Fig. 1).

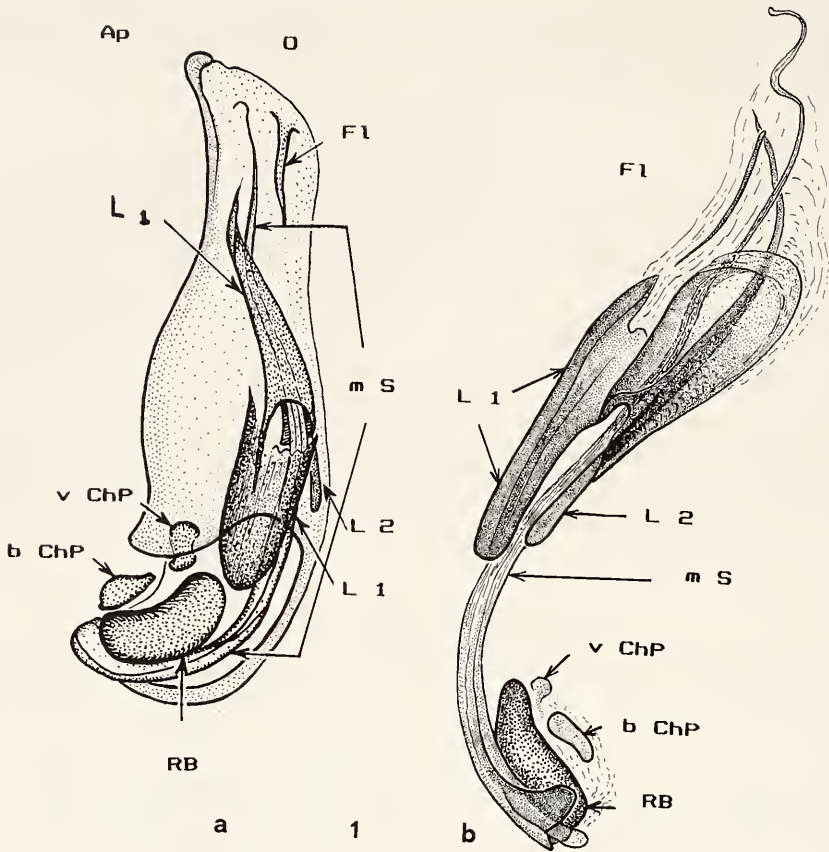


Fig. 1. Endophallus armature of *Peryphanes*-species. – 1a. Right lateral view, sketch; – 1b. left lateral view, endophallus extracted from the median lobe of aedeagus. – For abbreviations see text in chapter 4.

Ribbon brush (ERWIN & KAVANAUGH, 1981) = corpus squamosus (e. g. FASSATI, 1947, 1949) = Borstenwulst (LINDROTH, 1939; MÜLLER-MOTZFELD, 1983, 1986 etc.); pacchetto squamigero (DE MONTE, 1943). This is one of the rare cases with readily recognizable homology.

Basal chitin platelet = corpusculum adsquamosum basal (FASSATI, 1950) = chitin platelet 2 (ERWIN & KAVANAUGH, 1981) = parte rivolta delle membrane (DE MONTE, 1943).

Ventral chitin platelet = corpusculum adsquamosum ventral (FASSATI, 1949) = ? chitin platelet 1 (ERWIN & KAVANAUGH, 1981) = parte rivolta delle membrane (DE MONTE, 1943).

Lamina 1 (Innere Lamellen, LINDROTH, 1957) = membranöser Sack von *Ocyturanus* (MÜLLER-MOTZFELD, 1986) = chitin platelet 3 (ERWIN & KAVANAUGH, 1981) = lamina stiligera (DE MONTE, 1943).

Lamina 2. This structure seems to be fused with lamina 1 in its portion adjacent to the left side of the aedeagus (Fig. 1). Probably it is homologous with the stylet of some *Ocydromus* s. str. or e. g. the species of the *terminale*-group.

Main sclerite = sclerite principal (FASSATI, 1949) = Hauptsclerit (MÜLLER-MOTZFELD, 1986) = chitin platelet 4 (ERWIN & KAVANAUGH, 1981) = parte flagelliforme delle membrane (DE MONTE, 1943).

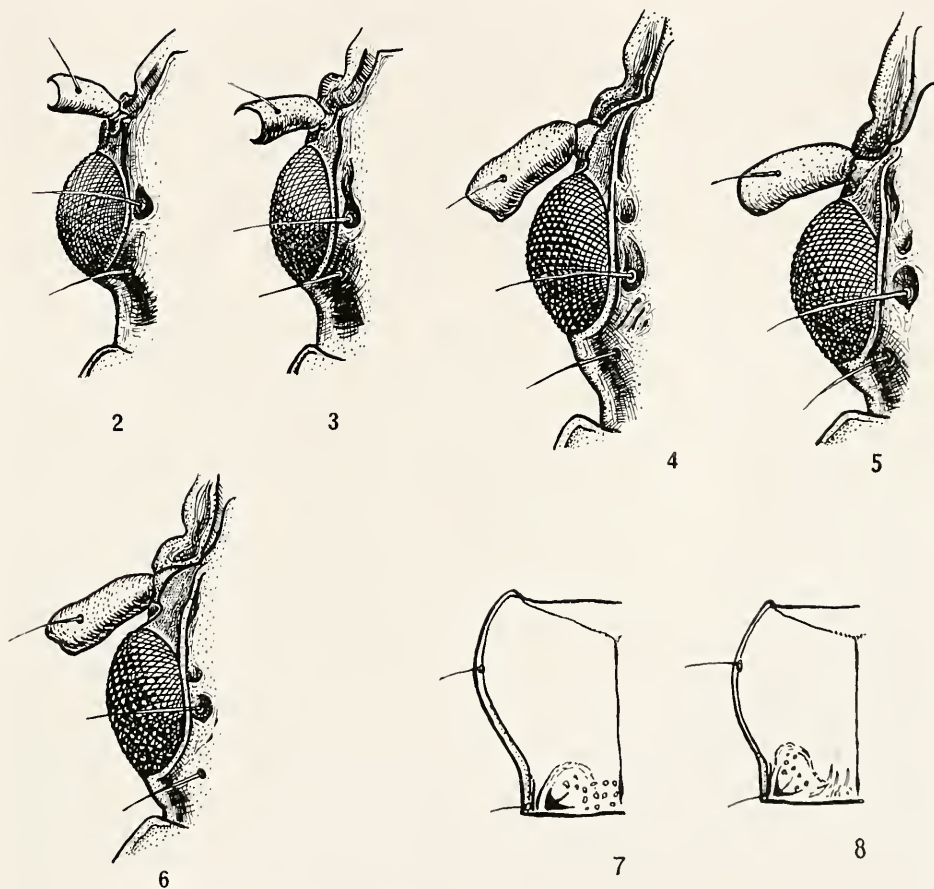
Flagellum (e. g. FASSATI, 1957; MÜLLER-MOTZFELD, 1986) = frenulo (DE MONTE, 1943).

Ostium (LINDROTH, 1957) = apicales Orificium (MÜLLER-MOTZFELD, 1983) = Ostialöffnung (FASSATI, 1990).

All the above structures are designated in Fig. 1.

The female genitalia (Figs 23–31) are variable in conformation and, like in the male, they show a tendency to enlarging their separate parts in some cases. In all known Caucasian species, the female genitalia are characterized by a more or less strongly pronounced, snake-shaped, spermathecal ductus lacking an annulus receptaculi. Depending on the species, the spermatheca is constricted into two or three portions (e. g. Figs. 26–27), the basal of which being strongly and asymmetrically swollen. The above variability concerns the development of the apical constriction of the spermatheca as well as the number of spires and the degree of their sclerotization in the spermathecal ductus.

Some morphometric characters are used in this paper too. Body length is measured from the front margin of the labrum to the apex of the elytra; the length of the elytra from the anterior termination of the marginal gutter to the apex of the elytra; the width of the latter at their broadest part; the length of the pronotum along its median line. Discal formula as used by PAWLOWSKI (1979).



Figs 2–6. Eye of *Peryphanes*-species. – 2. *B. adygorum* n. sp., female, Otkhara; – 3. *B. fraxator* Mén., female, Lagodekhi; – 4. *B. imereticum* n. sp., female, Borzhomi; – 5. *B. phryganobium* n. sp., female, Nius-Nius; – 6. *B. olegleconidovici* Fas., female, Psezuapse.

Figs 7–8. Pronotum of *Peryphanes*-species. – 7. *B. fraxator* Mén., Zakataly; – 8. *B. lirykense* Rtt., Hyrcan Reserve.

5. Species list

5.1. *Bembidion fraxator* Ménétré (Figs 3, 7, 10, 27, 33, 34)

Bembidion fraxator Ménétré, 1832, Cat. rais.: 138 (Loc. typ. pente orientale, des Alpes du Caucase).

Bembidion fraxator: JAKOBSON, 1906, Beetles of Russia and West Europe, 4: 286.

Bembidion dalmatinum var. *fraxator*: CSIKI, 1928, Cat. col.: 91.

Bembidion dalmatinum ssp. *fraxator*: NETOLITZKY, 1943, Koleopt. Rundsch., 29: 48.

Bembidion fraxator: SCHULER, 1961, L'Entomologiste, 17 (4–5): 79.

Bembidion nitidulum fraxator: IABLOKOFF-KHNZORIAN, 1976, Fauna Armen. SSR, 1: 182.

Bembidion fraxator: MÜLLER-MOTZFELD, 1986, Ent. Nachr. Berichte, 30 (1): 39.

Bembidion nitidulum var. *pseudonitidulum*: REITTER, 1908, Fauna Germ., 1: 116 (part.).

Bembidion nitidulum var. *pseud(o)nitidulum*: NETOLITZKY, 1943, Koleopt. Rundsch., 29: 50.

? *Bembidion lucidum* Faldermann, 1835, Fauna Transcauc. 1: 109.

Material examined

Krasnodar Prov.: 1 (1) ml [AK], Tuapse Distr., 5 km SE of Olginka, 8. VIII: 1987, leg. KOVAL. – 4 ex. [AK], same locality, 31. VIII. 1993, leg. KOVAL. – 21 ex. [ZISP, AK, IB, IS], same locality, 7.5 km NW of Olginka, 27. VI. 1987, leg. KOVAL. – 25 ex. [ZISP, AK], same area, Dederkoi River, near Dederkoi, 4. VII. 1987, leg. KOVAL. – 2 fms [IB], same area, Semashko Mt., 19. VI. 1988, leg. BELOUSOV. – 1 ex. [AK], Sochi, Lazarevskoye, aul Krasnoalexandrovskiy, 21. VIII. 1984, leg. KOVAL. – 1 ex. [ZISP], same locality, 16. VI. 1984, leg. KOVAL. – 1 ex. [ZISP], Sochi, Psezuapse, 23. VII. 1984, leg. PRASOLOV. – 3 ex. [AK], same area, Tatianovka, 5. VII. 1987, leg. KOVAL. – 1 ex. [AK], same locality, 6. IX. 1987, leg. KOVAL. – 10 ex. [ZISP, AK], same locality, 2. IX. 1993, leg. KOVAL. – 12 ex. [ZMUM, AK], same area, Solokhaul, Shakhe River, 21. VI. 1986, leg. KOVAL. – 1 ex. [AK], same locality, 1. VIII. 1987, leg. KOVAL. – 4 ex. [AK], Solokhaul, valley of Shakhe River, 1. VIII. 1988, leg. RUBTSHENIA. – 1 ex. [AK], same area, Alexeevskoe, 19. VII. 1984, leg. KOVAL. – 1 fm [IB], same area, Vardane, valley of Buu River, 18. V. 1989, leg. BELOUSOV. – 1 (1) ml [ZISP], same area, Dagomys, 11. VI. 1960, leg. KURNAKOV. – 1 (1) ml [ZISP], same area, Kaveshir. – 1 ex. [AK], Mt. Akhun, Agura Valley, 300 m, 24. V. 1993, leg. KOVAL. – 3 ex. [AK, IB], Agura River, 22. IX. 1977, leg. MIROSHNIKOV. – 1 ex. [IB], same area, Krasnaya Polyana, Estosadok, 1020 m, 11. IX. 1978, leg. BELOUSOV. – 1 (1) ml, 2 fms [ZISP], same locality. – 11 ex. [ZISP, ZMUM, AK], Atshishkho Mt. Range, Beshenka River, 18. VII. 1986, leg. KOVAL. – 9 ex. [ZISP, IB], same area, Khosta, 24. VIII. 1980, leg. KOROLEV. – 1 ex. [AK], same area, Aibga Mt. Range, 13. VI. 1987, leg. KOVAL. – 1 ml [IB], same area, Ubinskaya, Papai Mt., 23.–25. VII. 1992, leg. M. & V. SAVITZKYI. – 2 ex. [MPU], Kamyshanova Polyana, 8. VI. 1985, leg. UTIANSKAYA. – 1 ml, 3 fms + 8 ex. [ZISP], same area, Shuntuk, 1. VI. 1933, leg. ARNOLDI. – 15 ex. [ZISP, ZMUM, IB], Nikel, 500 m, leg. GREBENNIKOV. – 1 ml [VG], Guzeripl, 900 m, 3. VII. 1991, leg. GREBENNIKOV. – 1 ex. [MPU], same locality, 19. VII. 1986, leg. DANILEVSKYI. – 1 ex. [ZISP], same locality, 7. VI. 1970, leg. DANILEVSKYI. – 2 fms [ZISP], Lagonaki, sources of Kurdzhips River, 1700 m, 10. VII. 1991, leg. GREBENNIKOV. – 1 fm [ZISP], same locality, 2000 m, 5. VII. 1989, leg. KAZANTSEV. – 1 fm [ZISP], same locality, forest, 1600–1900 m, 7. VII. 1993, leg. M. & V. SAVITZKYI. – 2 ex., Adygei Autonomous Region, valley of Sakhai River, 800–1000 m, 26. VIII. 1993. – 1 ml, 3 fms [VG], Caucasian State Reserve, Umpyr, 15. VI. 1992, leg. GREBENNIKOV. – 5 ex. [AK, IS], Mostovskoy Distr., Novoprokhladnoe, 600 m, 3. VI. 1993, leg. KOVAL. – 22 ex. [ZISP, AK], same area, Mt. Bolshoi Tkhatsh, 1800 m, 5. VI. 1993, leg. KOVAL. – 2 ex. [ZISP], 10 km W Dakhovskaya, 1000 m, 4. VII. 1987, leg. SAVITSKYI. – 2 mls, 2 fms [ZISP, IB], same area, Chertovy Vorota Mts, 21. VI. 1990, leg. BELOUSOV. – 1 ml [IB], same area, valley of Urushten River, 22. VI. 1990, leg. BELOUSOV.

Stavropol Prov.: 12 (5) mls, 13 (3) fms [ZISP], Stavropol Kavkazskiy, 29. IV. 1932, leg. LUTSHNIK. – 4 ex. [ZISP], same locality, 5. IV. 1923, leg. LUTSHNIK. – 2 ex. [ZISP], same locality, 3. X. 1923, leg. LUTSHNIK. – 2 fms [VG], Stanitsa Peredovaya, leg. GREBENNIKOV. – 2 ex. [IB], Abishira-Akhuba Mt. Range, near Lesokiafar, right bank of Tshilik River, 4. VII. 1987, leg. BELOUSOV. – 2 ex. [VG, IB], Arkhyz, Dukka Pass, leg. GREBENNIKOV. – 4 ex. [IB], same area, sources of Sofia River, Tshaget-Tshat, 1500–2000 m, 3. IX. 1992, leg. SAVITSKYI. – 2 fms [VG], Karats-

hai, Gumbashi, 3. IX. 1991, leg. GREBENNIKOV. – 1 (1) ml [ZISP], Teberda env., 1300 m, 31. VII. 1983, leg. BELOUSOV.

Balkaria: 3 ex. [IB], Verkhnyaya Zhemtala, 7. VI. 1992, leg. BELOUSOV. – 1 ml [IB], same area, near Verkhnyaya Balkaria, 1600–1700 m, 10. VI. 1992, leg. BELOUSOV.

North Ossetia: 1 (1) ml [ZISP], Vladikavkaz, leg. ANTONOVA. – 2 mls [IB], same area, Stolovaya Mt., gorge of Gher-Tshon River, 500 m, 22. VI. 1989, leg. BELOUSOV. – 1 ex. [ZISP], same area, 21. V. 1993. – 2 ex. [IB], vic. Karmadon, 8.–9. VIII. 1983, leg. BELOUSOV. – 1 ex. [ZISP], Lesistyi Mt. Range, Ganakh, 2. VII. 1987, leg. KOZLOV. – 1 ex. [MU], Ters Prov., Balta, 21. V. 1908, leg. STSHUKIN. – 1 ex. [VG], North Ossetian State Reserve, kordon Unal, 3. VIII. 1991, leg. GREBENNIKOV.

Daghestan: 3 ex. [ZISP, IB], Bezhta env., Mezhduretskie, 21. VI. 1979, leg. G. ABDURAKHMANOV. – 5 ex. [ZISP, IB], Akhtytshai, 2000 m, 16. VI. 1983, leg. BELOUSOV. – 2 ex. [IB], same area, near Kusur, 17. VII. 1984, leg. BELOUSOV. – 22 (2) ex. [ZISP, IB], Kurush env., 26.–27. IX. 1983, leg. BELOUSOV. – 2 mls, 1 fm [IB], same locality, 23. VIII. 1986, leg. DAVIDIAN. – 1 fm [ZISP], same locality, leg. ABDURAKHMANOV.

Abkhazia: 2 ex. [AK], Gagrskiy Mt. Range, Mt. Mamdzyshkha, 1300 m, 29. VII. 1981, leg. KOVAL. – 2 ex. [ZISP, AK], same area, Telebash Mt. Range, 19. VIII. 1986, leg. KOVAL. – 4 mls, 2 fms [IB], same area, watershed of Khashupse & Kholodnaya Rechka rivers, 9. VI. 1991, leg. BELOUSOV. – 23 ex. [ZISP, ZMUM, AK, IK], Gudauta Distr., near Khuap, 31. V. 1986, leg. KOVAL. – 3 mls [IB], same area, W slope of Adzapsh Mt., 12. VI. 1991, leg. BELOUSOV. – 2 ex. [AK], same area, Bzybian Mt. Range, Mt. Turetskaya Shapka, 14. VIII. 1986, leg. KOVAL. – 1 ex. [AK], same area, Mtsaga River, 17. VII. 1987, leg. KOVAL. – 5 ex. [ZISP, IB], Sakeni, 450 m, 3. VIII. 1983, leg. BELOUSOV. – 1 ex. [ZISP], Mts near lake Amtkel, 17. VIII. 1958, leg. KURNAKOV. – 1 fm [ZISP], E. Abkhazia, Dzhampal River, 31. VIII. 1986, leg. PRASOLOV. – 1 fm [IB], same area, Tshamagvara Mt., 1940 m, 7. VI. 1989, leg. BELOUSOV. – 1 ex. [IB], Klukhor Pass, 1900 m, 3. VIII. 1983, leg. BELOUSOV. – 35 ex. [ZISP, ZMUM, AK, IB], same area, Kodorian Mt. Range, B. Khodzhal River, 15. VIII. 1986, leg. KOVAL. – 2 fms [IB], same area, Akhatshku Mt., 4. V. 1989, leg. BELOUSOV.

Georgia: 3 ex. [IB], W Mingrelia, near Dzhvari, valley of Intsira River, 29. V. 1988, leg. BELOUSOV. – 1 ml [IB], Low Svanetia, upper reaches of Mannanauri River, 18. VII. 1990, leg. BELOUSOV. – 1 ml, 1 fm [IB], Ratsha, S slope of Mamisson Pass, near Shovi, 23. VII. 1985, leg. BELOUSOV. – 1 fm [IB], same area, Ratshinskyi Mt. Range, S slope of Lebeurismta Mt., forest, 16. VII. 1987, leg. BELOUSOV. – 1 (1) ml [ZISP], Borzhom, 3. IV. 1895. – 1 (1) fm, same area, Bakuriani, 9. X. 1932, leg. KIRSCHENBLATT. – 14 ex. [ZISP, IB], same locality, 1700 m, 15. VIII. 1983, leg. BELOUSOV. – 15 (5) mls, 13 (3) fms [ZISP], Lagodekhi Reserve, 29. V. 1977, leg. KRYZHANOVSKY. – 1 (1) fm + 2 ex. [ZISP], same locality, 28. V. 1965, leg. KRYZHANOVSKY. – 4 ex. [ZISP], same locality, 25. VI. 1984, leg. BELOUSOV. – 3 ex. [IB], Lagodekhi env., Ninigori, 680 m, 22. V. 1979, leg. BELOUSOV. – 6 ex. [ZISP, IB], same locality, pass from Ninigori to Tsumelukh, 24. V. 1979, leg. BELOUSOV. – 1 ex. [ZISP], Kutaisi env., Sataplia Reserve, 30. I. 1989, leg. GAVRIUSHIN. – 2 ex. [MPU], same locality, 28. I. 1987, leg. MAKAROV. – 1 fm, 2 ex. [ZMUM], Tkibuli, Mukhura, 23. X. 1981, leg. GOLOVATCH. – 1 (1) ml [ZISP], Kizil-Kilisa, near lake Tabitzkhuri, 18. V. 1909, leg. BERG. – 1 (1) ml [ZISP], Ed. Betania, prope Tiflis, 12. V. 1929, leg. KIRSCHENBLATT. – 1 (1) fm [ZISP], Antsal-Or Valley, Sign., Tiflis, 25. VII. 1913, leg. MLOKOSSEVITCH. – 3 mls, 2 fms [IB], Meskhetian Mt. Range, Gomis(m)ta, 1900–2200 m, 10.–12. VIII. 1987, leg. BELOUSOV.

Azerbaijan: 6 ex. [IB], Belokany Distr., middle course of Mazumtshai River, 28. VI. 1984, leg. BELOUSOV. – 47 (3) ex. [ZISP, IB], Zakataly, 600 m, 20. VIII. 1982, leg. BELOUSOV. – 15 (2) ex. [ZISP, IB], same locality, 8. X. 1983, leg. BELOUSOV. – 1 ex. [IB], same locality, 5. V. 1983, leg. DAVIDIAN. – 12 ex. [ZISP, IB], same area, Talatshai, 6. VIII. 1977, leg. BELOUSOV. – 3 ex. [IB], same locality, Tala, 2. IV. 1983, leg. BELOUSOV. – 2 ex. [IB], same locality, Perzivan, 28. X. 1982, leg. DAVIDIAN. – 2 ex. [IB], same locality, 22. IV. 1983, leg. DAVIDIAN. – 3 ex. [IB], same locality, 13. IV. 1983, leg. DAVIDIAN. – 15 ex. [ZISP, IB], same locality, 9. VII. 1986, leg. DAVIDIAN. – 3 (1) ex. [IB], Zakataly Distr., Dindiyskiy Pass, 2600 m, 16. X. 1983, leg. BELOUSOV. – 2 ex. [IB], Kakhi Distr., near Sarybash, 2000 m, 12.–13. VI. 1983, leg. BELOUSOV. – 2 (1) ex. [IB], Sheki Distr., Shintshai River, 18. VI. 1983, leg. BELOUSOV. – 16 ex. [ZISP, ZMUM, IB], Vartashen, 2. VII. 1982, leg. BELOUSOV. – 3 ex. [IB], same area, Nazartshai River, 1200–1700 m, 15. VIII. 1984, leg. BELOUSOV. – 2 mls [IB], same locality, Goodontshai Valley in basin of Khalkhaltshai,

20. VIII. 1984, leg. BELOUSOV. – 4 mls, 3 fms [ZISP, IB], W Laghitsh, S Babadagh Mt., sources of Ghirdimantshai River, 14. IX. 1984, leg. BELOUSOV. – 3 ex. [IB], same locality, between Ismailly and Dzholnya, 11. IX. 1984, leg. BELOUSOV. – 1 ex. [IB], Shemakha, 3. VII. 1977, leg. BELOUSOV. – 9 ex. [IB], same area, Purkuli Reserve, 20.–26. V. 1984, leg. LOGUNOV. – 3 ex., same locality, 6.–7. IX. 1984, leg. LOGUNOV. – 7 ex. [ZISP, IB], Kuba env., 25. IX. 1982, leg. BELOUSOV. – 6 ex. [MPU, IB], same locality, 21. VI. 1984, leg. MAKAROV. – 13 ex. [ZISP, IB], Kusary Distr., Shakhnabadshai River, 22. VII. 1982, leg. BELOUSOV. – 1 ex. [IB], same locality, Kurush Pass, 24. VIII. 1986, leg. DAVIDIAN. – 23 / (2) ex. [ZISP, ZMUM, IB], Mt. Shakh-Dagh, Sudur, 25. IX. 1984, leg. BELOUSOV. – 2 ex. [IB], same locality, NW slope of Shakh-Dagh Mt., Tsolakh-Yayla, 24.–25. IX. 1983, leg. BELOUSOV. – 1 (1) fm [ZISP], same locality, 1. X. 1933, leg. BOGATSHEV. – 3 ex. [IB], same area, Laza env., 23. VII. 1982, leg. BELOUSOV. – 1 ml [IB], Kunakhkend Distr., Velvilitshai Valley, 5.–9. IX. 1985, leg. DAVIDIAN. – 2 ex. [IB], Divitshi Distr., sanat. Galalty, 8. VI. 1985, leg. DAVIDIAN. – 6 ex. [IB], the easternmost part of the Caucasus Major, Diubrar Mt., 22. IV. 1984, leg. BELOUSOV. – 1 ex. [IB], same area, valley of Atatshai River, between Khyzy & Alty-Agatsh, 21. IV. 1984, leg. BELOUSOV. – 18 (1) ex. [ZISP, IB], Turiantshai, 18.–19. V. 1983, leg. BELOUSOV. – 6 ex. [ZISP, IB], Murovdagh Mt. Range, Shamkhortsai, 1500–2500 m, 4. X. 1982, leg. BELOUSOV. – 17 ex. [ZISP, IB], same locality, Khan-Bulak, 29. IX. 1982, leg. BELOUSOV. – 1 ml [IB], same area, Khanlar, Taganly, Ghyandzha River, near Tshai-kend, 1. VIII. 1984, leg. BELOUSOV. – 1 ex. [IB], same locality, 19. IX. 1986, leg. DAVIDIAN. – 2 mls, 1 fm [IB], same locality, Gheyghoel Reserve, Kiapaz Mt. Range, 2. VIII. 1984, leg. BELOUSOV. – 6 ex. [IB], same area, N spurs of Ghodzhadagh Mt., near Rustam-Aliev, 29. VIII. 1984, leg. BELOUSOV. – 7 ex. [IB], same area, N slopes of Murovdagh Mt. Range, Shakh-Dagh Mt., 25.–26. VIII. 1984, leg. BELOUSOV. – 1 ml, 2 fm [IB], S slopes of Murovdagh Mt. Range, Turaghai Pass, near Yanshak Village, 1500–2500 m, 5. VIII. 1984, leg. BELOUSOV. – 1 ml, 2 fms [IB], Kelbadzhary Distr., near Istisu, Dalidagh Mt., 2300–3200 m, 6. VIII. 1984, leg. BELOUSOV. – 3 (3) mls, 2 (2) fms, + 11 ex. [ZISP], Karabakh, Lysogorsk, leg. BOGATSHEV. – 2 mls, 1 fm [IB], same locality, E slope of Sarybaba Mt., 1800–2000 m, 18. X. 1984, leg. BELOUSOV. – 3 ex. [IB], same range, Ghyrkghyzy Mt., 11. VIII. 1985, leg. DAVIDIAN. – 1 ml, 1 fm [ZIU], same area, Shusha env., Dushatly, 1100 m, 1. V. 1983, leg. DOLIN. – 1 (1) ml + 2 ex. [ZISP], same area, Sandzharady, 3. VI. 1909, leg. KIRITSHENKO. – 5 (1) ex. [IB], Zangelan env., 16. V. 1983, leg. BELOUSOV. – 6 (1) ex. [ZISP, IB], Talysh, Lerik, 900 m, 11. VII. 1983, leg. BELOUSOV. – 7 ex. [IB], same locality, 5–10 km E Lerik, near village Azerbaidjan, 11. VII. 1983, leg. BELOUSOV. – 4 (4) mls, 1 (1) fm + 4 ex. [ZISP], same locality, 12. V. 1909, leg. KIRITSHENKO. – 9 (3) ex. [IB], same locality, Mastail, 5. VII. 1983, leg. BELOUSOV. – 5 ex. [ZISP, IB], same area, Zuvant, Ambur-Dere, 9. VII. 1983, leg. BELOUSOV. – 16 (2) ex. [IB], same area, Galabyn, 6.–7. VII. 1983, leg. BELOUSOV. – 5 (1) ex. [IB], same area, Pirasora, Orant, 9. VII. 1983, leg. BELOUSOV. – 13 (5) [ZISP, IB], same area, Veri, 2.–3. VI. 1983, leg. BELOUSOV. – 3 ex. [MU], Zuvant, Mistan Mt. Range, Dzhon (= Dzhuni), leg. KAZANTSEV. – 4 (4) mls, 1 (1) fm + 24 ex. [ZISP], Zuvand, Aiuliakeran, 3. VIII. 1981, leg. ZNOIKO. – 1 ml [AZ], Talysh, Alexeevka, 15. VI. – 28. IV. 1993, leg. SHAMAEV. – 32 ex. [ZISP, IB], same area, Alazapin (Bilyasary), Khanbulak River, 18.–19. VII. 1984, leg. BELOUSOV.

Nakhichevan: 11 ex. [IB], Ordubad env., Nius-Nius, 4. VII. 1984, leg. BELOUSOV. – 1 ex. [IB], right bank of Vanandtsai, above Yukhary-Aza, 8. VII. 1984, leg. BELOUSOV.

Armenia: 4 mls, 1 fm, 11 ex. [ZISP, IB], N slopes of Murovdagh Mt. Range, 24. VIII. 1984, leg. BELOUSOV. – 1 (1) fm + 1 ex. [ZISP], Dzhahal-Ogly (= Stepanavan). – 1 (1) ml [ZISP], same locality, 10. V. 1986, leg. KAEPPEROV (?). – 2 ex. [IB], W spurs of Gegamskiy Mt. Range, Garni vic., 28. V. 1979, leg. BELOUSOV. – 5 ex. [EK], Leninakan env., 5. VI. 1989, leg. KRAVETS. – 1 ex. [IB], Kavirli Mt., S Vorotan Pass, 14. VII. 1984, leg. BELOUSOV. – 2 ex. [IB], Zanghezur Mt. Range, Mt. Kaputdzukh, 2400–2800 m, 9. VI. 1982, leg. BELOUSOV. – 1 (1) ml, 4 ex. [IB], same locality VI. 1986, leg. DAVIDIAN. – 1 ml [ZIU], same area, Kadzharan Distr., 16. VI. 1977, leg. DOLIN. – 1 ex. [ZIA], Dilizhan env., Agartsyn, 4. VII. 1980, leg. KALASHIAN. – 1 ex. [IB], same locality, NW tributary of Agstev River, 1800 m, 31. VII. 1986, leg. DAVIDIAN. – 1 ex. [ZIA], Sevan Plateau, Semenovka, 30. VI. 1976, leg. KALASHIAN. – 1 fm [MPU], Megri Distr., Niuvedy, 26. IV. 1983, leg. YANUSHEV. – 1 ml [ZIU], same locality, 26. IV. 1983, leg. DOLIN. – 1 ex. [IB], same area, Litshk, 29. VI. 1983, leg. BELOUSOV.

Redescription

Medium-sized, body length 4.55–5.80 (5.25) mm. Subconvex. Upperside dark blue, shining, sometimes with greenish lustre; legs flavous, femora strongly darkened, usually only distal quarter light; antennae distinctly darkened beginning from apical half of the antennomere 3.

Head moderate in size, 1.16–1.32 (1.25) times as wide as pronotum. Frontal furrows deep and irregular, at bottom slightly transversely rugose, with a few, very fine and small punctures; sometimes a similar punctuation distinguishable also on vertex. Eyes flattened, ca. 3.0–4.0 (3.5) times as long as tempora; posterior supraorbital seta level to rear eye margin. Antennae moderate in length, not reaching to level of elytral fore discal pores; 3rd antennomere 2.7–3.2 (2.9) times as long as wide and a little less than 1.5 times as long as the 2nd.

Pronotum (Fig. 7) cordate, its sides strongly sinuate before large and rectangular hind angles, comparatively transverse, 1.24–1.40 (1.30) times as wide as long and 1.27–1.40 (1.34) times as wide at broadest part as at base. Latter somewhat salient, slightly oblique on sides, on the average 1.05 times as wide as front margin. Front angles very small but slightly projecting forwards. Lateral gutter moderately reflexed throughout. Basal surface of pronotum strongly punctured and vaguely rugose longitudinally. Transverse apical impression sharply engraved but interrupted near median line, with a few fine punctures; basal impression relatively deep but indistinctly outlined; basal foveae small, very strongly impressed; postangular carina thin and long, almost straight; median line superficial, becoming deeper at level of both transverse impressions and interrupted near front and hind margins of the pronotum.

Elytra ovate, somewhat parallel-sided in middle part, broadest at midlength or just behind it and there 1.51–1.63 (1.57) times as long as wide combined, 1.91–2.14 (2.01) times as wide as head and 3.17–3.45 (3.35) times as long as pronotum. Six inner discal striae of elytra deep and strongly punctured (distance between punctures often comparable with their diameter). Stria 7 superficial, consisting of small and fine, isolated punctures. All striae much more shallow toward apex but even there distinguishable. Both apical pores in a well-developed, continuous, apical striola joining stria 5 anteriorly. All pores of humeral group of umbilicate series usually equidistant. Posterior discal pores about level to median group of umbilicate series. Discal formula 26–34 (30)/56–68 (64).

Usually microsculpture completely missing on the dorsum except for vertex and most of elytral apex.

Two proximal segments of male protarsi dilated, feebly inwards dentate and furnished with adhesive soles beneath, tarsomere 1 being ca. 1.5 times as long as wide.

Aedeagus (Fig. 10) large with an outwards projecting endophallus armature.

Spermatheca (Fig. 27) relatively small, its apical and basal parts subequal, former without distinct constriction. Spermathecal ductus as a regular polycoil spiral with a more or less strongly sclerotized stripe inside.

Variability

The most high-montane populations are characterized by flatter eyes, a more strongly depressed body with less strongly salient humeri, and highly delicate elytral striae, all this providing a striking superficial resemblance of e. g. the Shalbuzdagh

population, East Caucasus, with the sympatric *Bembidion sevanense asiorum* Müller-Motzfeld (BELOUSOV & MÜLLER-MOTZFELD, 1990).

Only specimens deriving from southeastern Transcaucasia display the elytra covered with an exceptionally superficial but distinguishable microsculpture, completely in females and at least on the posterior half in males. By this character, these populations are similar to *B. adygorum* n. sp., described below, but they usually differ from it by the less convex eyes that are even flatter than in the typical *B. fraxator*. On the other hand, some individuals from the above deviating populations exhibit a more or less strongly developed elytral spot. In this case, habitually they approach *B. dalmatinum haupti* Reitter. In addition, such specimens seem to display a clear-cut preponderance to lower terrain elevations (not higher than 1800 m a. s. l.) combined with more strongly convex eyes. This even reinforces their habitual resemblance with *B. dalmatinum haupti*. However, both forms are easily distinguishable in the latter's virtually missing elytral microsculpture.

Notes

This is the most common, widespread and variable consubgener in the Caucasus, also populating the greatest variety of habitats. This species differs from the most closely related *B. dalmatinum haupti* and *B. adygorum* n. sp. in the considerably flatter eyes, from the former also by the monochromous elytra, from the latter by the more strongly obliterated microsculpture and darker antennae and femora. The above polymorphism, especially in specimens from the extreme southeast of the Zanghezur Mountain Range, Armenia, i. e. at the range border of the species concerned with *B. dalmatinum haupti*, suggest a hybridization zone between them. However, deficiency of comparative material does not allow yet to solve this problem. It is even possible that this Zanghezur population actually represents a subspecies of its own.

Distribution

Widespread all over the Caucasus including the Talysh Mts (Fig. 34).

5.2. *Bembidion dalmatinum haupti* Reitter (Figs 9, 32, 33, 34)

Bembidion biguttatum Motschulsky, 1850, Käf. Russl.: 9 (nom praeoccup.), nec Fabricius.

Bembidion haupti Reitter, 1908, F. Germ.: 110 (Loc. typ. Araxesthal bei Ordubad).

Bembidion haupti: CSIKI, 1928, Cat. col.: 92.

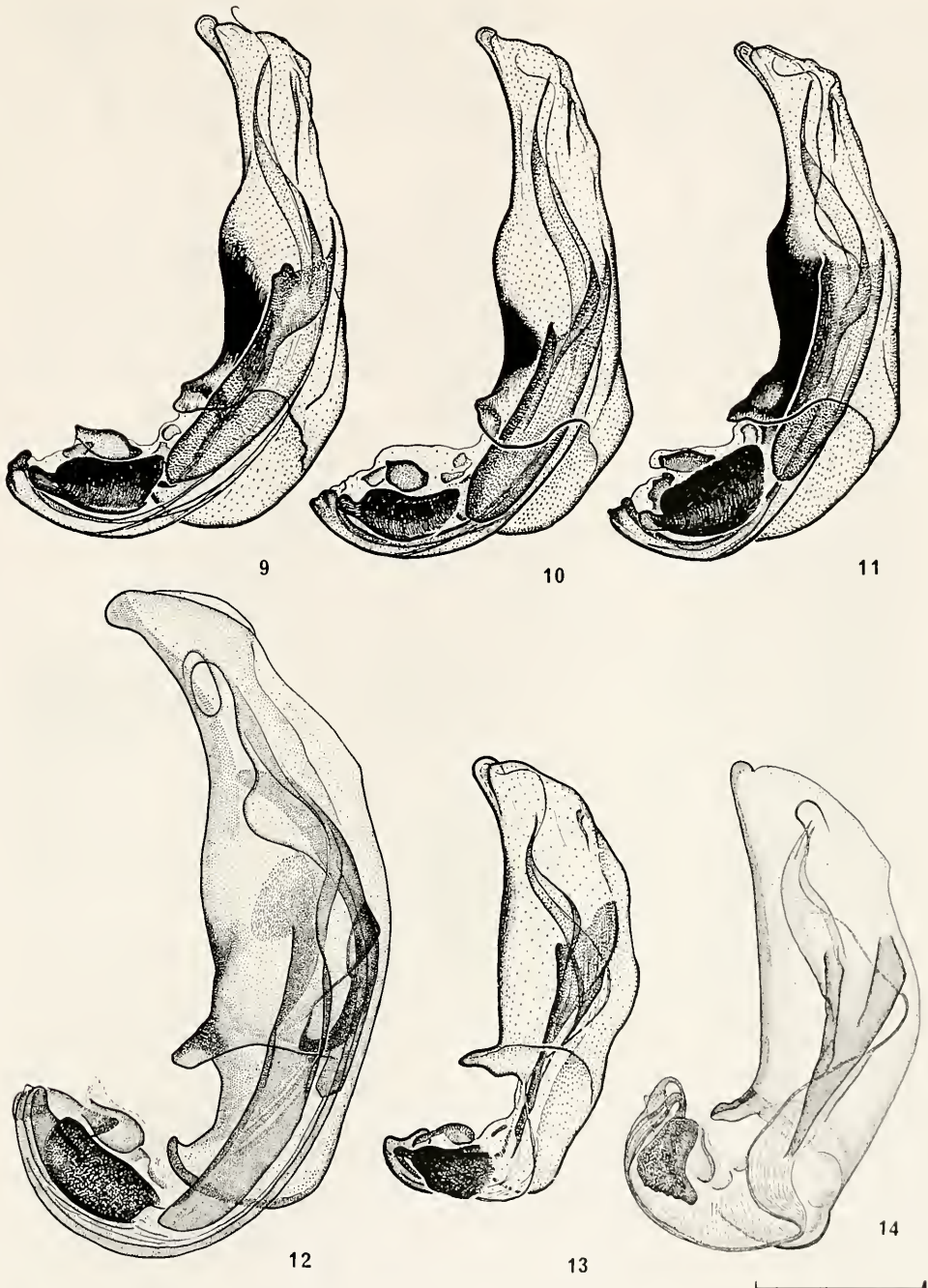
Bembidion dalmatinum ssp. *haupti*: NETOLITZKY, 1943, Koleopt. Rundsch., 29: 46.

Bembidion nitidulum haupti: Iablokoff-Khnzorian, 1976, Fauna Armen. SSR, 1: 182.

Bembidion nitidulum haupti: Müller-Motzfeld, 1986, 30 (1): 39.

Material examined

Armenia: 2 mls [IB], W slope of Gegharn Mt. Range, Garni-Gokhta, 15. V. 1979, leg. BELOUSOV. – 32 (3) mls, 41 (2) fms [ZISP, IB], Vedi env., 8. X. 1982, leg. BELOUSOV. – 5 ex. [IS], same locality, 7. X. 1982, leg. LUKHTANOV. – 1 ml [ZIU], Khosrov, 2100 m, 15. VI. 1986, leg. DOLIN. – 18 ex. [IB], same area, valley of Arpatshai River, 13. VII. 1984, leg. BELOUSOV. – 1 ml, 1 fm [IB], same area, near Martiros, 12. VII. 1984, leg. BELOUSOV. – 4 ex. [ZIA], Armenia, Ekhegnadzor, 3. VIII. 1983, leg. KALASHIAN. – 1 ex., Biurakan, Amberd, 14. VII. 1986, leg. KALASHIAN. – 1 fm [IB], Shamshadin Distr., 1800 m, 19. VI. 1986, leg. GOLOVATCH. – 1 ex. [IB], Megri env., 30. VI. 1983, leg. BELOUSOV.



Figs 9-14. Median lobe of aedeagus of *Peryphanes*-species. - 9. *B. dalmatinum haupti* Rtt., Nius-Nius; - 10. *B. fraxator* Mén., Lagodekhi; - 11. *B. adygorum* n. sp., Tshkhalta; - 12. *B. stephensi* Crotch, St. Petersburg env.; - 13. *B. lirykense* Rtt., Hyrcan Reserve; - 14. *B. hissaricum* Net., Ghissar Mt. Range. - Scalebar: 0,5 mm.

Nakhichevan: 3 mls, 3 fms [IB], Daralagoez Mt. Range, Kiukiu Mt., 9. VII. 1984, leg. BELOUSOV. – 1 ex. [IB], Ordubad env., Nius-Nius, 4. VII. 1984, leg. BELOUSOV. – 2 fms [MPU], Buzgov, 16. VI. 1983, leg. KAZIUTSHITS.

Azerbaijan: 1 fm [IB], Talysh, Avrova env., 9. VII. 1977, leg. DOLIN.

Turkmenia: 1 ml [MPU], Kopetdagh, Yeldere, Siunt, 29. VI. 1985, leg. KAZIUTSHITS. – 3 ex. [IB], same locality, 14. X. 1980, leg. GROMOV.

Redescription

Medium-sized, although somewhat greater as compared with the most closely related Caucasian species, body length 5.20–5.95 (5.50) mm. Subconvex, sides subparallel in middle part. Upperside dark blue, shining, elytra with vaguely delimited reddish spots at apical third; legs flavous, femora strongly darkened, only just at apex light; antennae as well as penultimate segment of labial palpi dark, only scapus and to some extent antennomeres 2 and 3 yellowish.

Head comparatively small, only 1.15–1.35 (1.21) times as wide as pronotum. Frontal furrows deep and irregular, at bottom slightly transversely rugose, with a few fine but usually distinct punctures. Eyes comparatively convex, 3.9–6.5 times as long as temporae (in males larger, this index on the average being 5.7 versus 4.8 in females); posterior supraorbital seta markedly in front of rear eye margin. Antennae moderate in length, usually not reaching to level of fore discal pores; their 3rd segment about 2.7 times as long as wide and ca. 1.5 times as long as the 2nd.

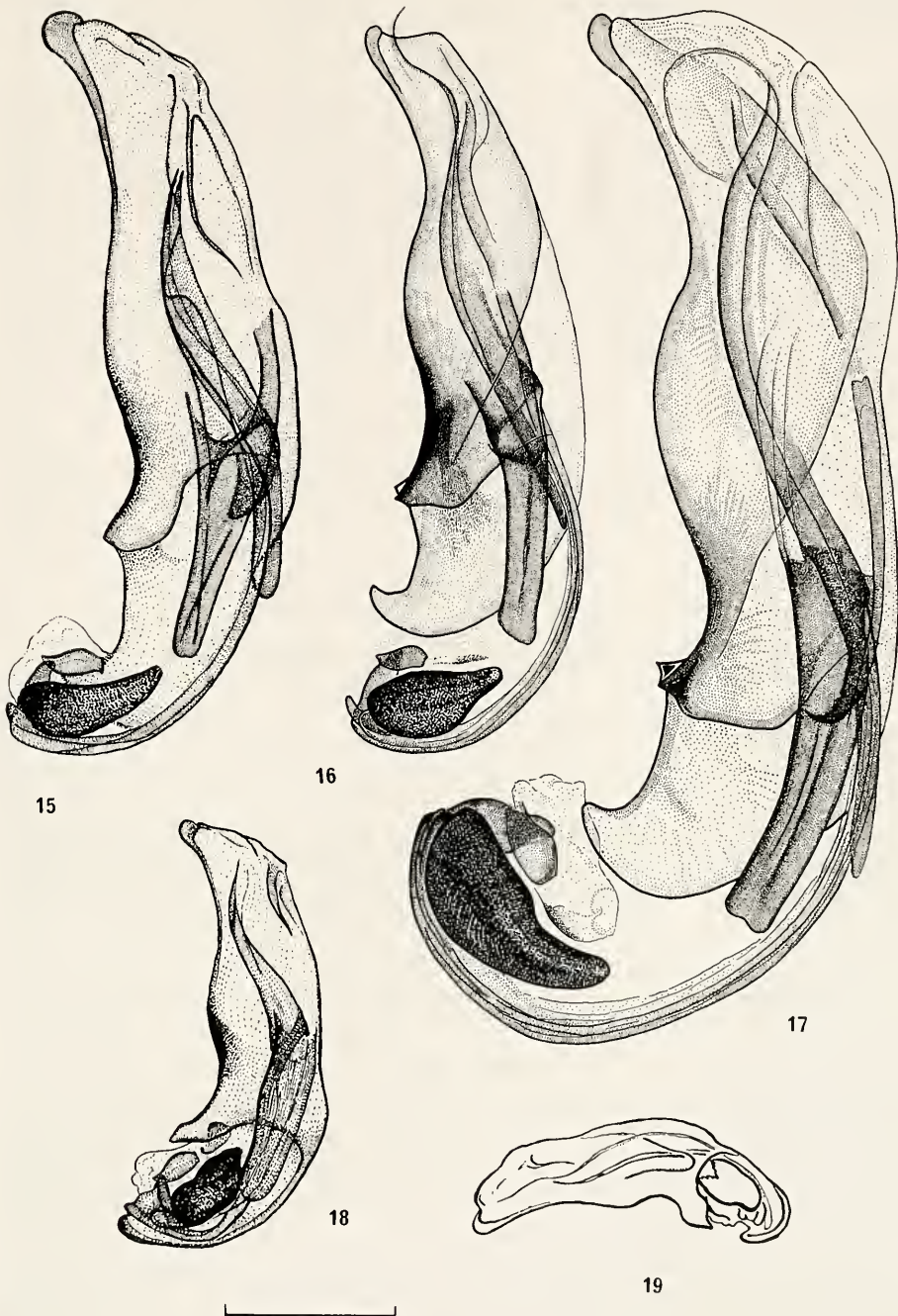
Pronotum cordate, comparatively transverse, its sides strongly sinuate before large and rectangular hind angles, 1.27–1.38 (1.33) times as wide as long and 1.32–1.38 (1.33) times as wide at broadest part as at base. Latter somewhat salient, slightly oblique on sides, about 1.05 times as wide as front margin. Front angles very small and slightly projecting forwards. Lateral gutter moderately reflexed. Basal surface of pronotum strongly punctured and vaguely rugose longitudinally. Transverse apical impression sharply engraved but interrupted near median line, with a few fine punctures; basal impression relatively deep but indistinctly outlined; basal foveae small and very strongly impressed; postangular carina thin and long, almost straight; median line well-developed but relatively superficial.

Elytra convex and ovate, subparallel in middle part, their maximum width distinctly behind midlength, 1.48–1.61 (1.58) times as long as wide combined, 1.87–2.11 (for males averaging 1.91 versus 1.97 in females) times as wide as head and 3.26–3.44 (3.37) times as long as pronotum. Six inner discal striae of elytra deep and strongly punctured (distance between punctures considerably less than their diameter). Stria superficial, consisting of small, fine, isolated punctures, all interspaces flat. All striae much more shallow toward apex, but even there distinguishable. Both apical pores in a well-developed, continuous, apical striola joining stria 5 anteriorly. Humeral pores 2 and 3 closer each to other as compared with other pores of humeral group of umbilicate series, first one being especially distant from others. Posterior discal pores about level to median group of umbilicate series. Discal formula 29–33 (31)/61–70 (64).

Microsculpture completely obliterated, visible only just at apex of the elytra.

Two proximal segments of male protarsi dilated, feebly inwards dentate and furnished with adhesive soles beneath, tarsomere 1 being about 1.5 times as long as wide.

Aedeagus (Fig. 9) as in nominotypical subspecies, large with an outwards projecting endophallus armature.



Figs 15–19. Median lobe of aedeagus of *Peryphanes*-species. – 15. *B. olegleonidovici* Fas., Lazarevskoye; – 16. *B. phryganobium* n. sp., Vedi.; – 17. *B. imereticum* n. sp., Borzhomi; – 18. *B. deletum* Serv., Gorgany; – 19. Outline of the aedeagus in the same scale, *B. brunnicorne* Dej., Lazarevskoye. – Scalebar: 0,5 mm.

Spermatheca (Fig. 32) distinctly larger as compared with that of *B. fraxator* Ménétériés, but much smaller than in *B. adygorum* n. sp.

Notes

This subspecies is easily distinguishable from the nominotypical one by the colour of the dorsum, the latter with two reddish apical spots on the elytra. Its distribution touches that of *B. fraxator* in the north. Along the boundary between them, both taxa considered differ from each other also by the shape of the eyes (see Fig. 33), more strongly protruding in *B. dalmatinum haupti*, as well as in the somewhat greater size and more transverse pronotum in the latter taxon. It is worthy noting that the southernmost populations of *B. fraxator* often possess a more strongly developed microsculpture perceptible also on the anterior part of the elytra at least in the female, this also permitting a secure separation of both species in question.

Distribution and ecology

This species occurs mainly in the most arid landscapes of Transcaucasia (Fig. 33), however avoiding plains. Met with in Nakhichevan and the Talysh at low elevations, at most hardly exceeding 2000 m a. s. l.

5.3. *Bembidion adygorum* n. sp. (Figs 2, 11, 28, 35)

Bembidion nitidulum hybridum: MÜLLER, 1918, Koleopt. Rundschau, 7: 88 (part.).

Bembidion nitidulum ab. *reticulatum* Iablokoff-Khnzorian, 1976, Fauna Armen. SSR, 1: 182 (Loc. typ. Idzhevan).

Bembidion dalmatinum: MÜLLER-MOTZFELD, 1986, 30 (1): 37, fig. 5, prep. N 1596 (part.).

Holotype: 1 ml [ZISP], Bzybian Mt. Range, Mt. Turetskaya Shapka, 2. VIII. 1988, leg. KOVAL.

Paratypes: 17 (1) mls, 8 fms [ZISP, AK, IB], same data as holotype. – **Krasnodar Prov.**: 1 (1) ml, 1 fm [ZISP], Cauc. Occid., regio maritima, leg. STARCK. – 1 (1) ml [IB], Gelendzhik env., 20. IV. 1990, leg. SHESTOPALOV. – 1 (1) ml, 1 fm [AK], Tuapse Distr., 6 km SE of Olginka, 27. VI. 1987, leg. KOVAL. – 1 ml [AK], same locality, near Dederkoi, Dederkoi Valley, 4. VII. 1987, leg. KOVAL. – 1 ml [IB], same area, Semashkho Mt., 19. VI. 1987, leg. BELOUSOV. – 3 (2) mls, 1 fm [AK], NW of Lazarevskoe (Sochi), aul Nadzhigo, Makopse River, 2. VIII. 1987, leg. KOVAL. – 1 (1) ml [AZ], Sochi, Lazarevskoye, 24. VI. 1985, leg. ZAMOTAJLOV. – 2 mls [AK], same area, Krasnoalexandrovskiy, Bekishei River, 12. VIII. 1984, leg. KOVAL. – 1 (1) fm [IB], Psezuapse River, 22. VII. 1984, leg. PRASOLOV. – 5 mls, 1 fm [ZISP, IB], same locality 300–400 m, 19. VII. 1984, leg. PRASOLOV. – 2 (1) mls, 4 fms [ZISP, AK], same locality, Alexeevskoe, 19. VII. 1984, leg. KOVAL. – 3 (1) ml, 2 fms [AK], same area, Tatianovka, 5. VII. 1987, leg. KOVAL. – 1 ml [AK], same locality, 6. IX. 1987, leg. KOVAL. – 3 fms [IB], same area, Soloniki, 22. VII. 1984, leg. PRASOLOV. – 4 (1) mls, 1 fm [AK], same area, Solokhaul, Shakhe River, 21. VI. 1986, leg. KOVAL. – 2 (1) mls, 1 (1) fm [AK], same locality, 1. VIII. 1987, leg. KOVAL. – 1 (1) fm [AK], Mt. Akhun, Agura Valley, 300 m, 24. V. 1993, leg. KOVAL. – 1 ml [SB], Kholmskiy, 13. VI. 1977, leg. BELOBORODOV. – 1 ml [ZISP], Cauc. occ., Krasnaja Polana, 30. VI. 1907, leg. KIRITCHENKO. – 1 (1) ml [ZISP], Cauc. occ., Krasa. Polana, leg. Dr. LGOCKI (this specimen is labelled as follows: „*Peryphus nitidulum*, NETOLITZKY det.“). – 1 (1) ml [ZISP], Mt. Stshetka, 30. VIII. 1986. – 1 ml, 1 fm, [IB], same area, Shessi Mt., 1. VI. 1992, leg. M. & V. SAVITZKYI. – 1 fm [ZISP], Tuby-Lagonaki, 14. VII. 1963, leg. KURNAKOV. – 1 fm [ZISP], Circassia, fl. Kitschmai. – 2 mls, 3 fms [ZISP], same area, Agura River, 30. VII. 1931, leg. LUTSHNIK. – 1 fm [IB], Ubynskaya, on light, 3. VII. 1988, leg. PERKOVSKIY. – 1 ml [ZISP], same locality, 4. VIII. 1977, leg. KOROTYAEV. – 1 fm [ZISP], same locality, 6. VII. 1970, leg. DANILEVSKIY. – 1 fm [ZISP], same locality, 27. VI. 1988, leg. PERKOVSKIY. – 1 ml, 1 fm [IB], same area, climb to Tkhav Mt., 26. VII. 1992, leg. M. & V. SA-

VITZKYI. – 1 ex. [VG], Guzeripl, leg. GREBENNIKOV. – 1 fm [IB], same locality, 21. VI. 1986, leg. USHAKOV. – 6 mls, 7 fms [ZMUM, ZISP, IB], W Caucasus, Guzeripl env., foothills of Ingernyi Mt. Range, 9–10. VI. 1992, leg. M. & V. SAVITZKYI. – 1 fm [ZISP], Khamyshki, leg. ARNOLDI. – 1 fm [AK], Mt. B. Tkhatsh, 1800 m, 5. VI. 1993, leg. KOVAL. – 1 (1) ml [SB], Psebai env., Caucasian State Reserve, Laba River, 8. VII. 1982, leg. IVANOV.

Abkhazia: 1 ml [AK], Gagrskiy Mt. Range, Telebash Ridge, near Atshmarda, 19. VIII. 1986, leg. KOVAL. – 1 (1) ml, 1 fm [IB], Bzybian Mt. Range, N of Khuap, 1600–2000 m, 23–24. VII. 1987, leg. BELOUSOV. – 1 fm [AK], same locality, 500 m, 25. VII. 1987, leg. KOVAL. – 1 (1) fm [AK], same locality, 31. V. 1986, leg. KOVAL. – 1 ml [ZISP], chaine de Bzyb, Distr. Gudauta, 23. V. 1958, leg. KURNAKOV. – 1 fm [IB], Gudauta Distr., 1–3 km N of Duripsh, 19. IX. 1985, leg. USHAKOV. – 1 fm [ZISP], same area, Otkhara, 11. III. 1955, leg. KURNAKOV. – 1 ml [ZISP], same locality, 17. IV. 1955, leg. KURNAKOV. – 13 mls, 14 fms [ZISP, AK], same locality, 8. VIII. 1988, leg. KOVAL. – 4 (1) mls, 1 fm [AK], same locality, 13. VI. 1986, leg. KOVAL. – 1 ml [AK], same area, Mtsagi River, 17. VII. 1987, leg. KOVAL. – 1 ml [AK], same area, Tshedym Mt. Range, Tshedym River, 5. IX. 1986, leg. KOVAL. – 1 (1) fm [ZISP], Sukhum, 4. IX. 1911, leg. ZAITSEV. – 2 fms [ZISP], same locality, 15. V. 1932, leg. BELIZIN. – 1 (1) ml [ZISP], same locality, 8. V. 1932, leg. BELIZIN. – 1 fm [IB], Tsimuri env., 8–14. IV. 1990, leg. KAZANTSEV. – 1 fm [IB], same locality, 450 m, 17–21. VII. 1990, leg. GUSAROV. – 1 fm [IB], same area, Ost-Gumista, VI. 1980, leg. GOTTWALD. – 4 (2) mls, 3 (1) fms [ZISP], Tshkhalt Valley, 24. VI. 1982, leg. DRABKIN. – 2 (2) mls, 2 fms [ZISP, IB], Dzhangal River, 1200 m, 29. VIII. 1986, leg. PRASOLOV. – 1 ml, 1 fm [IB], same locality, 28. VIII. 1986, leg. PRASOLOV. – 1 ml, 1 fm [AK], Bolshoy Khodzhal River, 16. VIII. 1986, leg. KOVAL.

Georgia: 1 (1) ml, 2 (1) fms [ZISP], Megrelian Mt. Range, 25. VI. 1962, leg. DZHAMBAZISHVILI. – 2 mls [AZ], Inguri Valley, Vedula River, Zeda-Vedi, 1200 m, 10–11. V. 1991, leg. ZAMOTAJLOV & MIROSHNIKOV. – 1 ml [ZISP], Tkibuli, Mukhura, 23. X. 1982, leg. GOLOVATCH. – 1 fm [MPU], Kutaisi Distr., Mt. Sataplia, southern slope, 2. II. 1987, leg. MAKAROV. – 1 fm [ZISP], Ratsha, Shovi, 17. VII. 1949, leg. KURNAKOV. – 1 fm [IB], Adzharia, Khulo Distr., Ogara, 5. VIII. 1990, leg. GUSAROV.

Armenia: 1 fm, Idzhevan, near Gosh, „1503“, 27. V. 1980, leg. KALASHIAN. – 1 ml [ZIA], same locality, near Goshali Lake, 23. X. 1979, leg. KALASHIAN. – 1 fm [ZIA], same area, Dashkean (= Dashkesan?), Bluantshai, „567“, 15. VI. 1976, leg. KALASHIAN. – 1 ml, 1 fm [IB], same area, near Artsvashen (= Bashkend), 24. VIII. 1984, leg. BELOUSOV.

Azerbaijan: 1 (1) ml, 1 (1) fm [IB], Murovdagh, Khanlar Distr., near Togana, 19. IX. 1986, leg. DAVIDIAN. – 3 mls, 3 fms [IB], same area, N spurs of Ghodzhadagh Mt. near Rustam-Aliev, 29. VIII. 1984, leg. BELOUSOV. – 1 (1) fm [IB], E part of the Caucasus Major, S Babadagh Mt., upper reaches of Ghirdimantshai River, 14. IX. 1984, leg. BELOUSOV.

Etymology

The species epithet derives from the people of Adyg, one of the Caucasian tribes.

Description

Medium-sized, body length 4.75–5.85 (5.25) mm. Subconvex, sides rounded, humeri protruding. Upperside blue, shining; legs flavous, femora darkened, usually only distal third light, but in some specimens almost entire femora light; antennae light, strongly darkened in the middle part beginning from apical half of antennomere 3.

Head comparatively large, only 1.18–1.32 (1.24) times as wide as pronotum. Frontal furrows deep and irregular, at bottom slightly rugose transversely, with a few very fine and small punctures, sometimes a similar, hardly distinguishable punctation also on vertex. Eyes (Fig. 2) moderately convex, bout 3.5–5.8 (4.5) times as long as temporae; posterior supraorbital seta a little in front of rear eye margin. Antennae moderate in length, not reaching to level of fore discal pores; their 3rd segment 2.5–3.2 (2.9) times as long as wide and 1.25–1.55 (1.40) times as long as the 2nd.

Pronotum cordate, its sides strongly sinuate before large and rectangular hind angles, comparatively transverse, 1.27–1.39 (1.34) times as wide as long and 1.24–1.39 (1.34) times as wide at broadest part as at the base. Latter somewhat salient, slightly oblique on sides, 1.00–1.15 (1.05) times as wide as front margin. Front angles very small but slightly projecting forwards. Lateral gutter moderately reflexed. Basal surface of pronotum strongly punctured and vaguely rugose longitudinally. Transverse apical impression sharply engraved but interrupted near median line, with a few fine punctures; basal impression relatively deep but indistinctly outlined; basal foveae small and very strongly impressed; postangular carina thin and long, almost straight; median line superficial, becoming more shallow anteriorly and usually posteriorly but deep near both transverse impressions.

Elytra ovate, with prominent humeri, somewhat parallelsided in the middle part, broadest at midlength and there 1.44–1.59 times as long as wide combined (in males longer, on the average 1.56 versus 1.52 in females), 1.86–2.11 (2.00) times as wide as head and 3.17–3.47 (3.35) times as long as pronotum. Six inner discal striae of elytra deep and strongly punctured (distance between punctures less than their diameter). Stria superficial, consisting of small, fine, isolated punctures. All striae much shallower toward apex but even there distinguishable. Both apical pores in a well-developed, continuous, apical striola joining stria 5 anteriorly. Usually all pores of humeral group of umbilicate series either more or less equidistant or median pair somewhat more distant from first pore of humeral group. Posterior discal pores about level to median group of umbilicate series. Discal formula 26–34 (40)/55–68 (64).

Microsculpture missing on head and pronotum. Only vertex and elytra including humeral areas with a superficial but distinct microsculpture consisting of fine transverse meshes better distinguishable in females.

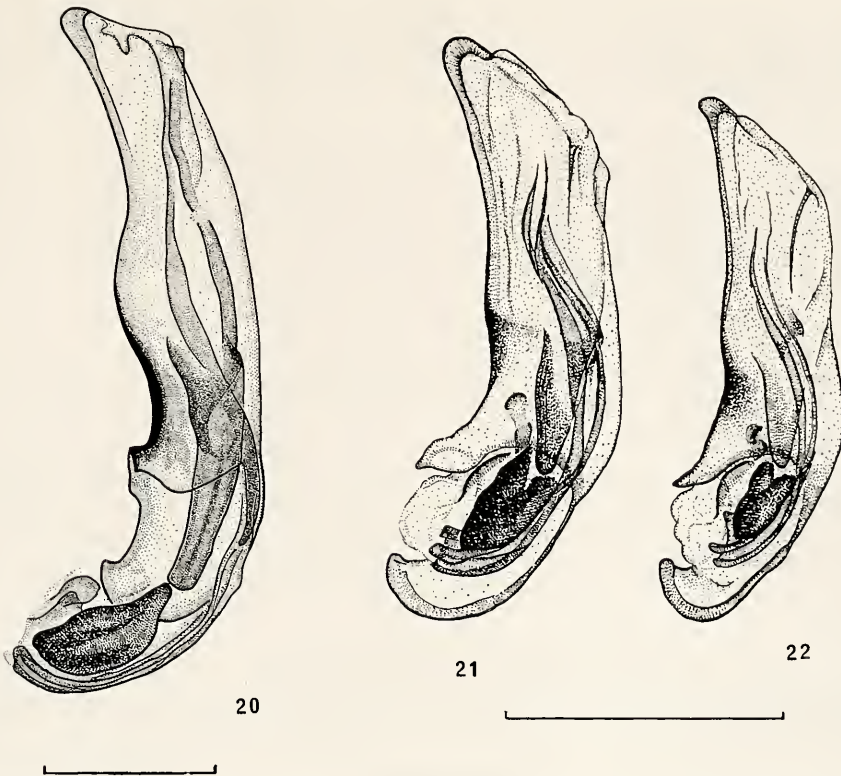
Two proximal segments of male protarsi dilated, feebly inwards dentate and furnished with adhesive soles beneath, tarsomere 1 being about 1.5 times as long as wide.

Aedeagus (Fig. 11) large, with an outwards projecting endophallus armature. Ribbon brush normally wider distally as compared with *B. fraxator*.

Spermatheca (Fig. 28) very similar in shape to that of *B. fraxator*, being easily distinguishable by the considerably larger size and somewhat longer and stronger swollen apical part.

Notes

This species is very closely related to the most common Caucasian consubgener, *B. fraxator* Ménétériés. Both species are very similar in the proportions and aedeagal conformation, differing mainly in the shape of the eyes and in microsculpture. The new species possesses more strongly protruding eyes (cf. Figs 2–3) and a better developed microsculpture of the elytra distinct even on their humeral areas in both sexes. In addition, the humeri of the new species are more strongly protruding. It is particularly surprising that such closely allied species are so readily distinguishable in the size of the spermatheca (cf. Figs 27–28), the latter being considerably larger in the new species. It is worthy noting that, in spite of the very faint differences in aedeagal conformation (the basal chitin platelet more strongly elongate in the new species), both species compared often coexist, remaining easily distinguishable externally. In the areas of sympatry, intermediate specimens have never been found.



Figs 20–22. Median lobe of aedeagus of *Peryphanes*-species. – 20. *B. grandipenne* Schaum, Lectotypus, Graecia; – 21. *B. brunnicorne*, Dej., Lazarevskoye; – 22. *B. milleri* Duval, Moldavia. – Scalebars: 0,5 mm.

In addition, this new species is habitually quite similar to the boreal *B. deletum* Serville, 1821 (= *B. nitidulum* Marsham, 1802), and it seems most likely that some former records of *B. nitidulum* (e. g. JAKOBSON, 1905: 286; HIEKE & WRASE, 1988: 53) or *B. nitidulum hybridum* Apfelbeck (APFELBECK, 1904; MÜLLER, 1918) in the Caucasus actually refer to *B. adygorum* n. sp. This is even more probable as part of material so determined by NETOLITZKY has been revised here (see above). Topotypical specimens at our disposal, all deriving from the environs of Idzhevan (the locus typicus of *B. nitidulum* ab. *reticulatus* Khnzorian), are in perfect agreement with KHNZORIAN's description and might be referred also to the species considered. Finally, a certain similarity of the new species with *B. deletum hybridum* from the Balkan Peninsula, should be noted. According to HIEKE & WRASE (1988: 53), the latter taxon actually belongs to *Bembidion dalmatinum* Dejean, 1831, this being ascertained by aedeagal structure. Both above taxa share the elytra covered with a more or less widespread (sensu the cited authors, developed only „am Ende der Flügeldecken“ in *B. dalmatinum hybridum*) microsculpture and relatively light femora, but they are readily distinguishable by the much more strongly protruding eyes and by the more distinctly salient humeri in the Caucasian species.

Distribution

This species is widespread over the Caucasian region except for southeastern Transcaucasia (Fig. 35).

5.4. *Bembidion grandipenne* Schaum (Figs 20, 29)

Bembidium grandipenne Schaum, 1862, Berl. ent. Zeitschr. 6: 113 (loc. typ. Graecia).

Bembidion grandipenne: JAKOBSON, 1906, Beetles of Russia and West Europe, 4: 286.

Bembidion grandipenne: CSIKI, 1928, Cat. col.: 98.

Bembidion grandipenne: NETOLITZKY, 1943, Koleopt. Rundsch., 29: 44.

Bembidion grandipenne: HIEKE & WRASE, 1988, Dtsch. ent. Zeitschr., 35 (1–3): 54.

Bembidion freyi Netolitzky, 1937, Ent. Blätter 33: 214 (loc. typ. Beirut).

Bembidion grandipenne freyi: FASSATI, 1990, Acta Univ. Carol.: 168.

Bembidion grandipenne bulgardagense Fassati, 1990, Acta Univ. Carol.: 34: 168 (loc. typ. Bulghar Dag).

Lectotype (here designated), male, labelled as follows: „55191“, „*B. grandipenne* m. Graecia“, *B. grandipenne* SCH. det. NETOLITZKY“, „Zool. Mus. Berlin“, „*Bembidion grandipenne* SCHAUM., Lectotypus, BELOUSOV design.“ (ZMB, Berlin). Holotype dissected by us, conserved in euparal.

Paralectotypes: 1 male and 1 female, labelled as holotype but without SCHAUM's determination.

Further material examined

1 fm (ZISP), Vlachi Pirin, Mac. VII. 32 MAR. et TAB. labelled as follows „*Bembidion grandipenne* SCH., Dr MARAN det.“.

Redescription

Large-sized, body length 6.25–6.85 (6.59) mm. Moderately convex and elongate, sides rectilinearly divergent posteriorly toward apical third of the elytra. Upperside blue, shining, vertex and elytra usually tinged with reddish. Legs including femora light, flavous; antennae sometimes vaguely darkened in middle part beginning from apical half of antennomere 3. Penultimate segment of maxillary palpi darkened at apex.

Head 1.20–1.23 (1.21) times as narrow as pronotum. Antennae long, normally distinctly surpassing fore discal pores level; their 3rd segment 2.9 times as long as wide and 1.55–1.75 (1.65) times as long as the 2nd. Eyes moderate in size, subconvex, 3.2–4.0 (3.7) times as long as tempora. Posterior supraorbital seta level to rear eye margin. Frontal furrows deep and irregular, distinctly transversely rugose at bottom, very finely and sparsely punctured like adjacent parts of vertex.

Pronotum cordate, its sides strongly sinuate before large and rectangular hind angles, 1.23–1.28 (1.26) times as wide as long and 1.28–1.36 (1.32) times as wide at broadest part as at base. Latter somewhat salient, feebly oblique on sides, 1.02–1.07 (1.05) times as wide as front margin. Front angles very small and hardly protruding forwards. Lateral gutter relatively narrow. Basal surface of pronotum sharply punctured and vaguely rugose longitudinally. Transverse apical impression sharply engraved but obliterated near median line; basal impression relatively deep but indistinctly outlined; basal foveae small and very strongly impressed; postangular carina thin and long, almost straight; median line superficial, becoming shallower anteriorly and toward base.

Elytra elongate and moderately convex, their sides subparallel, hardly divergent posteriad and widest at apical third, 1.57–1.68 (1.62) times as long as wide combined, 2.04–2.20 (2.13) times as wide as head and 3.48–3.65 (3.58) times as long as pronotum. Six inner striae of elytra well-impressed and strongly punctured, although distance between punctures distinctly greater than their diameter. Stria 7 superficial but distinguishable. All striae shallower toward apex but even there visible. Both apical pores in a well-developed, continuous, apical striola joining stria 5 anteriorly. Two inner pores of humeral group much closer to each other than to other humeral pores. Posterior discal pores level to median group of umbilicate series. Discal formula 29–36 (32)/63–71 (67).

Microsculpture dull on head and pronotum, distinct on elytra, forming there strongly transverse meshes.

Two proximal segments of male protarsi dilated, feebly inwards dentate and furnished with adhesive soles beneath, tarsomere 1 being about twice as long as wide.

Aedeagus (Fig. 20) relatively large, with endophallus armature rather strongly projecting outwards, 2.15 mm in length (lectotype). Ribbon brush touching lamina 1.

Spermatheca (Fig. 29) large, faintly constricted in middle of apical part, with spermathecal ductus enlarged, sclerotized, snake-looped.

Notes

From all taxa of the *grandipenne*-group except *B. olegleonidovici* the nominotypical subspecies is easily distinguishable by the flatter and smaller eyes as well as by the aedeagal conformation displayed by the lamina 1 touching the ribbon brush, a feature found in no other species of the group studied in this respect.

Distribution

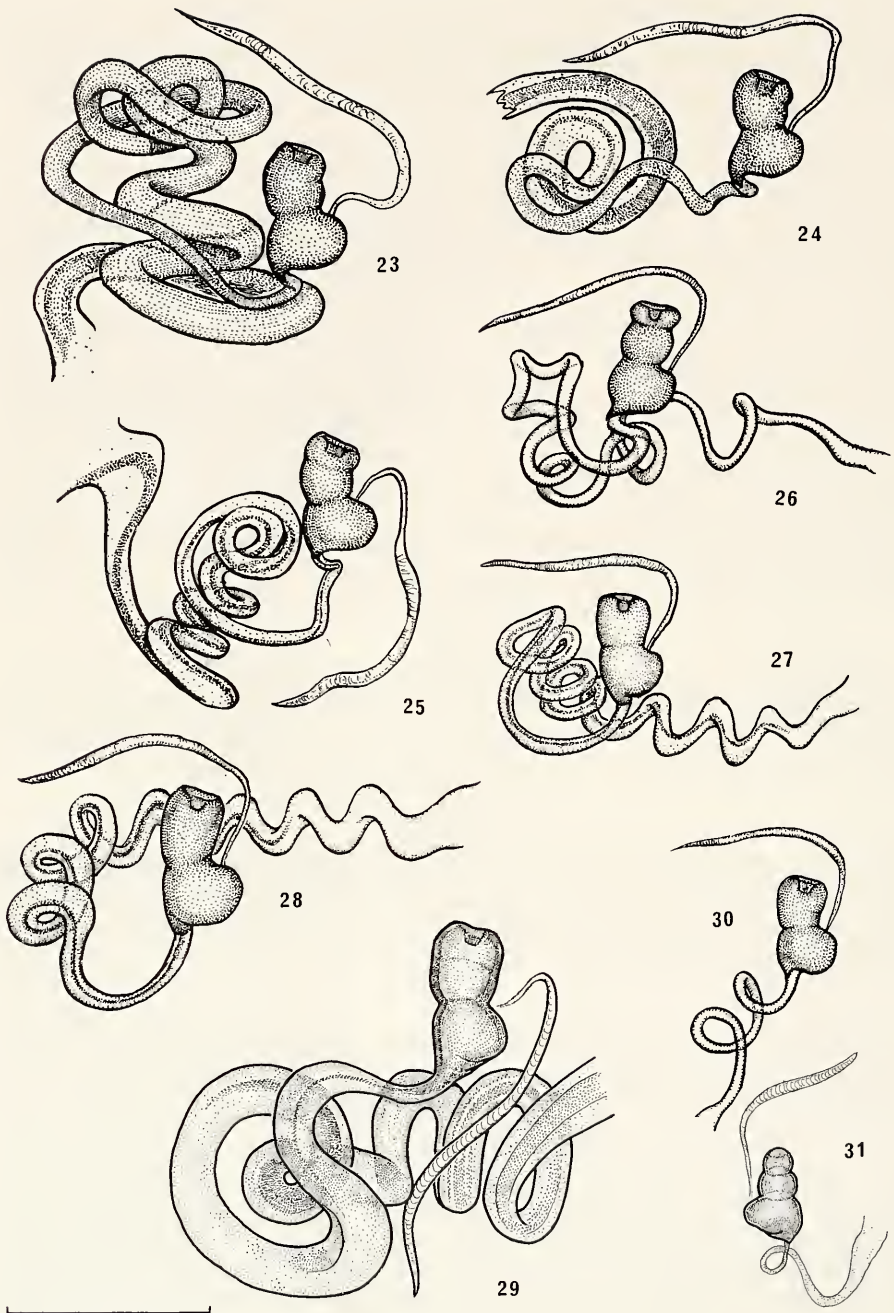
The nominotypical subspecies is known from the Balkan Peninsula, *B. grandipenne freyi* has been described from Beirut, Lebanon, and *B. grandipenne bulgardagense* inhabits some mountain systems in the southern part of Turkey, ranging from the Taurus to the Gyaurdag.

5.5. *Bembidion olegleonidovici* Fassati, **stat. nov.** (Figs 6, 15, 25, 36)

Bembidion grandipenne olegleonidovici Fassati, 1990: 169 (loc. typ. Krasn. Poljana).

Material examined

2 fms [ZISP], W Caucasus, Krasnodar Prov., Tuapse Distr., Dederkoi env., valley of river, 27. VIII. 1978. – 2 fm, 1 ml [AK], same area, 5 km SE of Olginka, 8. VIII. 1987, leg. KOVAL. – 2 mls, 1 fm [AK], same locality, 31. VIII. 1993, leg. KOVAL. – 3 mls, 5 fms [ZISP, AK], same locality, 12. VIII. 1988, leg. KOVAL. – 1 ex. [AK], W Caucasus, Ashe Valley, near Krasnoalexandrovskiy, 16. VI. 1984, leg. KOVAL. – 1 (1) ml [VG], same locality, 11. VII. 1987. – 1 ml, 2 fms [AK, AR], Sochi, Lazarevskoye, Kirovo, 31. VII. 1988, leg. RUBTSHENIA. – 10 mls, 5 fms [ZISP, AK, IB], W Caucasus, Sochi, Lazarevskoie env., Tatianovka, bank of Psezuapse River, 5. VII. 1987, leg. KOVAL. – 2 mls, 3 fms [AK], same locality, 6. IX. 1987, leg. KOVAL. – 2 mls [AK], same locality, 25. VIII. 1990, leg. KOVAL. – 1 fm [IB], same area, Maryino, Psezuapse River, 25. VIII. 1988, leg. USHAKOV. – 7 mls, 11 fms [ZISP, AK, IB], same area, Nadzhigo, Makopse River, 2. VIII. 1987, leg. KOVAL. – 26 mls, 23 fms [ZISP, IB, VG, IK], W Caucasus, Sochi, Soloniki (Tsuskhavadzh River), 27. V. 1990, leg. BELOUSOV. – 1 fm [AK], W Caucasus, Sochi, Babuk-Aul,



Figs 23–31. Spermatheca with spermathecal ductus of *Peryphanes*-species. – 23. *B. imeretium* n. sp., Borzhomi; – 24. *B. phryganobium* n. sp., Vedi; – 25. *B. olegleonidovici*, Fas., Psezuapse; – 26. *B. lirykense* Rtt., Hyrcan Reserve; – 27. *B. fraxator* Mén., Shakh-Dagh; – 28. *B. adygorum* n. sp., Turetskaya Shapka; – 29. *B. grandipenne* Schaum, paralectotype, Graecia; – 30. *B. brunnicorne* Dej., Lazarevskoye; – 31. *B. hissaricum* Net., Varzob. – Scalebar: 0,3 mm.

300 m, 12. VIII. 1984, leg. KOVAL. – 1 ml [AK], same area, Solokh-Aul, 600 m, 9. VI. 1984, leg. KOVAL. – 2 mls, 3 fms [AK], same locality, bank of Shakhe River, 500 m, 1. VIII. 1987, leg. KOVAL. – 1 ml [AK], same locality, 21. VI. 1986, leg. KOVAL. – 2 fms [ISol], same locality, 700 m, bank of spring, 7. VIII. 1992, leg. SOLODOVNIKOV.

Redescription

Large, body length 6.40–7.50 (7.00) mm. Dorsum slightly depressed, sides widely rounded. Upperside blue, shining, in some specimens tinged with brownish or reddish; legs including femora monochromously flavous, antennae either flavous or distinctly darkened beginning from apical half of antennomere 3.

Head comparatively small, only 1.21–1.32 (1.27) times as wide as pronotum. Frontal furrows deep and irregular, more or less transversely rugose at bottom; their posterior part as well as adjacent areas of vertex extraordinarily finely punctured. Eyes (Fig. 6) slightly convex, 2.25–3.00 (2.60) times as long as tempora; posterior supraorbital seta lying considerably behind eye level. Antennae long, markedly surpassing fore discal pore level; their 3rd segment 3.30–3.75 (3.50) times as long as wide and 1.70–1.90 (1.80) times as long as the 2nd.

Pronotum cordate, its sides strongly sinuate before large and rectangular hind angles, 1.21–1.32 (1.28) times as wide as long and 1.33–1.41 (1.36) times as wide at broadest part as at base. Latter somewhat salient, feebly emarginate on sides, 1.00–1.11 (1.04) times as wide as front margin. Front angles very small but slightly projecting forwards. Lateral gutter widely reflexed, especially at midlength. Basal surface of pronotum strongly punctured and vaguely rugose longitudinally. Transverse apical impression sharply engraved but interrupted near median line, with a few very fine punctures; basal impression relatively deep but indistinctly outlined; basal foveae small and very strongly impressed; postangular carina thin and long, almost straight; median line superficial, becoming more shallow anteriorly, at base deeper impressed.

Elytra widely rounded and slightly depressed on disk, broadest behind middle, 1.52–1.62 times as long as wide combined (in males longer, on the average 1.59 versus 1.55 in females), 2.09–2.23 (2.17) times as wide as head and 3.26–3.51 (3.43) times as long as pronotum. Six inner discal striae of elytra very deep and roughly punctured, distance between punctures comparable with their diameter. Stria 7 superficial consisting of small, fine, isolated punctures. All striae much shallower toward apex but even there distinguishable. Both apical pores in a well-developed, continuous, apical striola joining stria 5 anteriorly. Two inner pores of humeral group much closer to each other than to other humeral pores. Posterior discal pores level to median group of umbilicate series. Discal formula 29–37 (30)/59–70 (67).

Microsculpture obliterated on head and pronotum, distinct on elytra, forming there strongly transverse meshes in both sexes.

Two proximal segments of male protarsi dilated, feebly inwards dentate and furnished with adhesive soles beneath, tarsomere 1 being about twice as long as wide.

Aedeagus (Fig. 15) large, with a strongly and outwards projecting endophallus armature.

Spermatheca (Fig. 25) large, with an elongate apical part, latter's median constriction distinct. Spermathecal ductus strongly looped in a compressed spiral, comparatively narrow in its part adjacent to spermatheca, only proximally drastically enlarged. Chitinized stripe inside it narrow.

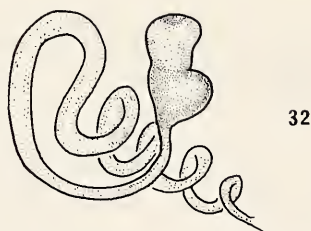


Fig. 32. Spermatheca of *B. dalmatinum haupti* Rtt., Nius-Nius.

Notes

This species is easily distinguishable from other representatives of the *grandipenne*-group in the body shape somewhat resembling that of *B. stephensi* Crotch. The presence of constant and sufficiently prominent differences in the habitus as well as in the aedeagal structure coupled with the distribution pattern allows to regard the taxon concerned as an independent species.

Distribution

This species seems to be restricted to the westernmost borderland of the West Caucasus occurring mainly in lowlands (Fig. 36).

5.6. *Bembidion imereticum* n. sp. (Figs 4, 17, 23, 36)

Holotype: ml [ZISP], Georgia, Borzhomi env., valley of Kura River, 850 m, 16. VIII. 1983, leg. BELOUSOV.

Paratypes: 4 mls, 13 fms [ZISP, IB], same data as holotype.

Description

Very large, body length 7.05–8.40 (7.91) mm. Subconvex, hind-body depressed, sides almost rectilinearly divergent posteriad toward apical third of elytra. Upper-side blue, shining, usually tinged with reddish both on vertex and suture of elytra; legs including femora uniform flavous, antennae light, normally vaguely darkened in middle part beginning from apical half of antennomere 3.

Head comparatively small, only 1.19–1.31 (1.25) times as wide as pronotum. Frontal furrows deep and irregular, at bottom slightly rugose transversely, with a few very fine and small punctures sometimes hardly distinguishable also on vertex. Eyes (Fig. 4) slightly convex, 2.40–3.55 (2.95) times as long as tempora; posterior supraorbital seta removed considerably behind rear eye margin. Antennae very long, reaching to midlength of elytra; 3rd antennomere 3.10–3.80 (3.50) times as long as wide and 1.80–2.15 (2.00) times as long as the 2nd.

Pronotum cordate, its sides strongly sinuate before large and rectangular hind angles, 1.20–1.28 (1.26) times as wide as long and 1.31–1.37 (1.34) times as wide at broadest part as at base. Latter somewhat salient, slightly oblique on sides, 0.96–1.10 (1.06) times as wide as front margin. Front angles very small but slightly projecting forwards. Lateral gutter moderately reflexed, especially at midlength. Basal surface of pronotum strongly punctured and vaguely rugose longitudinally. Transverse api-

cal impression sharply engraved but interrupted near median line, with a few fine punctures; basal impression relatively deep but indistinctly outlined; basal foveae small and very strongly impressed; postangular carina thin and long, almost straight; median line superficial, becoming shallower near front and hind margins of pronotum.

Elytra very large, their sides rectilinearly divergent posteriad, their maximum width at apical third, 1.54–1.68 times as long as wide combined (in males longer, on the average 1.65 versus 1.58 in females), 2.19–2.32 (2.25) times as wide as head and 3.45–3.79 (3.61) times as long as pronotum. Six inner discal striae of elytra deep and strongly punctured (distance between punctures considerably less than their diameter). Stria 7 superficial, consisting of small, fine, isolated punctures. All striae much shallower toward apex but even there distinguishable. Both apical pores in a well-developed, continuous, apical striola joining stria 5 anteriorly. Usually all pores of humeral group of umbilicate series equidistant, sometimes 4th somewhat more distant from others. Posterior discal pores about level to median group of umbilicate series. Discal formula 28–36 (30)/65–72 (69).

Microsculpture obliterated on head and pronotum, distinct on elytra, forming there transverse meshes in both sexes.

Two proximal segments of male protarsi dilated, feebly inwards dentate and furnished with adhesive soles beneath, tarsomere 1 being about twice as long as wide.

Aedeagus (Fig. 17) extraordinarily large, with endophallus armature proximally strongly projecting outwards.

Spermatheca (Fig. 23) of moderate size, its apical part a little longer and narrower than basal one, with a faint but distinct constriction. Spermathecal ductus completely sclerotized and looped into an incrassate snake-like spiral.

Notes

The largest species of the treated subgenus. This remarkable taxon is very similar in habitus to the nominotypical subspecies *B. grandipenne*, being considerably greater (the average body length 7.91 mm versus 6.59 in *B. grandipenne*), its eyes are even smaller (on the average 2.95 times as long as tempora versus 3.7 in *B. grandipenne*), antennae longer (almost reaching to midlength of elytra), elytra larger, 2.19–2.32 (2.25) times as wide as head versus 2.04–2.20 (2.13) in *B. grandipenne*. Most important is the difference in aedeagal conformation. The aedeagus in the new species is much bigger than in *B. grandipenne* (Figs 17, 30), the average length of its median lobe being 2.74 mm. It is noteworthy that the size variation in aedeagus is considerably less pronounced as compared with the variability of body size. The body length to aedeagal length ratio for the new species is on the average 2.96, being somewhat less than in *B. grandipenne* (3.07) and considerably less as compared with these indices for *B. ogleleonidovici* (3.31) and *B. phryganobium* (3.35). The proximal part of lamina 1 is distinctly emarginate at apex and far distant from the ribbon brush in *B. imereticum*, while they touch each other in *B. grandipenne* (cf. Figs 17, 20). The proximal process of lamina 2 is strongly protruding beyond the basal lobe of the aedeagus. The most proximal part of the main sclerite is devoid of a projecting process as opposed to all other Caucasian members of the *grandipenne*-group. From *B. ogleleonidovici*, the new species is easily distinguishable in the body shape (rectilinearly divergent sides of the elytra with the maximum width at the apical third) and by lamina 2 not dilated distally. As far as the habitus is concerned, *B. imereticum*

shows a remote similarity with *B. phryganobium* and two subspecies of *B. grandipenne*, *bulgardagense* Fassati, 1990 and *freyi* Netolitzky, 1937, differing from them all at once by the strongly flattened eyes and, besides that, from the former in aedeagal conformation (see notes below), from the latter in the dark metallic colour of the elytra with only a slightly pronounced reddish tinge.

Distribution and ecology

Known only from the locus typicus. This species has been found on a sandy bank of Kura River at Borzhomi, within the town proper (Fig. 36).

5.7. *Bembidion phryganobium* n. sp. (Figs 5, 16, 24, 36)

Holotype: ml [ZISP], Azerbaidjan, Nakhichevan, valley of Nius-Nius River, near Ordubad, 4. VII. 1984, leg. BELOUSOV.

Paratypes: 9 mls, 9 fms [ZISP, IB], same data as holotype. – 2 mls [IB], same area, Pozmary, 27. VI. 1983, leg. BELOUSOV. – 1 ml [IB], same area, Batabad Lake, S Bichenek Pass, 22. IV. 1983 leg. YANUSHEV. – 5 mls, 9 fms [IB], Armenia, Vedi, 8. X. 1982, leg. BELOUSOV. – 1 ml, 1 fm [IB], same area, Ekhegnadzor, Arpi, 3. VIII. 1983.

Description

Large, body length 6.00–7.25 (6.58) mm. Elongate and moderately convex. Hind wings fully developed. Upperside blue, shining, elytra distinctly tinged with brownish; legs uniform flavous, antennae either monochromously flavous or vaguely darkened beginning from apical half of antennomere 3. Penultimate segment of maxillary palpi strongly darkened at apex.

Head comparatively large, only 1.04–1.22 (1.18) times narrower than pronotum. Antennae long, normally distinctly surpassing fore discal pore level; 3rd antennomere 3.00–3.60 (3.35) times as long as wide and 1.70–1.95 (1.85) times as long as the 2nd. Eyes (Fig. 5) large and convex, 4.15–6.60 (5.15) times as long as tempora. Posterior supraorbital seta level to rear eye margin. Frontal furrows deep and irregular, distinctly rugose transversely, very finely and sparsely punctured at hind part. Adjacent parts of vertex likewise hardly punctured.

Pronotum cordate, its sides strongly sinuate before large and rectangular hind angles, 1.24–1.35 (1.29) times as wide as long and 1.34–1.40 (1.37) times as wide at broadest part as at base. Latter somewhat salient, feebly oblique on sides, 1.00–1.10 (1.05) times as wide as front margin. Front angles very small but a little projecting forwards. Lateral gutter widely reflexed, especially at midlength. Basal surface of pronotum finely but sharply punctured and vaguely longitudinally rugose. Transverse apical impression sharply engraved but interrupted near midline; basal impression relatively deep but indistinctly outlined; basal foveae small and very strongly impressed; postangular carina thin and long, almost straight; median line superficial, becoming shallower anteriorly, at base either reduced or in some specimens controversially impressed much deeper.

Elytra elongate and moderately convex, their sides rectilinearly hardly divergent posteriorly and broadest at apical third, 1.57–1.71 times as long as wide combined (in males somewhat longer, on the average 1.65 versus 1.62 in females), 1.79–2.02 (1.96) times as wide as head and 3.35–3.67 (3.49) times as long as pronotum. Six inner striae

of elytra fine but well-expressed, consisting of small separate punctures. All striae much shallower toward apex but even there distinguishable. Both apical pores in a well-developed, continuous, apical striola joining stria 5 anteriorly. Two inner pores of humeral group much closer to each other than to other humeral pores. Posterior discal pores level to median group of umbilicate series. Discal formula 27–35 (31)/64–73 (68).

Microsculpture dull on head and pronotum, distinct on elytra, forming there strongly transverse meshes.

Two proximal segments of male protarsi dilated, feebly inwards dentate and furnished with adhesive soles beneath, tarsomere 1 being about twice as long as wide.

Aedeagus (Fig. 16) large with a strongly, outwards projecting endophallus armature. Its length averaging 1.94 mm, i. e. 3.35 times as short as body length. Process proximal of lamina 2 surpassing basal lobe of aedeagus. Shape of membrane (appearing as a translucent darkened structure) near its junction site with lamina 2 quite different as compared with other species of the *grandipenne*-group.

Spermatheca (Fig. 24) smaller than in *B. imereticum* n. sp. with subequal apical and basal parts, latter bearing only a trace of constriction. Spermathecal ductus snake-like looped, less strongly sclerotized as compared with *B. imereticum*.

Notes

This species seems to be very close to some southern Anatolian and Syrian races of *B. grandipenne*: ssp. *freyi* (NETOLITZKY, 1937) and ssp. *bulgardagense* (FASSATI, 1990). They are similar in convex eyes and shallower striae on the elytra. However, the new species is smaller (the average body length 6.59 mm versus 7.30 in both above races of *B. grandipenne*), with distinct temporae (in *freyi* „völlig ohne Schläfen“, in *bulgardagense* „ganz ohne Schläfen“, FASSATI, 1990). Besides that, it differs from both by the strongly pronounced metallic reflection of the elytra only tinged with reddish.

This new species is also allied to *B. imereticum* and *B. grandipenne grandipenne*, differing readily from both by the considerably more convex eyes. From the latter it differs also in the ribbon brush not touching the proximal end of lamina 1, and from both in the pattern of endophallus armature presented in the above description.

Distribution and ecology

This species occurs in the most arid mountainous areas of southeastern Transcaucasia (Fig. 36), inhabiting banks of springs and small rivers, avoiding considerable terrain elevations. Almost all localities lie within the Nakhichevan region.

5.8. *Bembidion brunnicornе* Dejean (Figs 19, 21, 30, 37)

Bembidion brunnicornе Dejean, 1831, Spec. Gen. Col.: 141, 859 (Loc. typ. Dalmatic).

Bembidion brunnicornе: JAKOBSON, 1906, Beetles of Russia and West Europe, 4: 286.

Bembidion brunnicornе: CSIKI, 1928, Cat. col.: 88.

Bembidion brunnicornе: MÜLLER, 1918, Koleopt. Rundsch. 7: 87 (part.).

non *Bembidion brunnicornе*: JEANNEL, 1941, Faune de France.: 513, fig. 193a.

Bembidion brunnicornе: NETOLITZKY, 1943, Koleopt. Rundsch., 29: 50.

Bembidion brunnicornе: DE MONTE, 1943, Boll. Soc. ent. Ital., 75: 6, 9.

Bembidion milleri: FREUDE, 1973, Nachrbl. bay. Ent., 22: 101.

Bembidion milleri: FREUDE, 1976, Käfer Mitteleur.: 116, 117, fig. 46, part.

N beetles

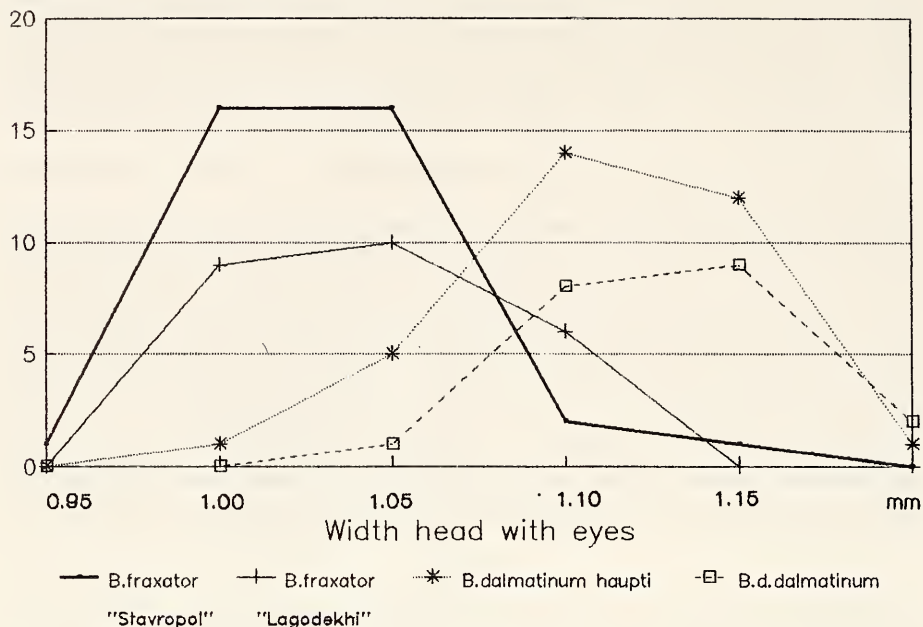


Fig. 33. Width of head with eyes in *Peryphanes*-species.

Bembidion brunnicornis: DE MONTE, 1984, Atti Mus. civ. Stor. nat. Trieste, 36 (2): 75–82.

Bembidion milleri: HIEKE & WRASE, 1988, Dtsch. ent. Zeitschr., 35 (1–3): 54 (part.).

Bembidion brunnicornis: MÜLLER-MOTZFELD, 1986, Ent. Nachr. Berichte, 30 (1): 39.

? *Peryphanes brunnicornis cauracus*: SCHULER, 1969, L'Entomologiste, 25 (3): 51 (Loc. typ. Bel-fort)

Material examined

Krasnodar Prov.: 1 fm [VG], Guzeripl, 3. VII. 1991, leg. GREBENNIKOV. – 1 (1) ml [ZMUM], Guzeripl env., foothills of Ingenernyi Mt. Range, 9.–10. VI. 1992, leg. M. & V. SAVITZKYI. – 2 mls, 5 fms [ZISP, AK], Tuapse env., 5 km SE of Olginka, 27. VIII. 1987, leg. KOVAL. – 1 fm [AK], same locality, 12. VIII. 1988, leg. KOVAL. – 3 fms [AK], same area, Dederkoi River, 4. VII. 1987, leg. KOVAL. – 1 ml [AK], Sochi, Lazarevskoe env., aul Nadzhigo, Makopse River, 2. VIII. 1987, leg. KOVAL. – 1 ml [AK], aul Krasnoalexandrovskiy, Bekishei River, 21. VIII. 1984, leg. KOVAL. – 1 ml [IB], W Caucasus, Sochi, Lazarevskoe, Psezuapse Valley, 300 m, 19. VII. 1984, leg. PRASOLOV. – 2 mls [IB], same locality, 18. VII. 1984, leg. PRASOLOV. – 3 fms [IB], same area, Soloniki, 22. VII. 1984, leg. PRASOLOV. – 5 (1) ml, 5 (4) fms [AK, IB], same locality, Tatianovka, 5. VII. 1987, leg. KOVAL. – 2 (2) mls [AK], same locality, 25. VIII. 1990, leg. KOVAL. – 1 (1) fm [AK], same locality, 6. IX. 1987, leg. KOVAL. – 2 mls [AR], same locality, aul Kirova, 31. VII. 1988, leg. RUBTSHENIA. – 2 (2) mls, 1 (1) fm [AK], same area, near Solokhaul, right tributary of Shakhe River, 1. VIII. 1987, leg. KOVAL. – 2 (1) mls, 1 fm (1) [AK, IB], same locality, 21. VI. 1986, leg. KOVAL. – 1 fm [ISol], same area, Kraevsko-Armianskoe, bank of Matsesta River, 2. VIII. 1992, leg. SOLODOVNIKOV. – 1 (1) ml, same area, Aibga Mt. Range, 800 m, 12. VI. 1987, leg. KOVAL. – 1 (1) ml [IS], same area, Mzymta Valley, 13. VII. 1986, leg. SOKOLOV.

North Ossetia: 1 ex. [MU], Sunzhenskiy Mt. Range, near Elkhotoovo, 11. VI. 1985, leg. ALEXEEV.

Chechen Republic: 2 mls [EK, IB], Khulakhulau River, below Tsi-Vedeno, 15. VII. 1984, leg. KOMAROV.

Abkhazia: 1 ml [IB], W Abkhazia, Gagrskiy Mt. Range, watershed of Khashupse & Kholodnaya Rechka, 6. VI. 1991, leg. BELOUSOV. – 3 (1) mls [AK], Gudauta env., Khuap env., 31. V. 1986, leg. KOVAL. – 1 fm [AK], Mt. Turetskaya Shapka, 2. VIII. 1986, leg. KOVAL. – 1 fm [AK], Tsebel'da env., 30. VI. 1990, leg. KOVAL. – 4 (2) mls, 1 (1) fm [IB], E. Abkhazia, Saken Valley, near Gentsvishi, 3. VIII. 1983, leg. BELOUSOV. – 3 (1) fms [AK, IB], B. Khodzhal River, 16. VIII. 1986, leg. KOVAL. – 1 ml [IB], same area, valley of Okumi River, above Gumurishi, 500–1000 m, 1. V. 1989, leg. BELOUSOV.

Georgia: 3 fms [AR], Mingrelia, Doberazeni env., 14. VIII. 1990, leg. RUBTSHENIA. – 1 ml, 1 fm [AZ], same area, Vedula Valley, 3 km below Zeda-Vedi, 1200 m, 10.–11. V. 1991, leg. ZAMOTAJLOV & MIROSHNIKOV. – 2 (2) mls, 1 (1) fm [IB], Bakuriani env., 1700 m, 15. VIII. 1983, leg. BELOUSOV.

Adjara: 1 ex. [MPU], Batumi, Khala, 10. X. 1974, leg. YANUSHEV. – 2 mls [IB], 24 km E of Batumi, Keda env., Zeda-Agora, 12. V. 1987, leg. KAZANTSEV. – 1 ml [IB], same area, Khulo Distr., Ogara, 5. VIII. 1990, leg. GUSAROV.

Azerbaijan: 36 ex. [IB], Belokany Distr., basin of Belokantshai River, Filiztshai, 1000–1700 m, 21. VI. 1984, leg. BELOUSOV.

Redescription

Smallest Caucasian consubgener, body length 3.85–4.80 mm (males on the average smaller, 4.25 versus 4.50 in females). Ovale and subconvex, flattened on disk of elytra. Upperside blue, shining, usually tinged with reddish on vertex and sometimes on elytra; legs flavous, femora at most scarcely darkened at base, antennae light, often vaguely darkened in middle part beginning from apical half of antennomere 3.

Head 1.18–1.29 (1.24) times as wide as pronotum. Frontal furrows deep and irregular, at bottom slightly rugose transversely, with a few very fine and small punctures. Eyes feebly convex, 3.15–4.60 (3.85) times as long as tempora; posterior supra-orbital seta level to hind eye margin. Antennae moderate in length, clearly not reaching to level of fore discal pores; their 3rd segment 2.50–3.75 (3.00) times as long as wide and 1.15–1.50 (1.35) times as long as the 2nd.

Pronotum cordate, its sides strongly sinuate before large and rectangular hind angles, 1.23–1.37 (1.30) times as wide as long and 1.30–1.48 (1.36) times as wide at broadest part as at base. Latter somewhat salient, slightly oblique on sides, 0.95–1.08 (1.04) times as wide as front margin. Front angles very small but slightly projecting forwards. Lateral gutter moderately reflexed, broadest at midlength. Basal surface of pronotum strongly punctured and vaguely rugose longitudinally. Transverse apical impression sharply engraved but interrupted near median line, with a few fine punctures; basal impression relatively deep but indistinctly outlined; basal foveae small and very strongly impressed; postangular carina thin and long, almost straight; median line superficial, becoming shallower near front margin and basal margin.

Elytra subconvex, depressed on disk; broadest at about midlength, 1.36–1.66 (1.58) times as long as wide combined, 1.86–2.08 (1.97) times as wide as head and 3.13–3.44 (3.27) times as long as pronotum. Six inner discal striae of elytra deep and strongly punctured, distance between punctures being less than their diameter. Stria 7 superficial, consisting of small, fine, isolated punctures. All striae much shallower toward apex but even there distinguishable. Both apical pores situated in a well-developed, continuous, apical striola joining stria 5 anteriorly. Pores 2 and 3 of umbilicate series somewhat closer to each other than to pores 1 and 4. Posterior discal pores about level to median group of umbilicate series. Discal formula 27–34 (31)/57–73 (64).

Microsculpture completely obliterated on head and pronotum but more or less strongly developed on elytra, the latter's apical quarter always with a distinct

microsculpture in both sexes. In females and sometimes in males, anterior part of elytra also with a superficial, hardly distinguishable microsculpture.

Two proximal segments of male protarsi dilated, feebly inwards dentate and furnished with adhesive soles beneath, tarsomere 1 being about 1.5 times as long as wide.

Aedeagus (Figs 19, 21) small, with a widely rounded apex, its endophallus armature not protruding beyond basal lobe of aedeagus.

Spermatheca (Fig. 30) only a little smaller than in considerably larger species, e. g. *B. fraxator*, its apical part without distinct constriction, nearly equal in length to basal part. Spermathecal ductus with a few coils only.

Notes

This species has long been known from the Caucasus (JAKOBSON, 1905). However, sometimes its occurrence was rejected (KHNZORIAN, 1959: cited after IABLOKOFF-KHNZORIAN, 1976) or reconfirmed, dependent on the specialist and state of the species. The nomenclatural problems concerning this species and its relations with the allied *B. milleri* Duval and *B. italicum* De Monte seem to be the most complicated and intricate within the subgenus considered. The authors of the present paper adhere to the view of DE MONTE (1943, 1984) who was the only one to consider all really existing species and whose taxonomic data agreed with the geographic ones. To any case, the occurrence of *B. brunnicorne* sensu Freude (FREUDE, 1973, 1976; HIEKE & WRASE, 1988) in the Caucasus cannot be accepted.

B. brunnicorne treated as above differs from all other Caucasian consubgenera in the smaller size and lighter colour of the appendages; from the closely related *B. milleri* and its different geographic races mainly in the wide apex of the aedeagus (Figs 21–22), and from *B. italicum* in the straight, not swollen ventral side of the aedeagus.

Distribution

This species has a wide distribution within the Caucasus (Fig. 37), perhaps missing only both in the easternmost part of the Caucasus Major east of Mt. Guton and in southeastern Transcaucasia. These lacunae seem to be the more so surprising as the range of this species covers a considerable part of the northeastern Mediterranean region, from the Balkans to the Caucasus. Nevertheless, similar patterns are rather common among Caucasian carabids, and some have already been published (BELOUSOV, 1988).

5.9. *Bembidion lirykense* Reitter (Figs 8, 13, 26, 36)

Bembidion stephensi var. *lirykense* Reitter, 1908, Faun. Germ. 1: 116 (loc. typ. Liryk).

Bembidion stephensi var. *lirykense*: CSIKI, Cat. col., 1928: 113.

Bembidion nitidulum lirykense: NETOLITZKY, Koleopt. Rundsch., 1943, 29: 50.

Bembidion lirykense: SCHULER, 1961, L'Entomologiste, 17 (4–5): 92.

Bembidion lirykense: MÜLLER-MOTZFELD, 1986, Ent. Nachr. Berichte, 30 (1): 39.

Bembidion zechneticum MÜLLER-MOTZFELD 1989, Ent. Nachr. Berichte, 33 (1): 3 (loc. typ., Zchneti near Tbilissi), n. syn.

Holotype

ml [TM], „Caspi.-Meer-Gebiet. Liryk, LEDER-REITTER“, „coll. REITTER“, „var. *lirykense* m.“, „Holotypus 1908, *B-on stephensi* v. *lirykense* RITTER.“

Further material examined

1 fm [ZISP], labelled as holotype. – 1 (1) ml [IB], Azerbaidjan, Talysh, Lerik Distr., near Azerbaidjan, 13. VII. 1983, leg. BELOUSOV. – 3 (1) ml, 1 (1) fm [IB], same locality, road from Lerik to Azerbaidjan, 11. VII. 1983, leg. BELOUSOV. – 1 ml, 3 (1) fms [IB], same area, Yardymly Distr., near Allar, 1600–1800 m, 25.–26. VII. 1984, leg. BELOUSOV. – 1 ex. [MU], Talysh, Lenkoran Distr., Alexeevka, 8. VII. 1978, leg. MIKHEITSHEV & NIKITSKYI. – 1 (1) ml [IB], same locality, 15. IV.–16. V. 1993, leg. SHAMAEV. – 1 ex. [IS], same locality, Hyrcan Reserve, 3. VII. 1983, leg. LOGUNOV. – 1 ml, 1 fm [IB], same area, Bilyasary, Alazapin, Khanbulak Valley, 18.–19. VII. 1984, leg. BELOUSOV. – 1 fm [IB], same area, near Veri, 3. VI. 1983, leg. BELOUSOV. – 1 ex. [ZISP], same area, Lenkoran Distr., Kusa, 14. VI. 1936, leg. ARNOLDI. – 2 mls [IB], Astara Distr., Askhankeran, 29. IV. 1984, leg. BELOUSOV. – 1 (1) ml, Armenia, Kaputdzukh Mt., 17. VII. 1982, leg. DANILEVSKY.

Redescription

Medium-sized, body length 5.00–5.85 (5.40) mm. Subconvex, comparatively narrow fore-body and widely rounded elytra. Upperside from reddish-brown to comparatively dark greenish-blue but vertex and elytra always tinged with reddish; legs including femora flavous (only their base slightly darkened), antennae either monochromously light or darkened in middle part beginning from apical half of antennomere 3 or 4.

Head 1.20–1.29 (1.24) times as wide as pronotum. Frontal furrows deep and irregular, at bottom slightly transversely rugose, with a few very fine and small punctures. Eyes flattened, 3.20–4.10 (3.70) times as long as tempora; posterior supraorbital seta hardly behind eye level. Antennae comparatively long, usually reaching to level of or even slightly surpassing fore discal pores; their 3rd segment 2.55–3.00 (2.75) times as long as wide and 1.30–1.55 (1.45) times as long as the 2nd.

Pronotum (Fig. 8) cordate, much less transverse as compared with allied Caucasian species, its sides strongly sinuate before large, rectangular hind angles pointed at apex, 1.16–1.27 (1.22) times as wide as long and 1.27–1.34 (1.31) times as wide at broadest part as at base. Latter somewhat salient, slightly oblique on sides, 1.04–1.11 (1.08) times as wide as front margin. Front angles hardly distinguishable. Lateral gutter very narrow (Fig. 8). Basal surface of pronotum strongly punctured and vaguely rugose longitudinally. Transverse apical impression sharply engraved but interrupted near median line, with a few fine punctures; basal impression relatively deep but indistinctly outlined; basal foveae small and very strongly impressed; postangular carina long, almost straight but less expressed as compared with other Caucasian species; median line superficial, becoming shallower near front and basal margins of pronotum.

Elytra large and convex, their sides widely rounded, maximum width at mid-length, being there 1.52–1.60 (1.55) times as long as wide combined, 2.01–2.17 (on the average, 2.08 in males and 2.12 in females) times as wide as head and 3.04–3.31 (on the average, 3.07 in males and 3.20 in females) times as long as pronotum. Six inner discal striae of elytra very deep and strongly punctured (distance between punctures comparable with their diameter), interspaces convex, especially in anterior part of elytra. Stria 7 superficial, consisting of small, fine, isolated punctures. All striae much shallower toward apex but even there distinguishable. Both apical pores in a well-developed, continuous, apical striola joining stria 5 anteriorly. Usually all pores of humeral group of umbilicate series equidistant, sometimes 4th somewhat more distant from others. Posterior discal pores about level to median group of umbilicate series. Discal formula 27–33 (29)/65–71 (67).

Microsculpture completely obliterated on disk of pronotum and head but well-developed on elytra, forming there distinct transverse meshes.

Two proximal segments of male protarsi dilated, feebly inwards dentate and furnished with adhesive soles beneath, tarsomere 1 being about 1.5 times as long as wide.

Aedeagus (Fig. 13) comparatively small, with endophallus armature strongly and outwards projecting.

Notes

This species is highly interesting from a taxonomical viewpoint. Doubtless, it is very closely related to *B. hissaricum* Netolitzky from Middle Asia, this being ascertained by the flat eyes, deep and strongly punctured striae of the elytra with convex interspaces, and especially by a very similar conformation of the aedeagus (cf. Figs 13–14). In addition, the spermatheca is similarly divided into three portions by two well-developed constrictions in both species. Nevertheless, the Caucasian taxon is easily distinguishable from its Asiatic counterpart by the more strongly ovate and convex body and monochromous elytra (*B. hissaricum* has a depressed and elongate body with the sides of elytra somewhat divergent posteriad and bearing vaguely delimited reddish apical spots). The above two species seem to be closer in certain respects to the subgenus *Ocyturanus* Müller-Motzfeld, bridging both to some extent as far as aedeagal conformation is concerned. This fact appears to be of great importance demonstrating very ancient relations between the Talysh and the Ghissar-Darvaz mountains, both ancient Mediterranean centres of speciation.

Externally, *B. lirykense* is easily distinguishable from all other Caucasian members of the subgenus by the elongate pronotum with a very narrow marginal gutter, the widely rounded elytra with deep, strongly punctured striae and convex interspaces as well as by the shape of the aedeagus.

Restudy of the holotype of *B. lirykense* allows to establish its specific independence from *B. deletum*, on the one hand, and to regard *B. zechneticum* Müller-Motzfeld as its new junior synonym, on the other.

Distribution

Common in Talysh and very rare in other Caucasian regions. Only one specimen collected on lime stones of Megri Mt. Range, outside Talysh is known to the authors. Besides, *B. zechneticum* was described from Zchneti near Tbilisi. This type of distribution reflects perhaps the way of secondary penetration of this species into Transcaucasia from Talysh. This point of view is supported by many cases of dispersal of Carabids along the peripheral limestone chains. For example, the same way of distribution is characteristic of *B. peliopterum* Chd., penetrating to the north up to the east edge of the Caucasus Major and for *Carabus hollbergi* Mén., penetrating through Mourou-Dagh and Karabakh Mt. Ranges up to the Zanghezour Mts.

6. Key to Causasian species of the subgenus *Peryphanes*

- 1 Pronotum less transverse, on the average only 1.20 times as wide as long, with marginal gutter narrow, especially anteriad (Fig. 8). Elytra entirely covered with microsculpture, their striae roughly punctured and deeply impressed, interspaces convex. Aedeagus (Fig. 13) moderate in size, endophallus armature projecting through basal orifice, proximal parts of lamina 1 attenuated and pointed at apex. Spermatheca (Fig. 26) constricted into

- three distinct portions. Length 5.00–5.85 mm. Southeastern Transcaucasia *lirykense* Reitter, 1908
- Pronotum more transverse, on the average more than 1.26 times as wide as long; its sides widely reflexed (Fig. 7); Elytra in medium-sized species mostly with a more or less strongly obliterated microsculpture. When endophallus armature strongly protruding through basal orifice, lamina 1 widely rounded at apex (e. g. Figs 9–12) 2
- 2 Large-sized; in Caucasian species length over 6.0 mm. Elytra entirely covered with microsculpture in both sexes. Legs including much of femora flavous. Endophallus armature strongly protruding through basal orifice, ventral chitin platelet reduced (Figs 12, 15–17) 3
- Medium- to small-sized, length 3.85–5.85 mm. Elytra usually with a partly evanescent microsculpture (rarely with superficial microsculpture, see *B. adygorum*). Lamina 1 in endophallus either very wide or with strongly convergent sides. Ventral chitin platelet of endophallus armature developed. Spermatheca (Figs 27–28, 30, 32) without any constriction in middle 6
- 3 Microsculpture of elytra consisting of very transverse meshes, at least partly forming fine, serried, transverse lines. Apex of aedeagus (Fig. 12) sagittally flattened and distinctly curved ventrally; endophallus armature with lamina 1 more widely rounded. Length 5.45–6.55 mm. Almost all Europe without southernmost parts. Within the East European Plain, mainly in the central part up to the St. Petersburg region in the north. [stephensi Crotch, 1869]
- Microsculpture of elytra consisting of distinct, although transverse, meshes. Apex of aedeagus (Figs 15–17, 20) hemispherical; endophallus armature with lamina 1 more narrow and parallel-sided. Spermatheca (Figs 23–25, 29) usually with apical part faintly constricted in middle (*grandipenne*-group) 4
- 4 Eyes more convex (Fig. 5). Aedeagus (Fig. 16) with a very narrow distal portion; lamina 2 not protruding beyond outline of median lobe; most proximal part of endophallus armature with a small process. Length 6.00–7.25 mm. Nakhichevan. Mountainous semideserts *pbryganobium* n. sp.
- Eyes strongly flattened (Figs 4, 6), with oblique and long temporae. Endophallus armature with lamina 2 distinctly surpassing outline of aedeagus. Humid areas of the Western Caucasus and Transcaucasia 5
- 5 Extraordinarily large-sized, body length 7.05–8.40 mm. Elytra very large, rectilinearly divergent posteriad up to their apical third and there broadest. Aedeagus (Fig. 17) exceptionally large in size, with a strongly projecting endophallus armature, its most proximal part without salient process, lamina 2 not dilated toward apex. Inner areas of Georgia, valley of Kura River *imereticum* n. sp.
- Somewhat smaller-sized, body length 6.60–7.25 mm. Elytra widely rounded on sides, broadest about midlength and distinctly depressed on disk. Aedeagus (Fig. 15) considerably smaller; its most proximal part with a distinct process, lamina 2 strongly dilated towards apex. Westernmost part of the Caucasus Major *olegleonidovici* Fassati, 1990
- 6 Small-sized, with completely light legs (mostly femora feebly darkened just at base). Eyes comparatively flat. Aedeagus (Figs 21–22) with endophallus armature not projecting through basal orifice. Ribbon brush deeply cleft at apex 7
- Medium-sized, with distinctly darkened femora, only distal part of them remaining light. When rarely femora almost entirely light, eyes more convex. Aedeagus (Figs 9–11, 18) with endophallus armature projecting through basal orifice. Ribbon brush widely rounded at apex 8
- 7 At least apical third of elytra with distinct microsculpture in males; in females, elytra often completely covered with microsculpture. Antennae usually darkened beginning from apical part of antennomere 3. Sides of pronotum deeply emarginate before hind angles. Aedeagus (Fig. 21) with a large and widely rounded apex. Length 3.85–4.80 mm. Balkans, Turkey; within the region considered, the Caucasus Major (except for the easternmost areas) and southwestern Transcaucasia *brunnicornis* Dejean, 1831

- Entire elytra without microsculpture in males. Antennae monochromously light. Sides of pronotum less emarginate before hind angles. Aedeagus (Fig. 22) with a narrower apex distinctly attenuate ventrally. Length 4.30–4.90 mm. Middle Europe; according to the materials at our disposal, widespread throughout the East European Plain from Moldavia to the Moscow region [*milleri kulti* Fassati, 1942]¹⁾
- 8 Aedeagus (Figs 9–11) with a strongly protruding endophallus armature 9
- Aedeagus (Fig. 18) with endophallus armature hardly projecting through basal orifice of aedeagus. Femora strongly darkened, elytra entirely covered with microsculpture. Length 4.50–5.50 mm. Northern and Middle Europe [*deletum* Serville, 1821]
- 9 Elytra with apical reddish spots. Eyes on the average comparatively convex. Spermatheca of moderate size (Fig. 32). Length 5.20–5.95 mm. Turkey, northern Iran and Turkmenia. Semiarid areas of southeastern Transcaucasia including Nakhichevan and the Talysh *dalmatinum haupti* Reitter, 1908
- Elytra monochromous, metallic 10
- 10 Eyes more convex (Fig. 2). Light distal part of femora more strongly extended, occupying at least apical third of femora. Even anterior part of elytra with a distinct, although superficial, microsculpture. Basal chitin platelet shorter (Fig. 11). Spermatheca considerably larger (Fig. 28). Length 4.75–5.85 mm. Caucasian region except for southeastern Transcaucasia *adygorum* n. sp.
- Eyes flatter (Fig. 3). Light distal part of femora more restricted, occupying at most their apical quarter. Basal chitin platelet longer (Fig. 10). Spermatheca (Fig. 27) smaller. Length 4.55–5.80 mm. All the Caucasus. The most common species of the subgenus. Eurytopic, from sea-level up to 3000 m *fraxator* Ménétriés, 1832.

7. Ecology

Ecological features of members of the subgenus in question have been the object of thorough discussion by SCHULER (1969), and they are mostly confirmed here. Among species associated with banks of streams, all *Peryphanes*-species as well as allied *Ocyturanus*-species avoid cool and gravel habitats at larger rivers with a swift current, contrasting in this respect with representatives of such subgenera as *Bembidionetolitzkya*, *Plataphus* with related groups, as well as most species of *Peryphus*. *Peryphanes*-species are especially common on banks of small streams or near trickling water. In such conditions, slow currents promote the deposition of thinner particles, on the one hand, and, in greatly eroded relief elements, the production of an intricate system of anastomosing microcaverns. That is why *Peryphanes* and the in this respect similar *Synechostictus* combine in a peculiar way some traits of cryptophilous hypogean species with those of less specialized open-living forms. With the former, *Peryphanes* shares more or less flattened eyes, a strongly pronounced constriction between the fore and hind body, elongate appendages, elytra depressed in some species with almost completely effaced humeri. Among Caucasian members of *Bembidion*, two species are most highly specialized in this respect, i. e. *B. lederi*, the only known Caucasian *Pseudolimnaeum*, as well as *B. (Ocys) trechoides*. Comparing these two species with *Peryphanes*, one can easily notice certain differences in the latter's coloration of the upperside which is not depigmented, the miniaturization of the eyes is never so strongly expressed, the appendages are not so long, the elytra are usually more convex in *Peryphanes*. All these differences bring the members of the

1) Notice that specimens deriving from different areas of the East-European plain are variable enough as the shape of pronotum is concerned and can not be always readily referable to the subspecies *kulti* Fassati, *pseudocarpaticum* Fassati, or *carpaticum* Müller.

subgenus in question together with open-living *Bembidion* displaying metallic lustre of the upperside and a comparatively high, non-depressed body. Considerable differences in the habitus observed amongst Caucasian *Peryphanes* permit to arrange them in a successive series exhibiting increasing cryptophily. *B. dalmatinum haupti*, *B. phryganobium* and *B. adygorum* can be referred to the most open-living species of this complex. Two reddish spots in the former species, a unique colour pattern among Caucasian *Peryphanes*, can be regarded in the same context. The more eurybiontic *B. fraxator* and the two more stenotopic *B. oegleleonidovici* and *B. imereticum* ought to be placed at the opposite extreme. Such a point of view is confirmed by field observations, with the former two species often occurring at banks of comparatively large rivers often flowing over a plain relief, in contrast to the remaining congener. Nevertheless, in arid phryganoid landscapes where they live, *B. phryganobium* and *B. dalmatinum haupti* dwell mainly at banks shaded by plants or near clefts, therefore also shaded, beds of streams. In forest communities, various native *Peryphanes*-species are less stenobiontic, being often met with in quite different conditions but still preferring small streams and rivers supported by strongly eroded relief elements. *B. adygorum* more often occurs at river banks, differing in this aspect from the sympatric, more common and more cryptophilous *B. fraxator*. *B. oegleleonidovici* mostly populates river banks on limestone.

8. Zoogeography

First of all, the distribution patterns of Caucasian *Peryphanes* deserve special attention. Only one species, *B. fraxator*, is almost trans-Caucasian in distribution, being absent perhaps only from the most arid landscapes of Nakhichevan and South Armenia. All other Caucasian consubgenera are more strongly restricted in range.

Two species, *B. brunnicornis* and *B. adygorum*, have a similar distribution pattern, being reported both from most of the Caucasus Major with the exception of its easternmost borderland and from southwestern Transcaucasia. It seems important to note that *B. adygorum* passes to the east somewhat further in both directions: along the Caucasus Major and along the northern chains of Transcaucasia as well (Fig. 38). As indicated above, this type of distribution pattern is highly characteristic of numerous Caucasian carabids. Two groups should be recognized within this type: firstly, species being also widely distributed over southern Europe and the Mediterranean region and secondly, Caucasian endemics. It is interesting that the latter extend further to the east of the Caucasus Major inhabiting the easternmost mountainous broadleaved forests. Really, in our case the endemic Caucasian *B. adygorum* extends to the east further than the Euro-Caucasian *B. brunnicornis*. The above mentioned Caucasian groups seem to have arisen at a time when the Caucasus Major had close relations with the adjacent areas of Transcaucasia and represent a more recent Caucasian colonists as compared with strictly Caucasian endemics. It is of great importance that none of the extant *Peryphanes*-species is referable to the latter group.

The two forms *B. phryganobium* and *B. dalmatinum haupti* also display similar distributions, being confined to the southernmost parts of eastern Transcaucasia. Both species represent an Irano-Armenian distribution pattern also very common amongst Caucasian carabids. Two allied and extraordinarily strongly restricted species of the *grandipenne*-group, *B. imereticum* and *B. oegleleonidovici*, must be regarded in connection with other members of this group, in particular with the neighbouring *B. phryganobium*. In this context, the ranges of the two former species re-



Fig. 34. Distributions of *B. fraxator* Mén. (circle) and *B. dalmatinum haupti* Rtt. (triangle).



Fig. 35. Distribution of *B. adygorum* n. sp.



Fig. 36. Distributions of *B. ogleleonidovici* Fas. (circle), *B. imereticum* n. sp. (rectangle), *B. phryganobium* n. sp. (triangle), and *B. lirykense* Rtt. (crosse).



Fig. 37. Distribution of *B. brunnicorne* Dej.

flect the pathway of a comparatively recent colonisation of the Caucasus by this East Mediterranean and in many respects advanced branch of *Peryphanes*. That is why *B. olegleonidovici* should be regarded as a young neoendemic arisen in situ in the westernmost borderland of the Caucasus Major in a recent geological time when the faunal ties between that area and western Transcaucasia through the mountain systems bordering the eastern coast of the Black Sea were more intimate than with the more easterly regions of the Caucasus Major. This point of view is confirmed also by the fact that the species considered inhabit the geologically youngest mountains in the entire West Caucasus. A thorough analysis of the distribution of *B. imereticum* is actually impossible because it is known only from one single locality. In addition, this species seems to be most closely related to the known races (?subspecies) of *B. grandipenne* from Asia Minor and to *B. phryganobium* from southern Transcaucasia, thus being obviously southern (?Anatolian) in origin.

Special attention should be drawn to the range of *B. lirykense*. As already noted, this species is common in broadleaved forests of the Talysh Mts, being remote phylogenetically from all hitherto known Caucasian consubgenera and most closely related to *B. hissaricum*, the latter deriving from the south of Middle Asia. Beyond any doubt, this pair possesses a very similar and archaic conformation of the aedeagus, bridging to some extent the gap between *Peryphanes* and the sister-group *Ocyturanus*. Outgroup analysis has led us to the conclusion that *B. lirykense* is the most ancient consubgenus within the region involved.

All data concerning the distribution of the Caucasian *Peryphanes*-species are summarized in fig. 38. Four main zoogeographic regions are to be defined: the Caucasian region (zone I on the figure) including the Caucasus Major and Southwestern Transcaucasia, Armenian region (II), intermediate region (III) and Talysh (IV). East Transcaucasia being deprived of any identifier species is not discussed here. This division is in good agreement with the distribution of other Caucasian carabids. In addition to the zoogeographic data, the above map provides us with an important information about local faunas of the consubgenera in question. Really, the major regions of the Caucasus are inhabited by several species of *Peryphanes* (Fig. 38). Coexistence of species in different regions depends on the history of their dispersal. The sympatry is of primary origin in the humid forest zone (region I, fig. 38), where the species are differentiated either by size patterns (*olegleonidovici* – *fraxator*, *adygorum* – *brunnicorne*) or by cryptophilia (*fraxator* – *adygorum*), and in the arid zone (region II, fig. 38), inhabited by 2 species of Irano-Armenian origin, *B. phryganobium* and *B. dalmatinum haupti*, which also belong to the different size classes. On the contrary, a considerable number of *Peryphanes*-species in zone III (see fig. 38) is supposed to be a result of mixing of the forest fauna of the subgenus (*adygorum* – for the Caucasus and *lirykense* – for Talysh) and the arid one from Armenian upland (*B. dalmatinum haupti*).

Based on the above patterns and presumptions, one can arrive to the following main conclusions concerning the distribution of the *Peryphanes*-species in the Caucasus.

Firstly, none of the extant species is endemic to the Caucasus Major (concerning *B. olegleonidovici*, see above). In this respect, Caucasian *Peryphanes*-members strongly differ from most other larger groups of the Caucasian *Bembidion* referable to the *Peryphus*-lineage, for example *Bembidionetolitzkya*, *Nepha*, *Ocydromus* s. str. and some others, including the closely related *Ocyturanus*. This seems to be of great

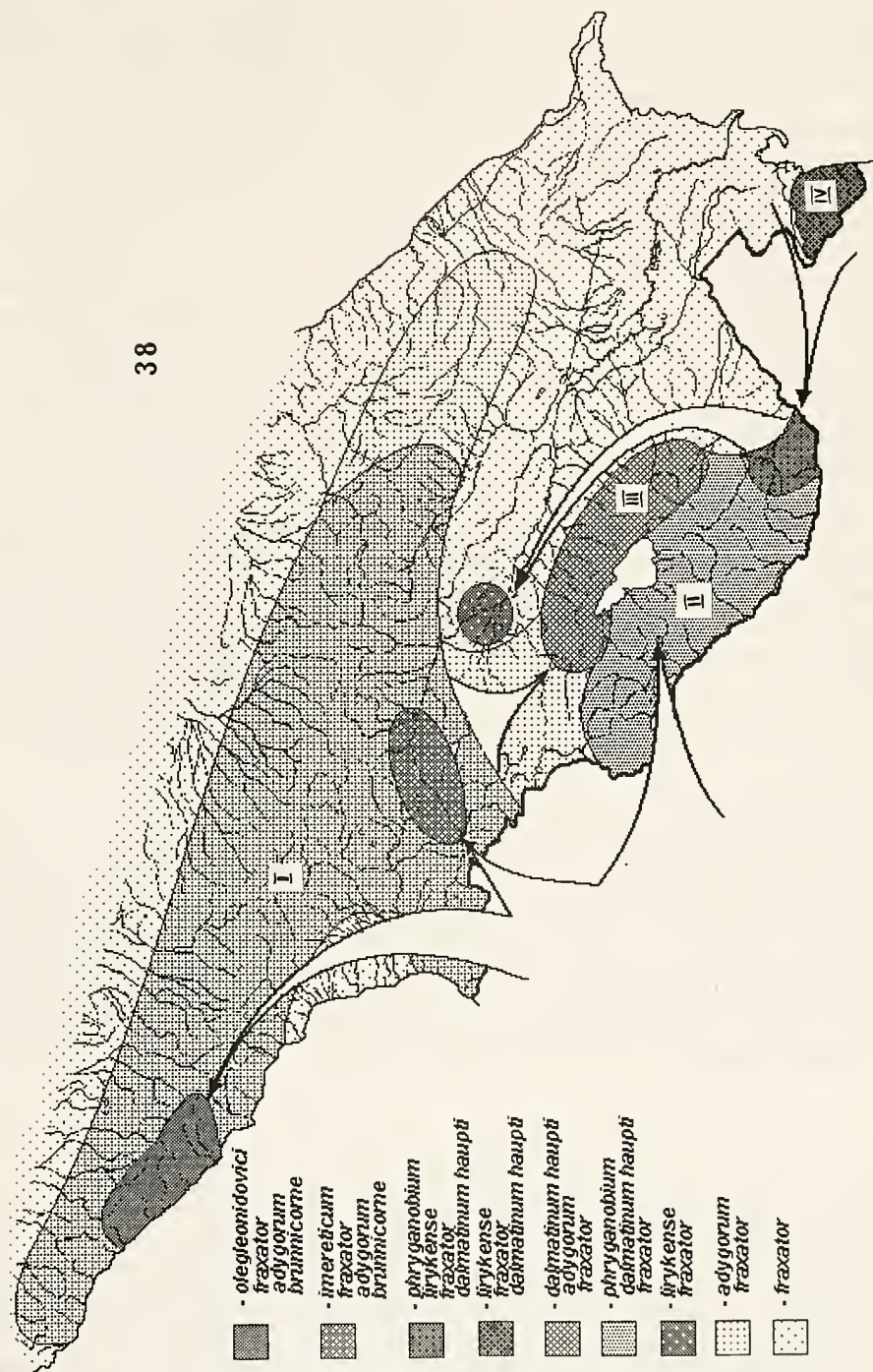


Fig. 38. Distributions of Caucasian *Peryphanes*-species.

importance for the reconstruction of the history of *Peryphanes* in the region considered. Secondly, all taxa endemic or subendemic to that region exhibit close phylogenetic relationships with Mediterranean species-groups. Thirdly, the Talysh as most ancient refugium of the Mediterranean fauna within the Caucasus harbours the most archaic *Peryphanes*-species. Finally, it seems noteworthy that none of the boreal species of *Peryphanes* has hitherto been recorded in the Caucasus.

Taking into account all the above, one can recognize the following main characteristics of *Peryphanes*-faunogenesis within the Caucasus. The Caucasus Major seems likely to have been deprived of any representatives of the subgenus until the first southerly land-bridge junction with the Anatolian platform in the Upper Miocene. The most ancient consubgener(s) seem(s) to have arisen in humid forests of the ancient Mediterranean region prior to the deviation of the common *Peryphanes* and *Ocyturanes* stem into the respective two branches. At the present, members of this very old, initial group seem to be restricted to a few, small, isolated areas still maintaining a comparatively stable humid climate (the Talysh within the region concerned and the Ghissaro-Darvaz in Middle Asia).

After the above, increasingly pronounced, junction of the Caucasus with the Anatolian platform, some more advanced, cool-adapted *Peryphanes*-species could have appeared. It seems very likely that the widely distributed subendemic species *B. adygorum* had such an origin. Somewhat later, in the Plio-Pleistocene, along with progressing continentalization of the region and against the background of an increasing aridization, some further thermophilous species could have penetrated the southern areas of the Transcaucasia (*B. phryganobium*, *B. dalmatinum haupti*). As regards the widespread East Mediterranean *B. brunnicorne*, this taxon seems to have got into the Caucasus quite recently together with several other species of European origin, all displaying a more or less similar distribution pattern, e. g. such as *B. tricolor*, *B. relictum*, *B. tibiale*. Being somewhat isolated from the allied East Mediterranean consubgener(s) and inhabiting almost all the Caucasian region including the arid plains of Ciscaucasia, the most common *B. fraxator* seems to have attained sympatry with the rather closely related *B. adygorum* only secondarily. Vicariance suggests that both species arose more or less simultaneously in different parts of the Caucasus which, at least as regards the faunogenesis of *Peryphanes*, can be considered as a three-component system consisting of more or less strongly isolated, but heterochronous, mountain areas of western Transcaucasia, most of the Central and West Caucasus, and the East Caucasus.

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