The genus Gunarus Des Gozis, 1886 belongs to the subtribe Cylindrinotina (Coleoptera: Tenebrionidae: Helopini)

**Rod Gunarus Des Gozis, 1886 относится к подтрибе Cylindrinotina (Coleoptera: Tenebrionidae: Helopini)**

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**Abstract.** The genus Gunarus Des Gozis, 1886 is transferred from the subtribe Helopina to the subtribe Cylindrinotina (Tenebrionidae: Helopini) based on the structure of male aedeagus and presence of posterior ventral grooves of lower aspect of eye in the type species Gunarus hirtulus (Reiche, 1861). New combinations are established: Stenohelops (Stenomaleis) gayirbegi (Nabozhenko et Keskin, 2009), comb. n. (from Gunarus), Stenohelops (Stenomaleis) korkutelensis (Nabozhenko et Keskin, 2009), comb. n. (from Gunarus) and Ectromopsis ovipennis (Allard, 1877), comb. n. (from Gunarus). The species Gunarus arenicola Antoine, 1949 and G. bremondi Antoine, 1949 must be transferred to the subtribe Helopina but its generic position is unknown. Generic position of other 7 Gunarus species must be revised accordingly to the position of the type species G. hirtulus in the system of the tribe Helopini. Key to similar genera Nalassus, Gunarus, Ectromopsis, Xanthomus is given.

**Introduction.** The genus Gunarus Des Gozis, 1886 was erected for the species Helops hirtulus Reiche, 1861 described from Algeria. Later several species from Southern Europe and Northern Africa were added to the genus [Reitter, 1922; Grimm, 1981; Nabozhenko, Keskin, 2009]. Some species previously included in the genus Gunarus were transferred to the genus Ectromopsis Antoine, 1949 [Nabozhenko, 2005]. Up to the present time the genus includes 13 species distributed in the Mediterranean region [Nabozhenko, Löbl, 2008; Nabozhenko, Keskin, 2009; Castro Tovar, 2016]. The genus is problematic (despite the small number of species), because the main diagnostic character is still the body size and comparative length of antennae [Antoine, 1949].

Antoine [1949], based on the structure of male genitalia divided the tribe Helopini into two group. The first group included the species with ‘helopioid’ aedeagus: apical piece with short strong backward spines and long alae (as extensions of ventral side of apical piece), which completely covered ventral side of the basal piece. The second group united the species with ‘nalassoid’ aedeagus: apical piece without spines, alae short, not completely covered ventral side of basal piece. Gunarus hirtulus and two Moroccan species G. arenicola Antoine, 1949 and
Figs 1–4. Gunaras hirtulus, habitus, details of structure.
1 – male, dorsal view; 2 – male, ventral view; 3 – head, lateral view; 4 – right protarsus. Arrow shows ventral groove.

Рис. 1–4. Gunaras hirtulus, габитус, детали строения.
1 – самец дорсально; 2 – самец вентрально; 3 – голова, вид сбоку; 4 – правая передняя лапка. Стрелкой показана вентральная бороздка.
G. bremondi Antoine, 1949 were included in the first group but Antoine figured only the last two species having apical piece with backward spines.

Subsequently Español [1956] separated the tribe Cylindrinotini (now the subtribe Cylindrinotina) for Antoine's second group. The genus Gunarus was included in the tribe Helopini sensu Español (now the subtribe Helopina). Later Español and Comas [1989: fig. 2] incorrectly figured and interpreted an aedeagus of *G. hirtulus* with spines on apical piece and short alae (extensions of apical piece), which did not cover the basal piece. Really representatives of the subtribe Cylindrinotina have short setae which are directed forward, while species of the subtribe Helopina have thick or thin spines which are directed backwards [Nabozhenko et al., 2016b].

The study of a male of *Gunarus hirtulus* from Algeria allowed to revise the position of the genus *Gunarus* in the system of the tribe Helopini.

**Material and methods**

The study is based on the examination of adult beetles from Zoological Institute of Russian Academy of Sciences (ZIN, St. Petersburg, Russia), Hungarian Natural History Museum (HNHM, Budapest, Hungary), Zoological Department of Ege University (ZDEU, Izmir-Bornova, Turkey; specimens of *Nalassus*). Scanning electron microscopy was performed in the analytic laboratory of Institute of Arid Zones of Southern Scientific Centre RAS with the SEM EVO-40 XVP (LEO 1430VP). We also used Zeiss Supra 55VP Field Emission Scanning Electron Microscope in MEİTAM (Mersin University, Yenişehir, Turkey) and SEM Quanta 250 (Izmir Institute of Technology, Urla, Turkey) for SEM images.

Terms of structure of male aedeagus are taken from Matthews and Bouchard [2008].

*Gunarus hirtulus* (Reiche, 1861)  
(Figs 1–8)

**Material.** 1♂ with label: "Helops (Gunarus) hirtulus Reche Alger" (ZIN).

**Brief redescription.** Male. Body small (length 4 mm), robust, ochreous, shiny. Head and pronotum covered with suberected hairs, elytra covered with long erected hairs. Ventral side pubescent with recumbent hairs. Lower aspect of eye with a deep posterior ventral groove. Prothoracic hypomera with smooth wrinkles and distinct punctation. Elytra with deep strial punctures without long setae; interstriae with only one line of deep punctures, each puncture with long erected setum. Interstriae 8 not more convex apically than other ones, connected with 2nd interstria (not with elytral margin) on apex. Coeloconic sensilla are absent on elytra. Pro- and mesotarsi widened (Figs 1, 4). Aedeagus of male is 'nalassoid' weakly sclerotised (Figs 5, 6): apical piece with laterally flattened keel on apex, without backward spines, only with sparse punctuation and apically directed very small and short setae in each puncture; alae as extensions of apical piece short, basal piece not covered ventrally; medial piece with narrowly rounded apex and two not connected baculi. Gastral spicula without processes on lobes and rods (Fig. 7). Inner male sternite VIII weakly sclerotized, without additional strongly sclerotized areas (Fig. 8).

**Discussion**


The structure of aedeagus relates *Gunarus* with 'nalassoid' genera of the tribe Helopini, which are represented in Western Mediterranean by the genera *Nalassus*, *Xanthomus* Mulsant, 1854 and *Ectromopsis* Antoine, 1949. *Gunarus hirtulus* is also psammophilous supralitoral species as the representatives of two last genera. Español [1953] noted that this species inhabits marine zone and was collected under Thymus.

All three genera of darkling beetles (*Ectromopsis*, *Xanthomus* and *Gunarus*) are morphologically very similar. *Xanthomus* as probably derivative of the genus *Ectromopsis*, is more specialized group and has some characters related to the thickness of the sand they inhabit: yellow, sometimes weakly translucent body, more or less flattened protibiae, erected hairs on outer margin of protibiae (sometimes meso- and metatibiae), sometimes pubescent elytra. *Gunarus hirtulus* also has specialized characters for psammobionts: body ochreous or light-brown, pubescent. *Gunarus* has not coeloconic sensilla on elytra unlike most...
Helopini [Nabozhenko et al., 2016a], that also relates with sand inhabitation.

The disjunctive distribution of *Ectromopsis* indicates relict range of this genus. Ancestral species (*Nalassus* at least is known from Eocene Baltic amber [Nabozhenko et al., 2016c]) of the genus were associated with the coast of Paratethys and Mediterranean basins [Nabozhenko, 2011]. Representatives of this genus are distributed near the Mediterranean Sea in the western part of generic range: *E. mendizabali* Cobos, 1953 is known from Almeria; *E. politollis* (Allard, 1876) from drying up reservoir (sebha) on Tell Atlas plateau; *E. bulgariica* (G.S. Medvedev et Angelov, 1981) from Struma River basin; *E. ovipennis* (Allard, 1877) from watershed between Nestos and Struma rivers in the lower reaches. Other species of *Ectromopsis* relate with relict continental reservoirs in the eastern part of range: *E. tantilla* (Ménétriés, 1848) is distributed in Northern Caspian Region; *E. bogatschevi* (Iablokoff-Khnzorian, 1957) is known from Ararat plain between Sevan Lake and Aras River; *Ectromopsis* sp. from sand dunes of relic Eğirdir Lake.

Considering the information above some species must be excluded from the genus *Gunarus*. Two species described from Turkey [Nabozhenko et Keskin, 2009] belonging to the genus *Stenohelops* Reitter, 1922: *Stenohelops gayirbegi* (Nabozhenko et Keskin, 2009), comb. n. and *Stenohelops korkutelensis* (Nabozhenko et Keskin, 2009), comb. n. have 'helopioid' male aedeagus and female genital tubes, small, strongly shining body, developed humoral angles as other *Stenohelops*. Unlike *Gunarus*, turkish *Stenohelops* inhabit mountain landscapes and live on trees (*Juniperus excelsa*, *Quercus coccifera*). These two species must be included in the subgenus *Stenomalies* Español, 1957 by the wrinkled prothoracic hypomera.

*Gunarus ovipennis* (we studied one specimen from Greece by Ottó Merkl) has typical characters of the genus *Ectromopsis*: dark brown body with metallic shine, absence of posterior ventral groove in lower aspect of eye, presence of coeloconic elytral sensilla. As a result, the new combination is established: *Ectromopsis ovipennis* comb. n.

Unfortunately we did not study other species included in the genus *Gunarus*, but it is clear from figures and descriptions that *G. bremondii* and *G. arenicola* belong to the subtribe Helopini and must be excluded from this genus. The species *Gunarus kaszabi* (Grimm, 1981) belongs to 'nalassoid' group according to the description and images [Grimm, 1981], however its generic position must be corrected considering characters of vertex and


9 – *N. plebejus* (Küster, 1850), head, ventral view; 10 – *E. tantilla*, the same; 11 – *N. adzhharicus* Nabozhenko et Dzhambazishvili, 2001, elytra with trichoid and coeloconic (arrow) sensilla; 12 – *E. tantilla*, elytral coeloconic sensillum; 13 – *E. tantilla*, elytral trichoid sensillum.


Table 1. Composition of the genus Gunarus.

<table>
<thead>
<tr>
<th>Subtribe Cylindrinotina</th>
<th>Subtribe Helopina</th>
<th>Species incertae sedis (subtribal belonging is unknown / принадлежность к подtribу неизвестна)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G. hirtulus (Retieh, 1861)</td>
<td>G. arenicola Antoine, 1949</td>
<td>G. tingitanus Allard, 1877</td>
</tr>
<tr>
<td>G. lapidicola (Küster, 1850)</td>
<td>G. brevmondii Antoine, 1949</td>
<td>G. laeviusculus Kraatz, 1883</td>
</tr>
<tr>
<td>G. karszaki Grimn, 1991</td>
<td></td>
<td>G. nodicornis Reitter, 1922</td>
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<tr>
<td>G. velai Castro Tovar, 2016</td>
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structure of 8th interstria on apex. The species Gunarus tingitanus Allard, 1877 requires the study of type material and designation of lectotype, because 3 syntypes of this species (site of Muséum National d’Histoire Naturelle (Paris, France): https://science.mnhn.fr/taxon/species/nalassus/tingitanus#allard%2C_1877) belong to 2 different species and at least one of them is Nalassus. Antoine [1949] figured ‘heloploid’ aedeagus for this species. Finally, from seven remaining species, G. lapidicola (Küster, 1850), G. parvulus Lucas, 1846 and G. nodicornis Reitter, 1922, also must be revised.

Recently Castro Tovar [2016] in the review of Spanish Gunarus added a new ‘nalassoid’ species to the genus and resurrected G. laeviusculus Kraatz, 1883 from the junior synonym of G. tingitanus. As a result, the polyphyletic genus Gunarus includes 9 species from different subtribes (Table 1).

Thus, further descriptions and revision of the genus Gunarus must (is necessary) considering the position of the type species Gunarus hirtulus in the system of the tribe Helopini.

Key to the ‘nalassoid’ genera of Western Mediterranean region

3(6). Lower aspect of eye has a posterior ventral groove (Figs 3, 9). Elytra with or without coeloconic sensilla.
4(5). Elytral interval 8 convex on apex and connected apically with elytral margin. Winged beetles (wings can be well developed or reduced and very small). Elytra with multipunctured interstriae and coeloconic sensilla (Fig. 11). Male pro- and mesotarsi not widened (only N. laevioctostriatus have widened tarsi) ..............
5(4). Elytral interval 8 not convex on apex and connected with 2nd interval apically. Wingless beetles. Elytral interstria only with one line punctures and only long erected trichoid sensilla in interstrial puncture line (Figs 1, 2). Male pro- and mesotarsi widened, transverse (Fig. 4) ................................................................. Gunarus
6(3). Lower aspect of eye without posterior ventral groove (Fig. 10). Wingless beetles. Elytra with trichoid and coeloconic sensilla (Figs 12, 13).
7(8). Body dark-brown, strongly shining, often with metallic shine. Prothorax not flattened or subfossorial. Tibia with recumbent hairs on outer margin. Male antennae often thickened ......................................................... Ectromopsis
8(7). Body yellow, moderately shining, without metallic shine. Prothorax less or more flattened, often subfossorial. At least prothorax with erected hairs on outer margin. Male antennae not thickened ...................

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