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research trends



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**A new species of the genus *Carpophilus*  
(Coleoptera: Nitidulidae: Carpophilinae)  
from Algeria, and taxonomic notes**

**Новый вид рода *Carpophilus*  
(Coleoptera: Nitidulidae: Carpophilinae)  
из Алжира и таксономические замечания**

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**Key words:** Coleoptera, Nitidulidae, *Carpophilus* s. str., new species, designation of lectotypes, synonymy, Palaearctic, Mediterranean, Sahara.

**Ключевые слова:** Coleoptera, Nitidulidae, *Carpophilus* s. str., новый вид, обозначение лектотипов, синонимия, Палеарктика, Средиземноморье, Сахара.

**Abstract.** *Carpophilus* (*Carpophilus*) *saharaensis* sp. n. belonging to the *bifenestratus*-group, which is distributed mostly in the Afro-Malagasy (Afrotropical, Capean and Malagasy) Regions, is described from Algeria (Theniet el Had). This group is first proposed. Its diagnosis, composition, variability and distribution are discussed. The lectotypes of *Carpophilus* (*Carpophilus*) *bifenestratus* Murray, 1864, *C. (C.) biguttatus* Klug, 1862 and *C. (C.) binotatus* Murray, 1864 are designated. The renewed synonymy for the species name *C. (C.) bifenestratus* and also the information on variability of this species and probable synonymy with *Carpophilus* (*Carpophilus*) *bipustulatus* (Heer, 1841) (*Ips*) are given. The latter name needs a re-examination of the type series used for its proposal.

**Резюме.** Описан *Carpophilus* (*Carpophilus*) *saharaensis* sp. n. из Алжира (Тхениэт Эл Хад), относящийся к группе *bifenestratus*, которая распространена преимущественно в Афро-Мадагаскарских (Афротропической, Капской и Мадагаскарской) областях. Эта группа предложена впервые. Обсуждается ее диагноз, состав и распространение. Обозначены лектотипы *Carpophilus* (*Carpophilus*) *bifenestratus* Murray, 1864, *C. (C.) biguttatus* Klug, 1862 и *C. (C.) binotatus* Murray, 1864. Дана обновленная синонимия для видового названия *C. (C.) bifenestratus*, а также информация об изменчивости этого вида и его возможной синонимии с *Carpophilus* (*Carpophilus*) *bipustulatus* (Heer, 1841) (*Ips*). Последнее название нуждается в переизучении типовой серии, использованной для его предложения.

## Introduction

The genus *Carpophilus* Stephens, 1829 consists of some subgenera (*Askocarpolus* Kirejtshuk, 2008; *Caplothorax* Kirejtshuk, 1997; *Carpophilus* s. str.; *Ecnomorphus* Motschulsky, 1857; *Gaplocarpolus* Kirejtshuk, 1997; *Megacarpolus* Reitter, 1919; *Myothorax* Murray, 1864; *Plapennipolus* Kirejtshuk, 1997; *Semocarpolus* Kirejtshuk, 2008) [Kirejtshuk, 2008]. The subgenus *Carpophilus* s. str. includes the *hemipterus*-group, whose species, in contrast to other consubgenera, have more or less distinct yellowish spots on elytra (sometimes scarcely expressed in very light immature specimens): *Carpophilus* (*Carpophilus*) *africanus* Kirejtshuk, 2001; *C. (C.) bifenestratus* Murray, 1864; ? *C. (C.) bipustulatus* (Heer, 1841); *C. (C.) binotatus* Murray, 1864; *C. (C.) bisignatus* Boheman, 1851; *C. (C.) delkeskampi* Hisamatsu, 1963; *C. (C.) hemipterus* (Linnaeus, 1758); *C. (C.) indicus* Hisamatsu, 1963; *C. (C.) jelineki* Audisio et Kirejtshuk, 1988 (= *politus* Jelinek, 1986, non Heer, 1841); *C. (C.) ligatus* Murray, 1864; *C. (C.) quadrisignatus* Erichson, 1843; *C. (C.) spinosus* Kirejtshuk, 1995 and *C. (C.) tegmenalis* Kirejtshuk, 1995. This group, in turn, can be splitted into two subgroups as following: (I) species with narrower and subflattened body and the postmesocoxal line slightly and more densely undulate (*bifenestratus*-subgroup): *C. (C.) bifenestratus*, ? *C. (C.) bipustulatus*, *C. (C.) binotatus* and *C. (C.) spinosus*; and (II) species with more robust and convex body, and also with the postmesocoxal line strongly and more sparsely undulate (*hemipterus*-subgroup): *C. (C.) africanus*, *C. (C.) bisignatus*, *C. (C.) delkeskampi*, *C. (C.) hemipterus*, *C. (C.) indicus*, *C. (C.) jelineki*, *C. (C.) ligatus*, *C. (C.) quadrisignatus* and

*C. (C.) tegmenalis*, although not infrequently specimens of the last-mentioned species and *C. (C.) africanus* have the body somewhat intermediate between the members of these two subgroups in its width and convexity, and the postmesocoxal line of *C. (C.) africanus* becomes obsolete. The pattern of coloration on elytra among the species of both subgroups is different. The former (*bifenestratus*-subgroup) is characterized by two paramedian yellowish spots near the middle of elytra, while the species of the latter (*hemipterus*-subgroup) have similar spots located at the inner apical (suturoapical) angles of elytra and the yellowish pattern of elytra frequently becomes more complex and reaches the base of elytra. Besides, both subgroups have some difference in distribution: the former (*bifenestratus*-subgroup) is spread mostly in the Mediterranean Province (including Kazakhstan) and Afro-Malagasy Regions, and only one species (*C. (C.) bifenestratus*) probably thanks to its association with stored products became subcosmopolitan, while the latter (*hemipterus*-subgroup) is distributed in natural habitats in all regions of the Eastern Hemisphere, but its many species more or less increased their initial range thanks to inhabitation in buildings and feeding on different remains of plant origin.

This paper is devoted to a description of one new species of the *bifenestratus*-subgroup of the subgenus *Carpophilus* s. str. from Algeria found among specimens named by A. Grouvelle as "*Carpophilus bifenestratus*" in the collection of the Muséum national d'histoire naturelle (hereafter MNHN, Paris, France).

## Material and methods

After current study of the specimens of the new species the holotype and most paratypes of it were deposited in MNHN and a part of paratypes were taken for depository in the collection of Zoological Institute of the Russian Academy of Sciences (hereafter ZIN, St. Petersburg, Russia). For comparative study specimens from many collections were used, including the Natural History Museum (British Museum of Natural History, hereafter BMNH, London, Great Britain), Zoologisches Museum der Humboldt-Universität (hereafter ZMB, Berlin, Germany). The study of specimens examined was carried out with the stereomicroscopes MBS-10; the photographs were taken with a Canon EOS 11 40D digital camera with a Canon MP-E 65 mm objective and were combined using Zerene Stacker 1.04 software.

**Family Nitidulidae Latreille, 1802**  
**Subfamily Carpophilinae Erichson, 1843**  
**Genus *Carpophilus* Stephens, 1829**  
**Subgenus *Carpophilus* Stephens, 1829**

Type species: *Dermestes hemipterus* Linnaeus, 1758 (designated by Parsons [1943]).

*Carpophilus (Carpophilus) saharaensis* sp. n.  
 (Figs 1–4, 6–9)

**Material.** Holotype, ♂ (MNHN) with labels: "Algérie, Teniet el Haad, June, 1892" [Algeria, Theniet el Had], "*Carpophilus bifenestratus*"

(det. Grouvelle), "Coll. A. Grouvelle". Paratypes, 16 specimens (11 – MNHN, 5 – ZIN) with labels: "Algérie, Teniet el Haad, June, 1892"; "Algérie, Teniet el Haad" or "Algérie, Teniet el Had"; "*Carpophilus bifenestratus*" (det. Grouvelle), "Coll. A. Grouvelle".

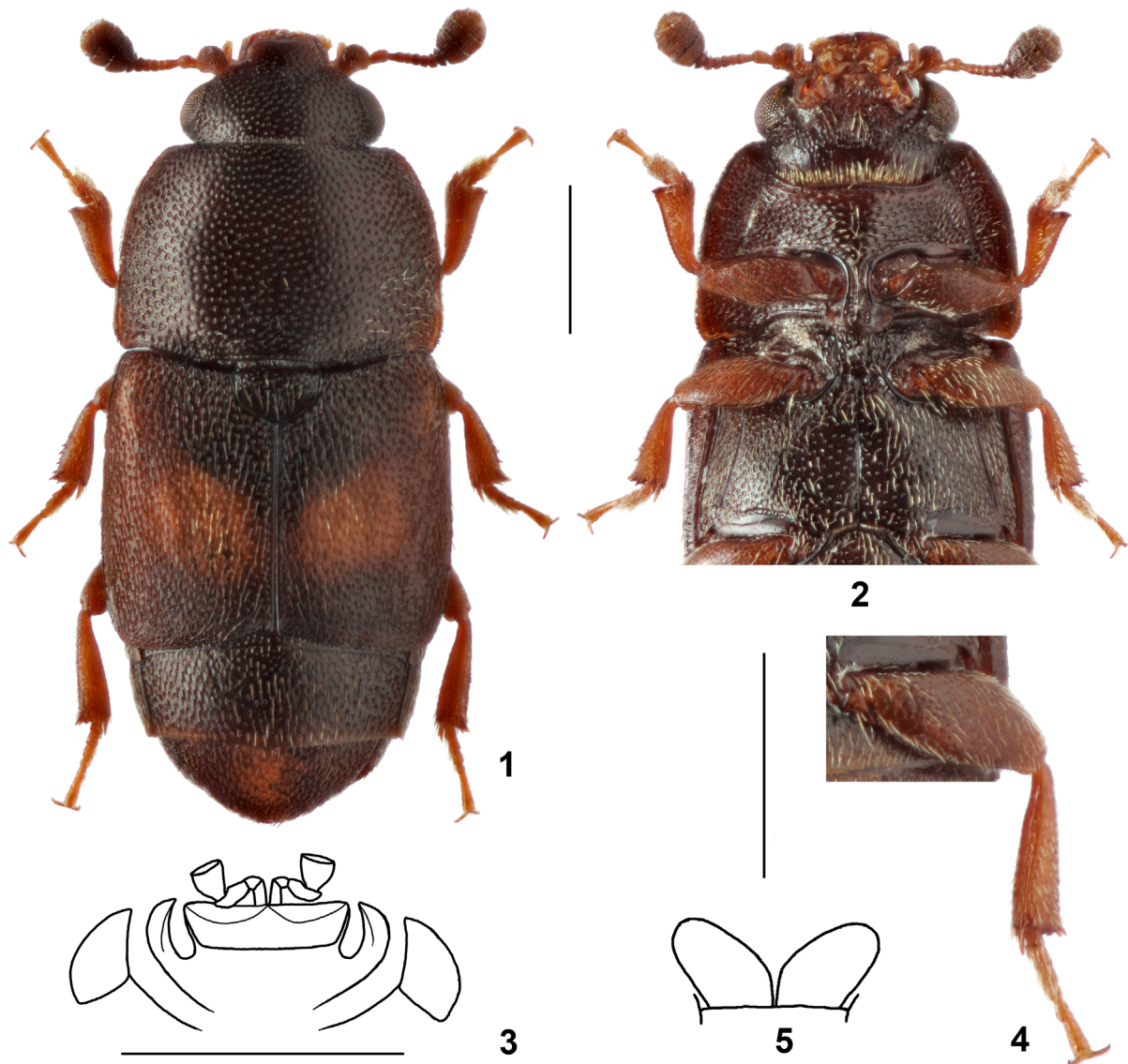
**Description.** Male (holotype). Body length 3.2, breadth 1.1, height 0.4 mm. Subflattened dorsally and moderately convex ventrally; pitchy brown to blackish upper surface and slightly lighter lower surface, with yellowish spots on elytra (usually asymmetric and somewhat displaced to suture at suturoapical angle) and with light brownish to reddish appendages; slightly shining; integument with recumbent and moderately conspicuous greyish hairs, 2–2.5 times longer than distance between their insertions.

Head, pronotal and elytral integument with distinct and regular punctures nearly twice greater than eye facets in diameter (at sides on pronotum and elytra) or somewhat smaller (on head and pronotal disk), interspaces between them greater than one puncture diameter at pronotal disk and smaller on other places, smoothly cellularly microreticulated. Uncovered tergites and hypopygidium with suboval and indistinct punctures, markedly smaller than those on other dorsal sclerites, interspaces between them about one puncture diameter, with dense and coarse microreticulation. Prosternal integument with less distinct punctures about twice as great as eye facets in diameter, interspaces between them markedly less than one puncture diameter and with rather smooth microreticulation. Integument of metaventrete with distinct and quite deep punctures, as coarse as those on prosternum, interspaces between them about 1–3 times as great as one puncture diameter and almost completely smooth; punctures on ventrites 1–4 becoming smaller, shallower and sparser distally, interspaces between them nearly smoothed on ventrite 1 and becoming more clearly microreticulated on ventrites 2–4.

Head about 0.7 time as long as distance between eyes. Antennae about 0.8 time as long as width of head; antennomere 2 (pedicel) slightly longer than antennomere 3 and more than 3 times as long as antennomere 4; their club suboval (about 1.2 times as long as wide), comprising about third of total antennal length and with subequal width of antennomeres 9–11. Pronotum evenly convex, with abrupt anterior and slightly bisinuate posterior edges, sides even to slightly undulate, arcuately narrowed from middle to rounded anterior angles and subparallel-sided in posterior half, its posterior angles widely rounded and scarcely projecting. Scutellum subpentagonal with slightly projecting and widely rounded apex. Elytra shorter than wide combined, flattened on disk, sides steeply sloping to lateral edges. Pygidium somewhat longer than penultimate tergite, with apical edge widely rounded. Antennal grooves distinctly outlined in both inner and outer edges and strongly convergent. Ultimate labial palpomere somewhat widened to apex and almost as wide as long. Mentum more than 3 times as wide as long. Distance between procoxae nearly twice smaller and that between metacoxae 1.5 times as great as that between mesocoxae. Prosternal process strongly carinate in narrowest place and strongly widened before apex, its apex about 1.7 times as wide as antennal club, posterior edge subtransverse in middle and widely rounded at sides. Mesoventrete without both trace of isolated flattened distal plate and median carina. Metaventrete subflattened and with median suture (discrimen), deeply depressed at convex anterior edge between mesocoxae, its posterior edge between metacoxae feebly angularly excised. Postmesocoxal line almost smooth to very weakly undulate, subparallel to posterior edge of cavities and deviating only at inner edge of metepisterna. Ventrite 1 markedly longer than ventrite 4, hypopygidium slightly longer than ventrite 1 and without depressions at medioapical excision. Epipleura at base slightly narrower than antennal club.

Tibiae comparatively short and rather stout; pro- and mesotibiae somewhat wider, but metatibiae somewhat narrower than antennal club, subtriangular, with nearly straight inner edge and slightly prominent outer subapical angle, outer edge of meso- and metatibiae with sparse and short stout spines. Femora with anterior and posterior edges gently curved, pro- and mesofemora





Figs 1–5. Species of the subgenus *Carpophilus* s. str., males.

1–4 – *Carpophilus (Carpophilus) saharaensis* sp. n.: 1 – body, dorsal view; 2 – idem (without abdomen and posterior legs), ventral view; 3 – mentum, antennal grooves and labial palpi, ventral view; 4 – posterior leg, ventral view; 5 – *C. (C.) indicus*, distal plate of mesoventrite, ventral view. Scale bars 0.5 mm.

Рис. 1–5. Виды подрода *Carpophilus* s. str., самцы.

1–4 – *Carpophilus (Carpophilus) saharaensis* sp. n.: 1 – тело, вид сверху, 2 – то же (без брюшка и задних ног), вид снизу, 3 – ментум, усиковые бороздки и лабиальные щупики, вид снизу, 4 – задняя нога, вид снизу; 5 – *C. (C.) indicus*, дистальная пластинка мезоventрита, вид снизу. Масштабные линейки 0,5 мм.

about 1.5 times, and metafemur about 2.5 times as wide as corresponding tibiae. Protarsus about half as wide as protibiae, claws long and narrow.

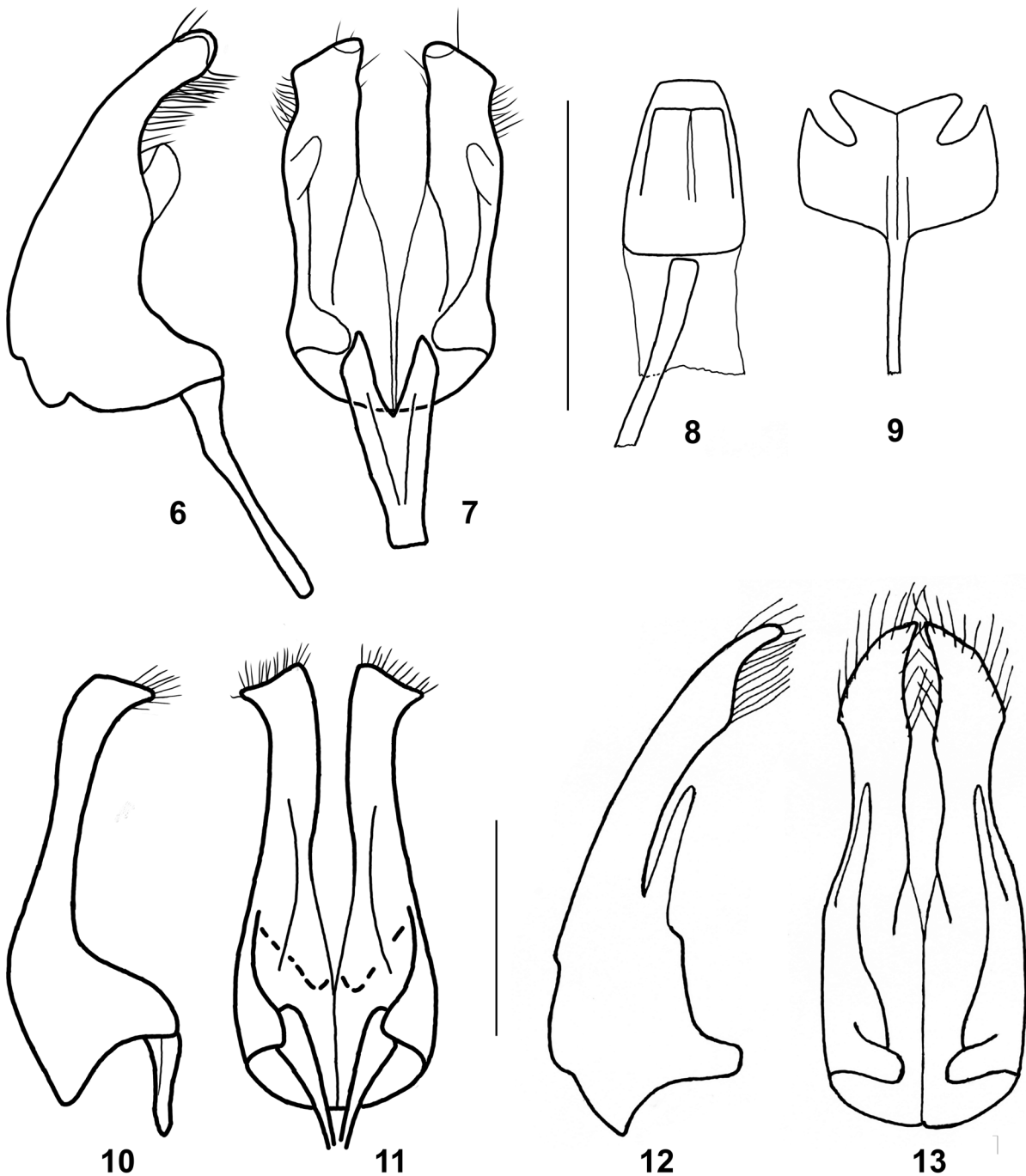
Aedeagus comparatively small, length of tegmen 0.3 and width of ventral plate 0.1 mm, tegmen heavily sclerotized with one hyaline accessory process at lateral edges of tegmen; armature of inner sac of penis represented by unclear sclerotization at proximal end.

Female. Differs from male in slightly narrower protarsi, longer subtriangular and subflattened pygidium with subacute apex and much longer hypopygidium (nearly 1.5 times as long as ventrite 1). Ovipositor similar to that of *C. (C.) bifenestratus*; moderately long and slightly sclerotized, but its apex with long styli located apically.

Variations. Body length 1.9–3.2 mm, ratio of general length to width 1.7–2.7. Some variation is observed in body coloration, punctuation and microsculpture, although yellowish spots on

elytra and lightening of antennal flagella and legs in all cases are more or less expressed. Ultimate labial palpomere demonstrates a certain variability width of its apex.

**Diagnosis.** This new species stands far apart from other species of the *hemipterus*-group (*Carpophilus (Carpophilus) bifenestratus*, ? *C. (C.) bipustulatus*, *C. (C.) binotatus*, *C. (C.) bisignatus*, *C. (C.) delkeskampii*, *C. (C.) hemipterus*, *C. (C.) indicus*, *C. (C.) jelineki*, *C. (C.) ligatus*, *C. (C.) quadrisignatus*, *C. (C.) spinosus* and *C. (C.) tegmenalis*) due to its comparatively slender and dorsally subflattened body, peculiar pattern of elytral spots, not raised distal plate of mesoventrite, as well as due to the male genital structure, particularly in the tegmen. *Carpophilus (Carpophilus) saharaensis* sp. n. belongs to



Figs 6–13. Male genital structures of species of the subgenus *Carpophilus* s. str. (Figs 10, 11 after Kirejtshuk [1995]).

6–9 – *Carpophilus (Carpophilus) saharaensis* sp. n.: 6 – tegmen, lateral view, 7 – idem, ventral view, 8 – penis trunk, dorsal view, 9 – ventral plate and spiculum gastrale, ventral view; 10–11 – *C. (C.) spinosus*: 10 – tegmen, lateral view, 11 – idem, ventral view; 12–13 – *C. (C.) indicus*: 12 – tegmen, lateral view, 13 – idem, ventral view. Scale bars 0.25 mm.

Figs 6–13. Структуры гениталий самцов *Carpophilus* s. str. (рис. 10, 11 по [Кирейтшук, 1995]).

6–9 – *Carpophilus (Carpophilus) saharaensis* sp. n.: 6 – тегмен, вид сбоку, 7 – то же, вид снизу, 8 – ствол пениса, вид сверху, 9 – вентральная пластинка и spiculum gastrale, вид снизу; 10–11 – *C. (C.) spinosus*: 10 – тегмен, вид сбоку, 11 – то же, вид снизу; 12–13 – *C. (C.) indicus*: 12 – тегмен, вид сбоку; 13 – то же, вид снизу. Масштабные линейки 0.25 мм.

the *bifenestratus*-subgroup consisting of narrower species with almost simple postmesocoxal line (see above) and it is distinct among the members in the absence of trace of distal plate on its mesoventrite, as on that of *C. (C.) spinosus*, however, the male aedeagi (particularly tegmina) of both

lastly-mentioned species are rather different (Figs 6, 7, 10, 11). On the other hand, the hyaline processes on the lateral edges of tegmen are known, except the new species, only in one member of the subgenus *Carpophilus* s. str., only in *C. (C.) indicus* (*hemipterus*-subgroup), but the shape

of the tegmina of this species and *C. (C.) saharaensis* sp. n. as well as the position and shape of their hyaline processes along the lateral edges of tegmina are rather different (Figs 6, 7, 12, 13). In addition to this genital difference *C. (C.) indicus* has also a rather raised distal plate on the mesoventrite (Fig. 5) and other characters mentioned for the *hemipterus*-subgroup (see above). Besides, the new species differs from other members of *hemipterus*-group in the comparatively shorter antennal flagella.

*Carpophilus (Carpophilus) saharaensis* sp. n. and *C. (C.) spinosus* have no remains of lateral and median ridges of the distal plate of the mesoventrite, while such plate is variable in more or less common species of the subgenus *Carpophilus* s. str., and in many specimens of *C. (C.) bifenestratus* it become rather reduced, particularly in smallest representatives (which were frequently determined as "*Carpophilus bipustulatus*").

Dobson [1993] described "*Carpophilus delkeskampi australiensis*" from Australia differing from *C. (C.) delkeskampi* and *C. (C.) indicus*, according to the original description, mostly in the castaneous body with the uniformly lighter elytra and the tegmen with "small angular terminal hyaline projection of the lateral lobes" [Dobson, 1993: 9]. It can be supposed that this form seems to be a separate species of the subgenus *Carpophilus* s. str. quite different from both *C. (C.) delkeskampi* and *C. (C.) indicus* in the mentioned characters, however, it could not be a member of the *bifenestratus*-subgroup.

### Taxonomic notes on *Carpophilus (Carpophilus) bifenestratus* Murray, 1864

The taxonomic interpretation and synonymy of *Carpophilus (Carpophilus) bifenestratus* here accepted is based on previous study of the types of *C. (C.) tersus* and *C. (C.) sanguineofasciatus* [Audisio, Kirejtshuk, 1988], and also on further testing the types of *C. (C.) bifenestratus* which completely fit the previous interpretation of this species by Kirejtshuk [1996: 25–27]. The lectotype of *C. bifenestratus*, male (BMNH), here designated has the labels: "Ceylon", "*bifenestratus*", "68.106", "Type", and lectotype of *C. (C.) biguttatus*, male (ZMB), here designated (designated by S. Endrody-Younga in collection but not published), and 2 paralectotypes (ZMB) of *C. biguttatus* have the labels: "*biguttatus* Kl., Madagasc., Goud.", "8363". The type series of *C. (C.) tenenbaumi* Roubal, 1926 (Israel) remained untested is presumably deposited in the collection of the Slovak National Museum in Bratislava. The type of ? *Carpophilus (Carpophilus) bipustulatus* Heer, 1841 (*Ips*) [Heer, 1841: 416: "Genf und im Wallis"] also needs a re-examination, because its interpretation after Spornraft [1967] could be treated as a variety of *C. (C.) bifenestratus*. Spornraft [1967] included in the European fauna only one species from the mentioned pair, *C. (C.) bipustulatus* and *C. (C.) bifenestratus*. Later Spornraft [1992] and Audisio [1993] distinguished two species (*Carpophilus bipustulatus* and *C. tersus*) mostly after the outline of the lateral lobes of tegmen. Both last-mentioned researchers pointed out that *C. (C.) bipustulatus* is spread in Southern Europe and "Central Asia", while *C. (C.) bifenestratus* (named as

*C. "tersus"*) in the Afrotropical and "acclimatized throughout Mediterranean countries" [Audisio, 1993: 237–238]. Indeed all specimens examined from the Caucasus, Transcaucasia, Middle East and Kazakhstan seem to be conspecific with other *C. (C.) bifenestratus* demonstrating a certain variation in the lateral lobes of tegmen within *C. (C.) bifenestratus* sensu Spornraft [1992] (named as "*tersus*") and *C. (C.) bipunctatus* sensu Spornraft [1967, 1992]. Specimens of this species from natural localities in the Mediterranean seem to be frequently somewhat smaller than those from southern areas and have the comparatively less raised to obsolete distal plate of mesoventrite (completely without median carina) and less curved distal parts of the lateral lobes of tegmen which could be interpreted as "*Carpophilus bipustulatus*" sensu Spornraft [1967, 1992], Audisio [1993] and other researchers. Nevertheless among large series from the Afrotropical and Indo-Malayan Regions there are also present some rather small specimens with weak to obsolete distal plate of mesoventrite and less curved distal parts of the lateral lobes of tegmen, although any clear correlation between the peculiar structure of mesoventrite and certain shape of tegmen is scarcely traceable. Crucial argument on correspondence of the type series of *C. (C.) bipustulatus* and other type series of the names synonymized with *C. (C.) bifenestratus* can be obtained after a further re-examination of the type series of *C. (C.) bipustulatus* and also additional materials from the Caucasus, Transcaucasia, Near East, Middle Asia and Kazakhstan. It is preliminarily accepted that the forms "*C. (C.) bifenestratus*" and "*C. (C.) bipustulatus*" could be somewhat isolated in the past distribution (but not now) or they still now have some level of isolation and can be treated as two subspecies of the same species. On the other hand, the African *C. (C.) binotatus* (lectotype, male (BMNH) here designated with the labels: "Guinea, Sra Leone", "ex Mus. Murray", "Fry Coll. 1905-100", "51849") with a weakly raised distal plate of the mesoventrite differs from *C. (C.) bifenestratus* also mostly in the lateral lobes of tegmen widened before apex [Kirejtshuk, 1996: 26, figs 6–7]. Thus, the current synonymy of *C. (C.) bifenestratus* can be recognized as following:

*Carpophilus (Carpophilus) bifenestratus* Murray, 1864  
 = *Carpophilus biguttatus* Klug, 1862: 208 (Madagascar), non Motschulsky, 1858: 43;  
 = *Carpophilus bifenestratus* Murray, 1864: 364 (Sri Lanka);  
 = *Ips tersus* Wollaston, 1865: 16 (Canary Islands, La Gomera);  
 = *Carpophilus sanguineofasciatus* Gemminger et Harold, 1868: 813, non Murray, 1864: 364 et non Dejean, 1837: 134 (for *Carpophilus biguttatus* Klug, 1862: 208);  
 = *Carpophilus tenenbaumi* Roubal, 1926: 171 (Israel);  
 = *Ips bipustulatus* auctorum, non Heer, 1841: 416 (Switzerland).

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