

Further investigation of Dorcadionini (Coleoptera: Cerambycidae) endophallus with a revision of taxonomical position of the genus *Trichodorcadion* Breuning, 1942

Дальнейшее изучение строения эндофаллюса Dorcadionini (Coleoptera: Cerambycidae) с пересмотром таксономического положения рода *Trichodorcadion* Breuning, 1942

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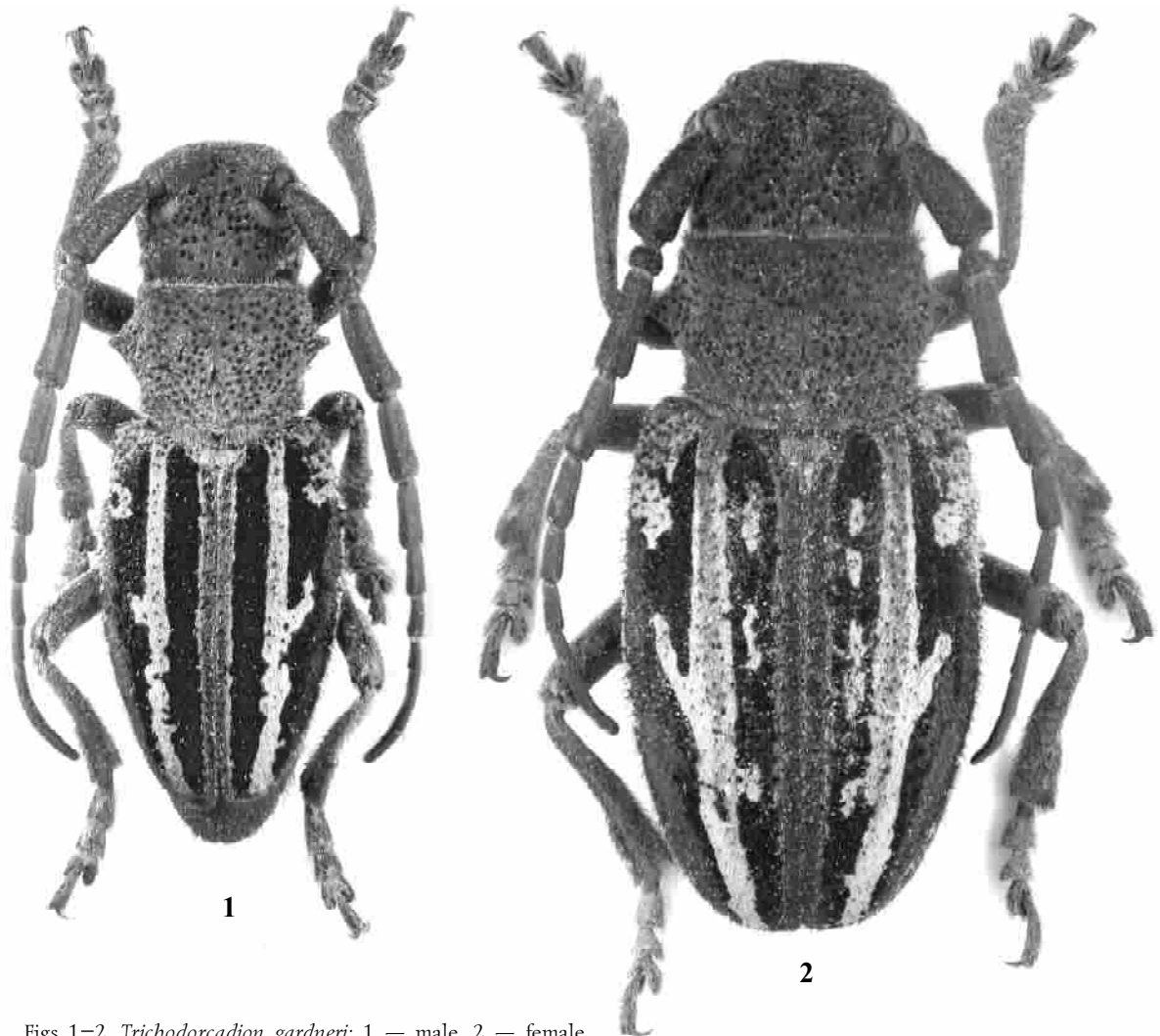
KEY WORDS: Cerambycidae, Dorcadionini, *Dorcadion*, *Trichodorcadion*, endophallus, morphology, taxonomy, new synonyms.

КЛЮЧЕВЫЕ СЛОВА: Cerambycidae, Dorcadionini, *Dorcadion*, *Trichodorcadion*, эндофаллюс, морфология, таксономия, новые синонимы.

ABSTRACT: Endophallus morphology of *Trichodorcadion gardneri* Breuning, 1942 is very close to *Iberodorcadion* Breuning, 1943 (but not to *Eodorcadion* Breuning, 1947, as could be more expectable because of geographical reasons), because of central trunk fused with preapical bulb without constriction, and preapical bulb delimited from apical bulb by deep constriction (absent in *Eodorcadion*), internal membrane at the base of apical bulb well developed (absent in *Eodorcadion*), but clearly differs because of very big distal structures. Genus *Trichodorcadion* Breuning, 1942 is transferred to Dorcadionini. Endophallic structures of 5 species being composed before in 2 subgenera of *Dorcadion*: *Megalodorcadion* Pesarini et Sabbadini, 1999: *D. (M.) ledereri* Thomson, 1865 (type species), *D. (M.) walteri* Holzschuh, 1991 and *Bergerianum* Pesarini et Sabbadini, 2004: *D. (B.) chrysochroum* Breuning, 1943 (type species), *D. (B.) hampei* Mulsant et Rey, 1863, *D. (B.) sonjae* Peks, 1993 — are described and figured. *D. (Megalodorcadion)* is recognized as a natural group of relative species, but endophallic morphology does not allow to regard it as a subgenus, being very typical for *D. (Cribridorcadion* Pic, 1901). So *D. (Cribridorcadion* Pic, 1901) = *D. (Megalodorcadion* Pesarini et Sabbadini, 1999), **syn.n.** *D. (Bergerianum)* is totally artificial complex consisting of three parts without any relative connections. Each of three is more or less similar to different groups of *D. (Cribridorcadion)* with the exception of *D. chrysochroum*, which is more or less unique,

though of general *D. (Cribridorcadion)* type. So *D. (Cribridorcadion* Pic, 1901) = *Dorcadion (Bergerianum* Pesarini et Sabbadini, 2004), **syn.n.**

РЕЗЮМЕ: Строение эндофаллюса *Trichodorcadion gardneri* Breuning, 1942 очень близко эндофаллюсу *Iberodorcadion* Breuning, 1943 (а не *Eodorcadion* Breuning, 1947, как можно было бы ожидать из географических соображений), так как центральный ствол слит с преапикальной камерой без явной перетяжки, а преапикальная камера отделена от апикальной камеры глубокой перетяжкой (отсутствующей у *Eodorcadion*), внутренняя мембрана в основании апикальной камеры хорошо развита (отсутствует у *Eodorcadion*), но хорошо отличается очень крупными дистальными структурами. Род *Trichodorcadion* Breuning, 1942 перенесён в Dorcadionini. Описаны и изображены эндофаллюсы 5 видов, выделенных ранее в 2 подрода *Dorcadion* — *Megalodorcadion* Pesarini et Sabbadini, 1999: *D. (M.) ledereri* Thomson, 1865 (типовой вид), *D. (M.) walteri* Holzschuh, 1991 и *Bergerianum* Pesarini et Sabbadini, 2004: *D. (B.) chrysochroum* Breuning, 1943 (типовой вид), *D. (B.) hampei* Mulsant et Rey, 1863, *D. (B.) sonjae* Peks, 1993. *D. (Megalodorcadion)* признан естественной группой родственных видов, однако, строение эндофаллюса не позволяет рассматривать её в ранге подрода, так как вполне типично для *D. (Cribridorcadion* Pic, 1901). Таким образом *D. (Cribridorcadion* Pic, 1901) = *Dorcadion (Bergerianum* Pesarini et Sabbadini, 2004), **syn.n.**



Figs 1–2. *Trichodorcadion gardneri*: 1 — male, 2 — female.
Рис. 1–2. *Trichodorcadion gardneri*: 1 — самец, 2 — самка.

dorcadion Pic, 1901) = *D. (Megalodorcadion* Pesarini et Sabbadini, 1999), **syn.n.** *D. (Bergerianum)* представляет собой искусственный комплекс не родственных видов, состоящий из трёх очень разных групп. Строение эндофаллуса в каждой из них напоминает эндофаллус тех или иных групп внутри *D. (Cribridorcadion)* за исключением *D. crysochroum*, эндофаллус которого несколько своеобразен, хотя вполне укладывается в план строения *D. (Cribridorcadion)*. Таким образом, *D. (Cribridorcadion* Pic, 1901) = *Dorcadion (Bergerianum* Pesarini et Sabbadini, 2004), **syn.n.**

Introduction

In our previous publication on Dorcadionini endophallus [Danilevsky et al., 2005] we supported the separation of *Dorcadion* subgen. *Megalodorcadion* Pesarini et Sabbadini, 1999 on the base of endophallic structure of *D. glabrofasciatum* Daniel, 1901, which was included in *Megalodorcadion* by C. Pesarini and A. Sabbadini in the original description of the subge-

nus. The endophallus of the type species of *Megalodorcadion*: *D. ledereri* Thomson, 1865 (original designation) was not investigated by us.

Recently *Dorcadion* subgenus *Bergerianum* Pesarini and Sabbadini, 2004 (type species: *D. chrysochroum* Breuning, 1943 — original designation) was described. Originally it includes four species: *D. chrysochroum* Breuning, 1943, *D. hampei* Mulsant et Rey, 1863, *D. sonjae* Peks, 1993 and *D. glabrofasciatum* Daniel, 1901. Five species (*D. ledereri* Thomson, 1865, *D. escherichi* Ganglbauer, 1897, *D. angorense* Ganglbauer, 1897, *D. parallelum* Kuster, 1847 and *D. walteri* Holzschuh, 1991) are still included in *D. (Megalodorcadion)*.

So, the endophallic structure of *D. glabrofasciatum* can not be used for characterization of *D. (Megalodorcadion)*. For better understanding of natural separation of two subgenera we have studied their type species and more representatives of each subgenus. Now we are able to describe endophallus of *D. ledereri* and *D. walteri*, as well as *D. chrysochroum*, *D. hampei* and *D. sonjae*.

We have also studied the endophallus of *Trichodorcadion gardneri* Breuning, 1942 (known from Ganges

river valley in India and Nepal) in order to understand the taxonomic position of the genus *Trichodorcadion* Breuning, 1942.

Descriptions

Trichodorcadion gardneri Breuning, 1942 (Figs 1–4)

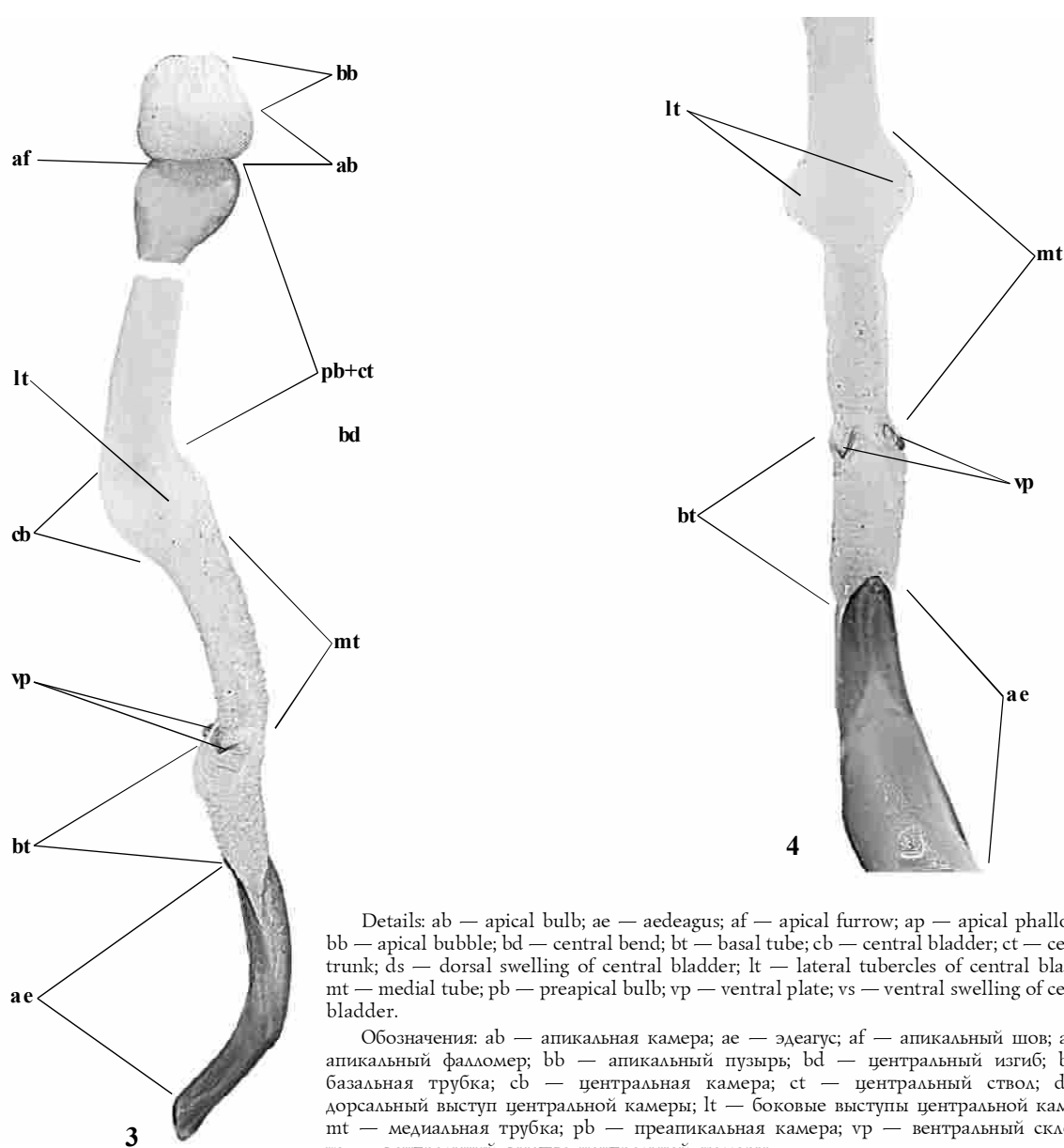
MATERIAL. ♂, ♀: Nepal, Narayani prov., Sauraha SW Chitwan Nat. Park, 180m, 27°34'80"N, 84°29'49"E, 17.4.2000, leg. A. Weigel (coll. of M. Danilevsky).

The species was described (on the base of one specimen — 11 mm long — most probably male, because of long antennae) as the type-species of a new genus *Trichodorcadion* from

India (Uttar Pradesh prov., Dehra Dun). The genus was placed by its author [Breuning, 1961] in Morimopsini and never figured.

Due to the courtesy of Mr. Andreas Weigel we have received a pair of *T. gardneri* from Nepal (Figs 1–2); length of male: 11.9 mm (including slightly exposed abdomen), length of female: — 14.8 mm. The identification of the species was made on the base of original description. The holotype must be preserved in the Museum of Dehra Dun. A female of the species has just the same elytral design as male, but relatively wider, anterior tarsi are not narrower than in male.

Unfortunately the sample of everted and inflated endophallus (Figs 3–4) of our single male was broken during preparation, but still all main characters can be seen.



Details: ab — apical bulb; ae — aedeagus; af — apical furrow; ap — apical phallomer, bb — apical bubble; bd — central bend; bt — basal tube; cb — central bladder; ct — central trunk; ds — dorsal swelling of central bladder; lt — lateral tubercles of central bladder; mt — medial tube; pb — preapical bulb; vp — ventral plate; vs — ventral swelling of central bladder.

Обозначения: ab — апикальная камера; ae — эдеагус; af — апикальный шов; ap — апикальный фалломер; bb — апикальный пузырь; bd — центральный изгиб; bt — базальная трубка; cb — центральная камера; ct — центральный ствол; ds — дорсальный выступ центральной камеры; lt — боковые выступы центральной камеры; mt — медиальная трубка; pb — преапикальная камера; vp — вентральный склерит; vs — вентральный выступ центральной камеры.

Figs 3–4. *Trichodorcadion gardneri*: 3 — endophallus, lateral view; 4 — basal half of endophallus, ventral view.
Рис. 3–4. *Trichodorcadion gardneri*: 3 — эндофаллюс, сбоку; 4 — базальная часть эндофаллюса, снизу.

DESCRIPTION. Endophallus relatively long, much longer than elytra (but shorter than elytra and prothorax combined). Basal tube (bt) relatively short, more than two times shorter than aedeagus, straight, microspicules indistinct, without transverse rugae, a little swollen distally; ventral plates (vp) relatively wide and strongly sclerotized. Medial tube (mt) about as long as aedeagus, straight, microspicules indistinct, distally swollen forming relatively large central bladder (cb), with well developed lateral tubercles of central bladder (lt). Central bend (bd) distinct; central trunk (ct) turned to the central bladder at the angle of about 30°, long, wide, relatively cylindrical, not swollen, without tubercles, covered with dense hardly visible microtrichiae only distally. Preapical bulb (pb) large, strongly swollen connected with central trunk without distinct constriction, dorsally, ventrally and distally with very distinct microspicules; basal and lateral areas of preapical bulb covered with very small, hardly visible microtrichiae. Apical bulb (ab) large, spherical, joined to preapical bulb by distinct constriction, covered with distinct regular spines. Apical furrow (af) with a well developed internal membrane inside. Apical bubble (bb) also large hemispherical, without sclerites; long flagellum seems to be developed, but it is still inside bubble in our sample. Gonopores situated near apex of apical bubble.

REMARK. In general endophallus belongs to *Iberodorcadion* Breuning, 1943 type because of preapical bulb connected with central trunk without distinct constriction, internal membrane present. Same connection is in *Neodorcadion* Ganglbauer, 1883 and in *Eodorcadion* Breuning, 1947, but in *Neodorcadion* preapical bulb is not differentiated and in *Eodorcadion* apical bulb absent; in *Neodorcadion* apical membrane present, but in *Eodorcadion* absent.

Dorcadion (*Cribridorcadion*) *ledereri* Thomson, 1865
(Fig. 5)

MATERIAL. ♂: "TR, vill. Corum, Çerum 10km E, 2-3.V.1992, lg. Pesarini & Sabbadini" (coll. of M. Danilevsky).

DESCRIPTION. Endophallus relatively long, about as long as elytra. Basal tube (bt) relatively short, about two times shorter than aedeagus, straight, without microspicules, transversely rugose; ventral plates (vp) relatively small and poorly sclerotized. Medial tube (mt) much longer than aedeagus, straight, covered with very small microspicules dorsally and ventrally, distally strongly swollen forming big and longitudinal central bladder (cb), with dorsal (ds) and ventral (vs) swellings. Central bend (bd) distinct; central trunk (ct) turned to the central bladder at the angle of about 45°, long, narrow, gradually tapering distally, not swollen, without tubercles, covered with very dense relatively long brown microtrichiae. Preapical bulb (pb) small, but wider than distal portion of central trunk, clearly delimited from central trunk by strong constriction, spherical, glabrous in main portion, but distally with dense brown microtrichiae similar to those of central trunk. Apical bulb (ab) joined to preapical bulb by distinct constriction, covered with distinct regular spines. Apical bubble (bb) without distinct sclerites.

REMARK. In general endophallus is not special. Such morphology type (with narrow, tapering posteriorly central trunk and small elongated distal structures) is known in several groups of *D.* (*Cribridorcadion*), which do not look to be relatives, for example in *D.* (*C.*) *apicerufum* Breuning, 1943, *D.* (*C.*) *lugubre* Kraatz, 1873 and others [Danilevsky et al., 2005: Figs 99, 106].

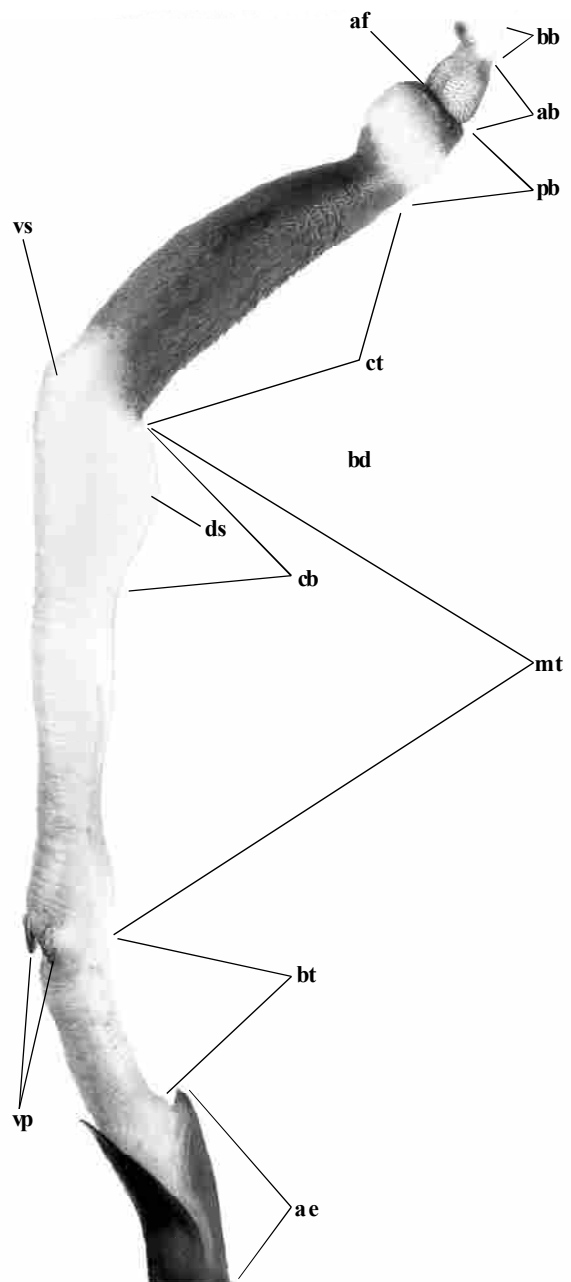


Fig. 5. Endophallus of *Dorcadion* (*Cr.*) *ledereri*, lateral view. Explanation see on Figs 3-4.

Рис. 5. Эндофаллюс *Dorcadion* (*Cr.*) *ledereri*, сбоку. Обозначения см. на рис. 3-4.

D. (*Cr.*) *walteri* Holzschuh, 1991
(Fig. 6)

MATERIAL. ♂ (paratype): "TR (Vill. Bolu), Alput Bey Köyü, bei Bolu, 800m, 16.4.1990, Heinz leg." (coll. of M. Danilevsky).

DESCRIPTION. General structure very similar to the preceding species, but central bladder (cb) hardly pronounced — in form of gradual dilatation of medial tube (mt), with long and narrow ventral swelling (vs). Central bend (cb) distinct, central trunk (ct) turned to the central bladder at the angle of about 45°, long, narrow, gradually tapering distally, not swollen, without tubercles, covered with very dense relatively long brown microtrichiae. Preapical bulb (pb) small, narrow,

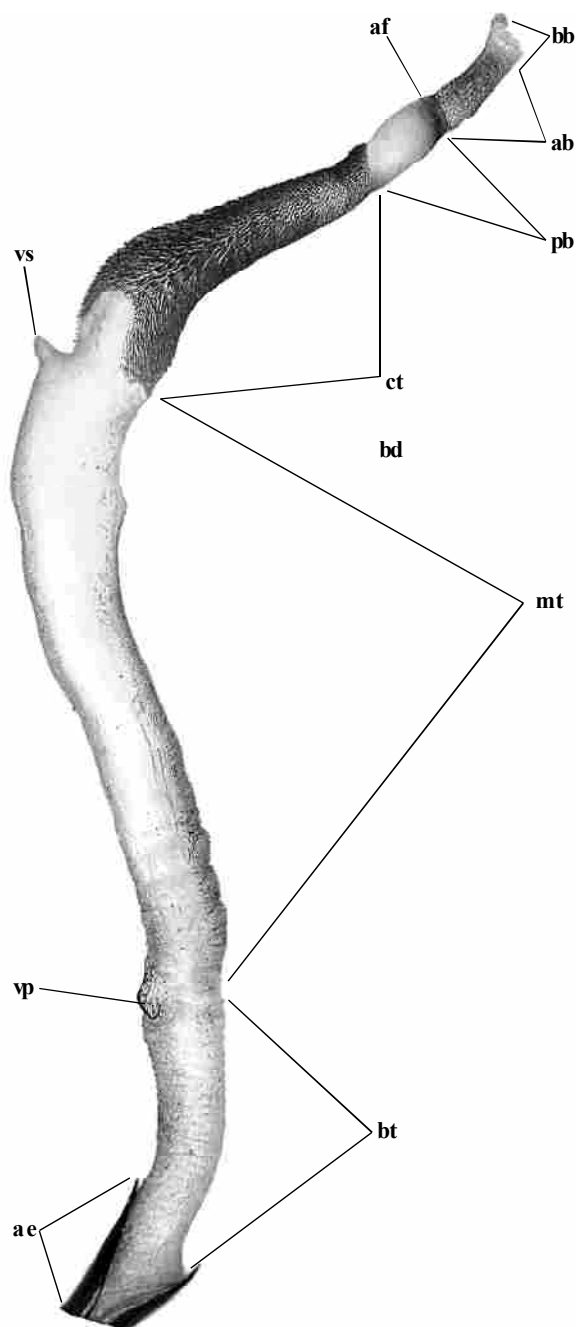


Fig. 6. Endophallus of *Dorcadion (Cr.) walteri*, lateral view. Explanation see on Figs 3–4.

Рис. 6. Эндофаллос of *Dorcadion (Cr.) walteri*, сбоку. Обозначения см. на рис. 3–4.

elongated, not wider than distal portion of central trunk, without constriction in between, glabrous in main portion, but distally with dense brown microtrichiae similar to those of central trunk. Apical bulb (ab) joined to preapical bulb by distinct constriction, covered with distinct regular spines. Apical bubble (bb) without distinct sclerites.

REMARK. According to the endophallus morphology, *D. walteri* is rather close to *D. ledereri*. The presence of ventral tubercle of central bladder is rather common in such type of endophallus. Long ventral tubercles are known in

D. (C.) bistratum Pic, 1898, *D. (C.) seminudum* Kraatz, 1873, *D. (C.) tauricum* Waltl, 1838 and others [Danilevsky et al., 2005: Figs 97, 98, 101].

D. (Cr.) chrysochroum Breuning, 1943
(Fig. 7)

MATERIAL. ♂: "GRAECIA, Peloponesos b., Ciokos Mts., 900–1000m, 2km NE Petsaki, 20.5.2004, J. Voříšek leg." (coll. of M. Danilevsky).

DESCRIPTION. Endophallus relatively long, longer than elytra. Basal tube (bt) relatively short, about two times shorter than aedeagus, straight, without microspicules, ventral plates (vp) relatively small and poorly sclerotized. Medial tube (mt) much longer than aedeagus, transversely rugose, straight, covered with very small microspicules dorsally and ventrally, distally strongly swollen forming big and longitudinal central bladder (cb), with big ventral swelling (vs). Central bend (bd) distinct; central trunk (ct) turned to the central bladder at the angle of about 60°, narrow, but relatively short, about two times longer than wide, cylindrical, not swollen, without tubercles, covered with very dense, short microtrichiae. Preapical bulb (pb) big, just a little shorter than central trunk (unique character!), swollen, elongated, much wider than distal portion of central trunk, totally covered with short microtrichiae, which become denser distally. Apical bulb (ab) also big, joined to preapical bulb by distinct constriction, covered with distinct regular spines, forming together with hemispherical apical bubble (bb) a large spherical apical phallomer (ap), which is bigger than preapical bulb; apical bubble without distinct sclerites.

REMARK. In general endophallus is rather special because of big apical phallomer and short central trunk. Similar apical phallomers are known in several *Dorcadion (Cribridorcadion)* groups, which are very far from *D. chrysochroum*, for example in *D. equestre* (Laxmann, 1770) or in "*D. semenovi*-group" [Danilevsky et al., 2005: Figs 71–76], but here central trunk longer and more or less swollen, while preapical bulb strongly transverse. Endophallus of *D. chrysochroum* is not similar the endophallus of any *Dorcadion* species, though it is in general of *D. (Cribridorcadion)* type.

D. (Cr.) hampei aureovittatum Kraatz, 1873
(Fig. 8)

MATERIAL. ♂: "TR — w. Niksar, w. YOLKONAK, 5.5.1996, S. Kadlec leg." (coll. of M. Danilevsky).

DESCRIPTION. Endophallus relatively short, much shorter than elytra. Basal tube (bt) short, about four times shorter than aedeagus, straight, with hardly visible microspicules; ventral plates (vp) distinct and strongly sclerotized. Medial tube (mt) a little shorter than aedeagus, straight, covered with very small microspicules dorsally and ventrally, distally a little dilated, forming hardly pronounced central bladder (cb). Central bend (bd) distinct; central trunk (ct) turned to the median tube at the angle of about 90°, very wide, but strongly reduced, short, two times shorter than wide, rather swollen dorsally, densely covered with distinct microasperities. Preapical bulb (pb) big, spherical, about as wide as swollen central trunk, clearly delimited from central trunk by strong constriction, glabrous basally, in main portion with dense moderately small microspiculae. Apical bulb (ab) joined to preapical bulb by distinct constriction, covered with distinct regular spines, cylindrical, tapering distally; internal membrane well developed. Apical bubble (bb) wide consists of dorsal and ventral portions, without distinct sclerites.

REMARK. General endophallus structure is rather exceptional, because of reduced, short, transverse central trunk

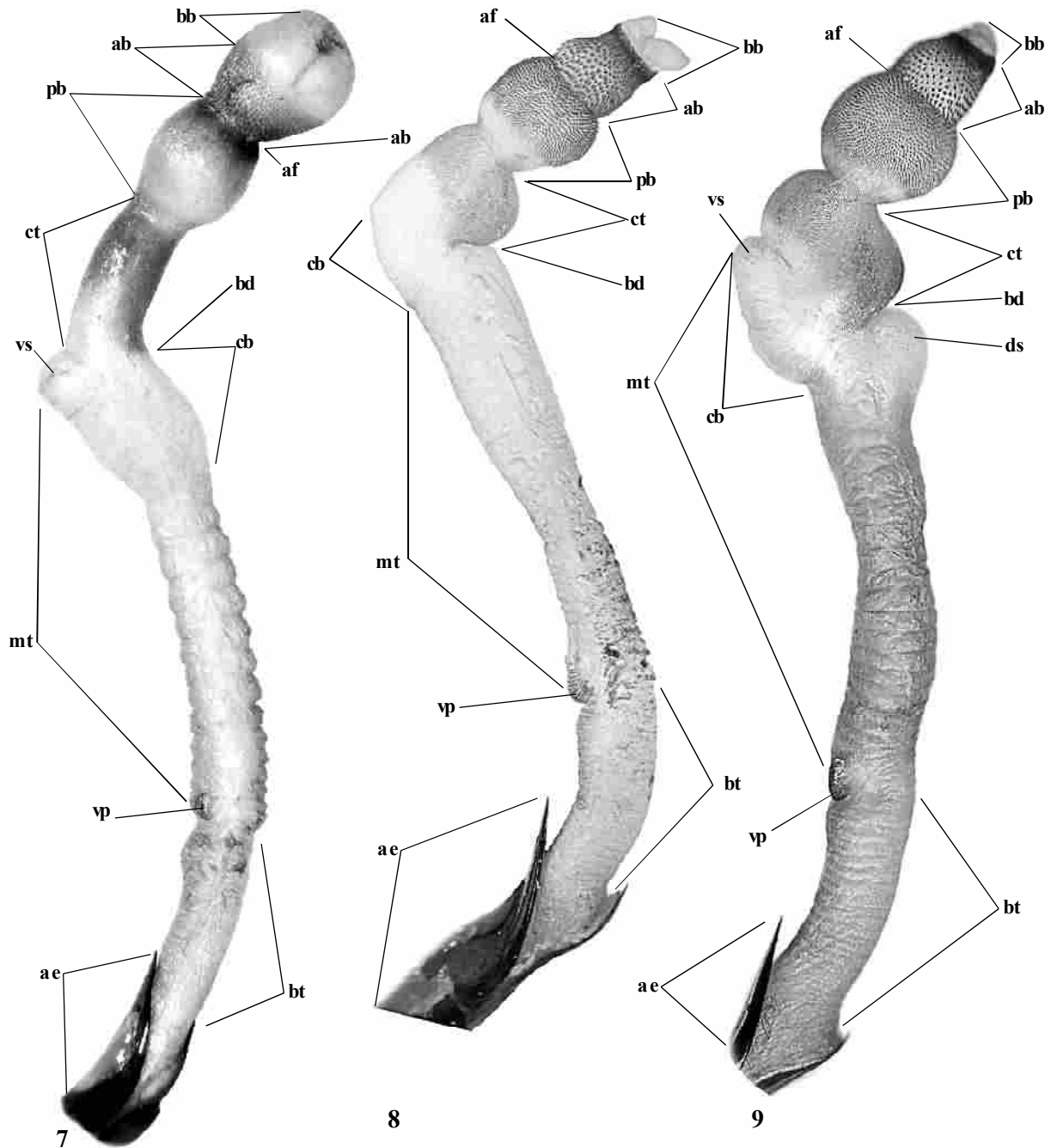


Fig. 7–9. Endophallus of *Dorcadion*, lateral view: 7 — *D. (Cr.) chrysochroum*; 8 — *D. (Cr.) hampei*; 9 — *D. (Cr.) sonjae*. Explanation see on Figs 3–4.

Рис. 7–9. Эндофаллюс *Dorcadion*, сбоку: 7 — *D. (Cr.) chrysochroum*; 8 — *D. (Cr.) hampei*; 9 — *D. (Cr.) sonjae*. Обозначения см. на рис. 3–4.

swollen dorsally. Such form was known before only in *D. (C.) sturmi* Frivaldsky, 1837 (Danilevsky et al., 2005: Fig. 108), but its close affinity to *D. hampei* is very doubtful.

D. (Cr.) sonjae Peks, 1993
(Fig. 9)

MATERIAL. ♂ (paratype): “TR (Elazio), Ayvar-Köyü b., Elmapiınan 850m (23km e Elazio), 15.IV.1992, Heinz leg.” (coll. of M. Danilevsky).

DESCRIPTION. General structure very similar to the preceding species, but central bladder (cb) is strongly developed with very large dorsal (ds) and ventral (vs) swellings; central trunk (ct) even wider being swollen dorsally and ventrally.

REMARK. The close natural affinities between *D. hampei* and *D. sonjae* are rather evident from the external characters of the species. These connections are proved by endophallic structures.

Conclusion

The morphological similarity between *Iberodorcadion* and *Trichodorcadion* in the general structures of distal portions seems to be the evidence of mutual ancient ancestor, younger than morphological type of *Cribridorcadion*, because several small features of *Trichodorcadion* are also same as in *Iberodorcadion*: the absence of microtrichiae on the most part of central trunk, presence of large lateral tubercles of central bladder (known only in certain *Iberodorcadion*), presence of long flagellum (also known only in *Iberodorcadion*). So, the natural position of the genus *Trichodorcadion* is inside Dorcadionini. The genus differs from all *Iberodorcadion* by the spherical shape of preapical bulb (in *Iberodorcadion* it is more or less cylindrical) and spherical structure forming by joined apical bulb and apical bubble (impossible in *Iberodorcadion* but known in certain *Cribridorcadion*).

Imagoes externally is normal Dorcadionini without wings, with wide membrane between clypeus and labrum (typical for *Eodorcadion*), elytra covered with recumbent pubescence and numerous stout erect setae.

D. (Megalodorcadion) is a natural group of species, that it rather clear from the external imaginal morphology. This point of view can be supported by endophallic morphology, as endophallus of *D. (M.) ledereri* is very close to endophallus of *D. (M.) walteri*. From the other side endophallic morphology can not be the base for separation of this natural group in a subgenus, as it does not differ from the general *D. (Cribridorcadion)* morphological type, so *D. (Cribridorcadion* Pic, 1901) = *D. (Megalodorcadion* Pesarini et Sabbadini, 1999), **syn.n.**

D. (Bergerianum) is a totally artificial complex consisting of three rather different groups without relative connections. Exceptional long endophallus of *D. glabrofasciatum* with "S"-shaped central bladder and "S"-shaped connection between central trunk and preapical bulb was described by us before (Danilevsky et al., 2005: Fig. 109). Endophallus of *D. chrysochroum* (type species) with its big apical phallomer and short central

trunk is not directly connected with any known *Dorcadion*, but can be easily placed inside *D. (Cribridorcadion)* morphological type. *D. hampei* and *D. sonjae* represent natural group which has no connections with two previous species because of reduced, short, transverse central trunk. *Bergerianum* was described on the base of similar shape modification of apical spines of hind male tibiae. But in reality the longest spines of hind male tibiae are not dilated in any of species included in the subgenus. In all four species these spines are not modified, as it was pictured by the authors of the subgenus. External morphology of all four species also does not allow to suppose their relative affinities. So *D. (Cribridorcadion* Pic, 1901) = *Dorcadion* (*Bergerianum* Pesarini et Sabbadini, 2004), **syn.n.**

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