

A key to species of the tribe Hylastini LeConte, 1876 (Coleoptera: Curculionidae: Scolytinae) from Russia and adjacent countries

Определительные таблицы видов трибы Hylastini LeConte, 1876 (Coleoptera: Curculionidae: Scolytinae) России и сопредельных стран

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KEY WORDS: Coleoptera, Curculionidae, Scolytinae, Hylastini, *Hylastes*, *Hylurgops*, bark beetles, taxonomy, Russia, endemics, countries of the former USSR.

КЛЮЧЕВЫЕ СЛОВА: Coleoptera, Curculionidae, Scolytinae, Hylastini, *Hylastes*, *Hylurgops*, короеды, систематика, Россия, эндемики, страны бывшего СССР.

ABSTRACT. Species of the tribe Hylastini Erichson, 1836 from Russia and adjacent countries are reviewed and keys to genera and species of the tribe are provided. Data on synonymy, geographic distribution and host-plants of all Hylastini species of Russia and neighboring states are given in an annotated list of species. Special attention is given to a poorly known subendemic species of Hylastini, *Hylastes substriatus* Strohmeyer, 1914 breeding on Schrenk spruce and limited in the distribution by the Tien-Shan mountains, i.e. by states of Middle Asia and neighboring provinces of China. New synonymy is established: *Hylurgops imitator* (Reitter, 1900), **syn.n.** of *Hylurgops interstitialis* (Chapuis, 1875).

РЕЗЮМЕ. Рассмотрен видовой состав короедов трибы Hylastini Erichson, 1836 России и сопредельных стран и приведены таблицы для определения родов и видов трибы. В аннотированный список видов собраны сведения о синонимии, географическом распространении и кормовых породах всех видов трибы Hylastini России и соседних государств. Специальное внимание уделено плохо изученному единственному субэндемичному виду трибы Hylastini бывшего СССР, *Hylastes substriatus* Strohmeyer, 1914, развивающемуся на ели Шренка и ограниченного в распространении горами Тянь-Шаня: странами Средней Азии и граничными провинциями Китая. Установлена новая синонимия: *Hylurgops imitator* (Reitter, 1900) = *Hylurgops interstitialis* (Chapuis, 1875), **syn.n.**

The tribe Hylastini LeConte, 1876 includes four genera of Scolytinae: *Hylastes* Erichson, 1836, *Hylurgops* LeConte, 1876, *Scierus* LeConte, 1876 and *Pachysquamus* Mercado-Vélez et Negrón, 2014 [Wood, 1986; Wood, Bright, 1992; Mercado-Vélez, Negrón, 2014] of which two are recorded from Russia and adjacent countries. The Palaearctic fauna of the tribe Hylastini currently includes 27 species [Wood, Bright, 1992; Pffefer, 1995; Knížek, 2011]. Besides, 8 fossil species were described from Baltic amber [Schedl, 1947; Wood, Bright, 1992].

Species in the tribe are characterized by the following features: 1) body cylindrical (Figs 1–4, 20); 2) vestiture of the upper side of the body usually includes both hair-like setae and scales, often vestiture is rather poorly developed (Figs 5–6); 3) head elongate, subrostrate, frons not sexually dimorphic (Figs 15–16); 4) eye oval, entire; 5) antennal funicle 7-segmented, scape elongate, club conical; 6) prothoracic precoxal area large, its lateral margins strongly elevated from anterior rim to coxae forming acutely elevated precoxal ridge; 7) pronotum narrowing anteriorly with more or less strongly developed constriction in the anterior third of its length, anterior margin simply rounded (Figs 17–19), not armed; 8) surface of pronotum punctured, without crenulations, denticles or rugosities; 9) base of elytra with poorly developed crenulations, not elevated; 10) elytral apex convex, simply rounded without profound armature; 11) tarsal segment 3 wider than 1 or 2 (Figs 13–14).

Description of the proventriculus in *Hylastes* and *Hylurgops* is given by Nobuchi [1969] and Lopez-Buenfil et al. [2001] (Figs 7–8). The proventriculus in both genera is narrowing posteriorly; anterior plate sclerotized on lateral sides, indistinctly bordered on crop, posteriorly with about 20–25 transverse ridges. In *Hylurgops* ridges are replaced by rows of minute tubercles in anterior portion (except lateral sides), the tubercles becoming sharper and longer in middle of anterior portion [Nobuchi, 1969]. In *Hylastes* ridges are more or less curved and accompanied with spinulae in middle of anterior portion and replaced by rows of sharp tubercles, becoming larger on each lateral side [Nobuchi, 1969]. Posterior plate as long as anterior; closing teeth long, extending beyond middle of masticatory brush. In *Hylurgops* crop rather closely covered by long spines, in *Hylastes* crop rather closely covered by pubescence [Nobuchi, 1969].

In male genitalia the median lobe is cylindrical, narrowing posteriorly; dorsal lobes overlapping, subequal to half length of median lobe with wedge-shaped hind margins; lateral lobes longer than dorsal ones, attaining 2/3 of median lobe length [Grocholski et al., 1977, Michalski et al., 1983]. Apophyses as long as median lobe, apophyses at base either divided (Figs 21–22, 26) or fused forming V-like figure (Figs 23–25); spicule longer than aedeagus, sickle-shaped, with flattened base adjoining the apices of the apophyses.

External morphology is very variable within species of this tribe and have led to numerous taxonomic discussions about the validity of several species [Pfeffer, 1944; Hansen, 1956; Lekander, 1965; Schedl, 1968; Beaver, 1970; Grocholski et al., 1976, 1977].

All species breed in coniferous hosts [Wood, 1982, 1986], mostly in habitats with high humidity, often in stumps, roots or logs contacting with ground. Some *Hylastes* species are of economic importance, damaging root neck or roots of young pines during maturation feeding; this feeding may cause stress and death of young pines.

Material and methods

Specimens were collected by the authors from 1975 to 2019 in the forests of the Russian Federation, including European part of Russia (Belgorod, Ivanovo, Kaliningrad, Kaluga, Kursk, Leningrad, Moscow, Novgorod, Pskov, Tambov, Tula, Tver, Vladimir, Vologda, Voronezh, Yaroslavl Provinces), Republic of Crimea, Republic of Karelia, North and North-West Caucasus (Krasnodar Terr., Adygeya Republic, Dagestan Republic), forests of Siberian Federal district (Buryatia Republic, Chita Province), Far-East (Primorsk Terr.) and elsewhere. Outside Russia we obtained samples from Kazakhstan, Kirgizstan, Ukraine. Museum specimens deposited in the Zoological Institute of Russian Academy of Sciences (St. Petersburg), Zoological Museum of Moscow University (Moscow), Siberian Zoological Museum (Novosibirsk), Institute of Biology and Soil Sci-

ences (Vladivostok), Natural History Museum (London), Naturhistorisches Museum Wien (Vienna), Natural History Museum (Budapest), and the United States National Museum of Natural History (Washington) were also examined.

Data about distribution were taken principally from Knížek [2011] and data about host plants from Pfeffer [1995] and Krivolutskaya [1958, 1983, 1996], but many unlisted sources were used as well as the authors' own field observations.

Photographs of beetles were taken using a Canon 50D camera and macro lens MP-E 65mm, and processed using the program CombineZP.

Results

KEY TO THE RUSSIAN GENERA IN THE HYLASTINI:

1. Third tarsal segment emarginate, narrow, 1.0–1.1x as wide as the second segment (Fig. 13); pronotum without noticeable constriction in the anterior third of its length or this constriction is only poorly developed, sides of pronotum usually parallel for most of its length, form of pronotum elongate-oval when viewed from above (Figs 17–18); pronotum more elongated, averaging 1.2x longer than wide; pronotal disc lacking or with fewer small than large punctures (Figs 9–11) *Hylastes* Erichson, 1836
- Third tarsal segment bilobed, broad, 1.3–1.7x as wide as the second segment (Fig. 14); pronotum with conspicuous constriction on anterior third, strongly narrowing anteriorly, nearly triangular when viewed from above, broad (Fig. 19), 0.9–1.1 times as long as wide; pronotal disc usually with about equal number of smaller and larger punctures *Hylurgops* LeConte, 1876

Genus *Hylastes* Erichson, 1836

In Russia and neighboring countries (in borders of the former USSR) 10 species are recorded. Out of these, *H. parallelus* Chapuis, 1875 is unknown to us and therefore not included in the key. It is apparently closely related to *H. ater* (Paykull, 1800) and *H. brunneus* (Erichson, 1836) according to Murayama [1962], but differs from these by the widely rounded, not nearly rectangular, basal angles of pronotum, the very large and shallow punctures on elytral striae, and narrow interstriae. The structure of ventrite 5 in the male in *H. parallelus* is undescribed in literature. Nobuchi [1969] made notes on the proventriculus of but without illustrations. This description did not allow us to establish differences between *H. paralellus* and *H. brunneus*.

KEY TO THE *HYLASTES* SPECIES OF RUSSIA AND NEIGHBORING COUNTRIES.

1. Pronotum subrectangular, anterior half wider or of equal width to the posterior half, 1.2–1.35 x as long as wide, pronotal disc with strong elongated punctures, longitudinal median area impunctate, slightly elevated, elytra 1.85–2.00 x as long as wide, with strongly developed striae, interstriae with fine recumbent setae, replaced on declivity by minute scales and single rows of semi-erect bristles. Rostrum with a very fine, sometimes inconspicuous longitudinal keel. Apex of male ventrite 5 with faint median impression, covered by minute erect setae, pubescent area forms small triangle; male genitalia as in Fig. 23; 3.0–4.5 mm *H. linearis*

- Pronotum widest on posterior half, 0.9–1.2 x as long as wide, pronotal disc with more or less round punctures, median impunctate area variable, short or long 2
2. Rostrum without extensive transverse impression, either with weak impression just above mandibles or without impression and without an elevated longitudinal median keel (Fig. 16) 6
- Rostrum with transverse impression occupying at least 1/3 of rostrum length, with longitudinal median keel, sometimes feebly developed or interrupted above upper border of transverse impression (Fig. 15) 3
3. Elytral interstriae both on disk and on declivity covered by recumbent golden hair-like setae arranged in 3 unregular rows (Figs 2, 5), these rows continue on declivity; declivital scales are microscopic and barely noticeable only on elytral declivity apex; male ventrite 5 with weakly developed median impression visible only at apex of ventrite, central part covered with pale setae forming a triangular brush (Fig. 28); male genitalia with apophyses separated at base, without apical plates at penis apex (Figs 21–22); 3.6–4.1 mm **H. substriatus**
- Elytral interstriae on disk with recumbent pale hair-like setae, in some species setae very small, barely noticeable (Figs 1, 3–4); on apical declivity clearly visible minute recumbent scales substitute for these setae and, besides, declivital interstriae with single rows of erect pale bristles (Fig. 6); in males median impression of ventrite 5 conspicuous and clearly visible from apex of ventrite up to its center, lateral portions of ventrite 5 weakly elevated (Figs 27, 29–30); male genitalia with apophyses fused at base, penis apex with large apical plates (Figs 24–25) 4
4. Pronotum wide, 0.94–1.15 x as long as wide, slightly constricted on anterior third or sides in anterior third rectilinearly narrowing towards the rounded apex (Figs 1, 18). Elytra short and broad, 1.46–1.76 x as long as wide, equal in width or wider than pronotum, elytral interstriae on disc with short recumbent pale hair-like setae arranged in two or three rows (Fig. 1). Pronotal punctures large, deep, densely located, space between punctures with fine reticulation (Fig. 11). In males ventrite 5 with subapical median impression and broad trapezoid tuft of light yellow setae (Fig. 30); often longitudinal carina in frons short, developed usually in epistomal area only and is interrupted when continues to front; 3.5–4.6 mm **H. cunicularius**
- Pronotum distinctly longer than wide, oval, without constriction in the anterior third, sides of pronotum in basal half almost parallel, straight; body more slender, elytra 1.6–2.0 x as long as wide, distinctly wider than pronotum; space between punctures on pronotal disc without reticulation (Figs 9–10); in males ventrite 5 with triangular tuft of setae 5
5. Surface of pronotum and elytra shining (Fig. 10); lateral sides of pronotum rounded on apical third; in males triangular hair tuft on ventrite 5 with glabrous longitudinal median area dividing tuft into two parts (Fig. 29); 3.4–4.8 mm **H. brunneus**
- Surface of pronotum and elytra dull (Fig. 9); lateral sides of pronotum subparallel; in males triangular tuft of setae on ventrite 5 entire without glabrous median area (Fig. 27); 3.4–4.8 mm **H. ater**
6. Pronotum short, only slightly elongated, 1.05–1.09 x as long as wide. Rostrum flat, with short longitudinal median pit above transverse depression on epistoma. Elytra either black or brown. Body length not exceeding 3.0 mm 8
- Pronotum very short and oval, 1.01–1.04 x as long as wide, with weak constriction in anterior third. Rostrum weakly convex with only weakly marked transverse impression above epistoma, without pit. Elytral interstriae with two rows of hair-like setae on disk and one row of setae on declivity. Body color black. 2.5–3.5 mm 7
7. Elytral striae strongly punctured; interstriae slightly wider than striae. Pronotum 1.01–1.03 x as long as wide, densely punctured and with median keel-like longitudinal impunctate area. 2.9–3.5 mm **H. opacus**
- Elytral striae more coarsely punctured; interstriae as wide as striae. Pronotum slightly longer, 1.04 x as long as wide. 2.6–3.5 mm **H. plumbeus**
8. Pronotum with weak constriction in anterior third. Elytral striae deeply and coarsely punctured; interstriae narrower than striae, each with a single row of hair-like setae from base to declivital apex; these setae are recumbent on disc and semi-erect and bristle-like on declivity. Body blackish-brown or elytra may be reddish-brown. 2.0–2.6 mm. **H. attenuatus**
- Pronotum oval, without signs of constriction in anterior third. Elytral interstriae as wide as striae, with two rows of recumbent hair-like setae in the basal half and one row of semi-recumbent hair-like setae on declivity. Body black. 2.5–3.0 mm **H. angustatus**

Annotated list of species of *Hylastes* of Russia and neighboring countries.

1. *H. angustatus* (Herbst, 1793)

= *scandinavicus* Lekander, 1965.

DISTRIBUTION. Russia: European part (central and southern parts), Crimea, North Caucasus (Adygeya Republic, Dagestan) [Petrov, 2005]; European countries of the former USSR (Belarus, Estonia, Latvia, Lithuania, Moldova, Ukraine), Caucasus; Northern, Central and Southern Europe; Asia (Turkey); South Africa (introduced).

HOSTS. *Pinus sylvestris*, *Pinus nigra pallasiana*, *Pinus* spp., also on *Picea orientalis*.

NOTES. *H. angustatus* is difficult to distinguish from *H. opacus*: records of *H. angustatus* from the northern half of European part of Russia should be verified. At least the previous records of *H. angustatus* from Leningrad Prov. of Russia [Mandelsham, Popovichev, 2000] are erroneous and most probably must be attributed to *H. opacus* [Mandelsham, Khairetdinov, 2017].

2. *H. ater* (Paykull, 1800)

Figs 4, 6–7, 9, 24, 27.

= *angusticollis* Eggers, 1929.

= *anomalus* (Oke, 1934).

= *chloropus* (Duftschmid, 1825).

= *pinicola* Bedel, 1888.

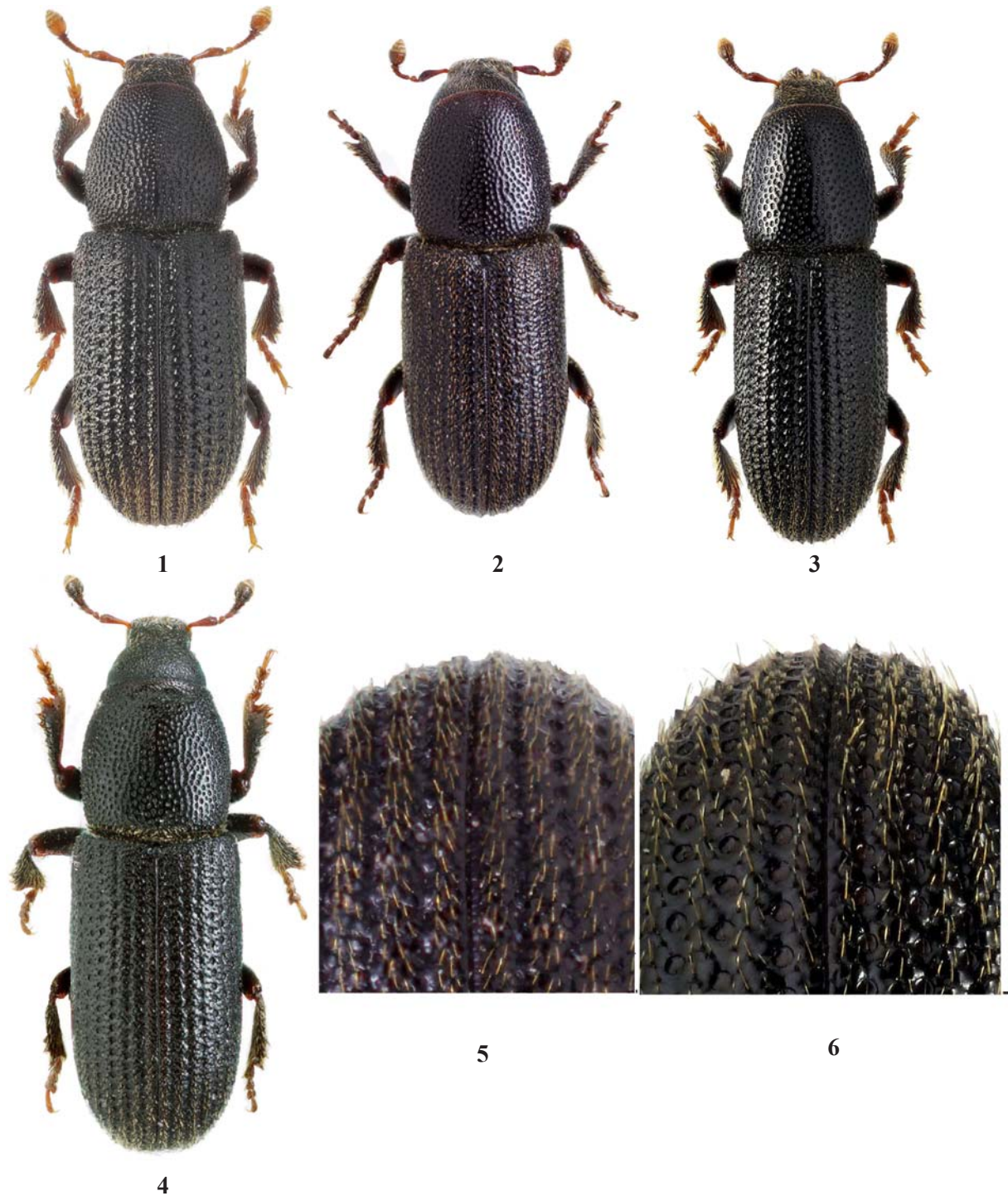
DISTRIBUTION. Russia: European part south from Moscow, Kaliningrad Prov., Crimea, North Caucasus, Western and Eastern Siberia (up to southern regions of Krasnoyarsk Prov.); European countries of the former USSR (Belarus, Latvia, Lithuania, Ukraine), Caucasus, Middle Asia (Kazakhstan); Northern, Central and Southern Europe; Asia (China, including Northeast provinces: Heilongjiang, Japan, North Korea, South Korea, Turkey); North Africa (Algeria); introduced to Chile and New Zealand.

HOSTS. *Pinus sylvestris*, *Pinus nigra*, *Pinus* spp.

NOTES. This species by many authors, including Murayama [1962] and Schedl [1981], was considered to be a senior synonym of *H. brunneus* and *H. aterrimus*. As a

result, many records of *H. ater* from Siberia, Russian Far-East and Asiatic countries may in fact refer to *H. brunneus* (= *H. aterrimus*). Besides, in Japan *H. parallelus* Chapuis, 1875 most probably substitutes completely for *H. ater*.

According to Krivolutskaya [1996] *H. ater* does not breed in Russian Far East. Records of the species for Kazakhstan [Kostin, 1973] may refer to *H. brunneus*. *H. ater* which has been reported for Leningrad Province of Russia and farther



Figs 1–6. Bark beetles of the genus *Hylastes*: 1 — *Hylastes cunicularius*; 2, 5 — *H. substriatus*; 3 — *H. brunneus*; 4, 6 — *H. ater*; 1–4 — habitus, dorsal view; 5–6 — elytral declivity; 1–4 — males; 1, 3 — Photographs from www.zin.ru/Animalia/Coleoptera. Author Kirill V. Makarov. Used with permission as indicated on website.

Рис. 1–6. Короеды рода *Hylastes*: 1 — *Hylastes cunicularius*; 2, 5 — *H. substriatus*; 3 — *H. brunneus*; 4, 6 — *H. ater*; 1–4 — габитус, вид сверху; 5–6 — скат надкрылий; 1–4 — самцы; 1, 3 — фотографии с www.zin.ru/Animalia/Coleoptera. Автор К.В. Макаров. Используются с разрешения автора.

to the North, for Estonia and Finland in some earlier references, does probably not have viable, permanent populations in the region [Voolma et al., 2004].

3. *H. attenuatus* Erichson, 1836

Fig. 16.

DISTRIBUTION. Russia: European part south from Moscow, Crimea, North Caucasus; European countries of the former USSR (Belarus, Estonia, Latvia, Lithuania, Ukraine), Caucasus; Northern, Central and Southern Europe [Pffefer, 1995; Lekander, 1965]; Asia (China, including Northeast provinces: Heilongjiang, Liaoning and Taiwan, Japan, South Korea, Turkey); North Africa (Madeira).

HOSTS. *Pinus sylvestris*, *Pinus nigra pallasiana*, *Pinus* spp.

4. *H. brunneus* Erichson, 1836

Figs 3, 10, 25, 29.

= *aterrimus* Eggers, 1933.

= *rotundicollis* Reitter, 1895.

DISTRIBUTION. Russia: European part, Western and Eastern Siberia, including Transbaikalia and Sakha Republic, Khabarovsk Terr., Primorsk Terr.; European countries of the

former USSR (Belarus, Estonia, Latvia, Lithuania, Ukraine), Caucasus, Middle Asia (Kazakhstan, Kirgizia); Northern, Central and Southern Europe; Asia (China: Northeast provinces; Mongolia, North India, North Korea, South Korea, Turkey); North Africa (Algeria); North America (introduced).

HOSTS. Preferentially on *Pinus sylvestris*, also on *Pinus koraiensis*, *Pinus* spp., *Picea* spp.; recorded rarely on *Picea schrenkiana* [Marikovskiy, 1956].

NOTES. In our opinion this species substitutes *H. ater* in the Far-East [Schedl, 1968].

5. *H. cunicularius* Erichson, 1836

Figs 1, 11, 18, 30.

= *starki* (Eggers, 1933).

DISTRIBUTION. Russia: European part where spruce grows, up to the Murmansk Prov. in the north, Western and Eastern Siberia, Primorsk Terr., Sakhalin Island; European countries of the former USSR (Belarus, Estonia, Latvia, Lithuania, Ukraine), Caucasus; Northern, Central and Southern Europe; Asia (China, Japan, North Korea, Syria, Turkey); North Africa (Algeria).

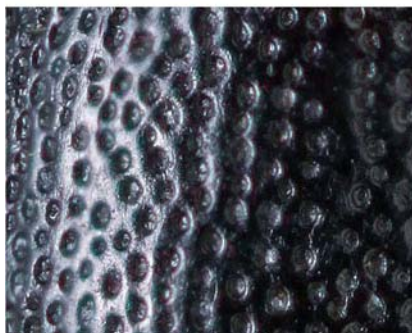
HOSTS. *Picea abies*, *P. jezoensis*, *P. obovata*, *P. orientalis*, rarely on *Pinus* sp. and *Larix* sp.



7



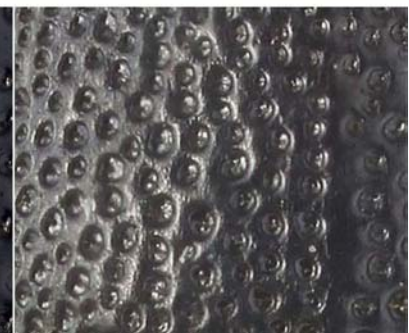
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9



10



11

Figs 7–11. Details of bark beetles from genera *Hylastes* and *Hylurgops*: 7, 9 — *Hylastes ater*; 8 — *Hylurgops palliatus*; 10 — *Hylastes brunneus*; 11 — *Hylastes cunicularius*; 7–8 — proventriculus; 9–11 — punctures of pronotal disc; 7–8 — photographs by Kirill V. Makarov.

Рис. 7–11. Детали строения короедов родов *Hylastes* и *Hylurgops*: 7, 9 — *Hylastes ater*; 8 — *Hylurgops palliatus*; 10 — *Hylastes brunneus*; 11 — *Hylastes cunicularius*; 7–8 — провентрикулюс; 9–11 — пунктировка переднеспинки; 7–8 — фотографии К.В. Макарова.

6. *H. linearis* Erichson, 1836

Fig. 23.

- = *clavus* Wollaston, 1854.
- = *corticiperda* Erichson, 1836.
- = *flavicornis* Lindberg, 1950.
- = *variolosus* Perris, 1852.

DISTRIBUTION. Russia [Pfeffer, 1995]; Ukraine (sporadically in western provinces) [Nikulina et al., 2015]; Central Europe [Nunberg, 1981], Southern Europe; Asia (Cyprus, Israel, Syria, Turkey); North Africa (Algeria, Canary Islands, Madeira, Morocco, Tunis); South Africa (introduced).

HOSTS. *Pinus halepensis*, *Pinus sylvestris*, *Pinus* spp.

NOTES. The authors have not seen specimens from the territory of Russia.

7. *H. opacus* Erichson, 1836= *simplex* Rey, 1892.

DISTRIBUTION. Russia: European part, Western Siberia, including Altay, Eastern Siberia, including Sakha Republic, Amur Prov., Primorsk Terr.; European countries of the former USSR (Belarus, Estonia, Latvia, Lithuania, Ukraine), Caucasus, Middle Asia (Kazakhstan); Northern, Central and Southern Europe; Asia (China: Manchuria, Japan, Mongolia, North Korea, South Korea); North America (USA).

HOSTS. *Pinus sylvestris*, *Pinus* spp., rarely on *Picea abies*.

8. *H. paralellus* Chapuis 1875

DISTRIBUTION. Russia: East Siberia, Far-East [Knížek, 2011], Asia (China, including Northeast provinces: Heilongjiang, Jilin, etc., including Taiwan; Japan, South Korea).

HOSTS. *Pinus densiflora*, *Pinus* sp. [Murayama, 1962].

NOTES. This species is unknown to the authors and is probably not occurring in Russia. It was not mentioned in previous keys and revisions of the Far-Eastern bark beetle fauna [Kurentsov, 1941; Stark, 1952; Krivolutskaya, 1996]. Data about the occurrence of *H. paralellus* in Russia are given according to Knížek [2011]. Murayama [1962] notes that the species is closely allied to *H. ater* and very common through Japan, but very rare in the Asiatic continent.

9. *H. plumbeus* Blandford, 1894

- = *fushunensis* (Murayama, 1940).
- = *obscurus* Chapuis, 1876.
- = *septentrionalis* Eggers, 1923.

DISTRIBUTION. Russia: European part (Arkhangelsk Prov., Karelia Republic, Leningrad Prov., Uralian Region), Western and Eastern Siberia, including Altay, Irkutsk Prov. and Sakha Republic, Khabarovsk Terr., Primorsk Terr., Kamchatka; Europe (Finland, Poland, Sweden); Asia (China, including Northeast provinces: Heilongjiang, Jilin; few other provinces, including Taiwan; Japan, North Korea, South Korea).

HOSTS. Preferentially on *Picea abies*, *P. jezoensis*, *P. obovata*, also on *Pinus koraiensis*, *Pinus thunbergi*, *Pinus densiflora* [Murayama, 1940], rarely on *Larix sibirica*, *Abies nephrolepis* [Stark, 1952].

10. *H. substriatus* Strohmeyer, 1914

Figs 2, 5, 12, 15, 17, 21–22, 28.

DISTRIBUTION. Middle Asia (Kirgizia, Kazakhstan: Trans-Ili Alatau), Asia (Western China). Records from Turkey [Knížek, 2011] are doubtful; probably absent in Turkmenistan and Uzbekistan [Stark, 1952].

HOSTS. *Picea schrenkiana*, also recorded from *Pinus sylvestris* [Temreshev, Kolov, 2013; Temreshev et al., 2016].

BIOLOGY. This species infests only unhealthy, damaged trees. The species preferentially attacks standing trees usually already weakened by other bark and phloem tunneling insects. On fallen trees, the galleries are built on the lower part of the trunk which is in contact with the ground. One necessary condition for successful breeding is high humidity; hence, the species is most common nearby mountain rivers and streams [Temreshev et al., 2016]. It can be found very rarely on naked roots or roots surrounded by the dry litter [Stark, 1952]. Galleries are built usually in the root neck of spruces in area covered by litter or mosses. According to Marikovskiy [1956], *H. substriatus* lives in large roots of spruces, under a layer of soil up to 30–40 cm deep. The species is monogamous as other *Hylastes* species. There is one generation per year. Larvae overwinters [Parfent'ev, 1951], however it was reported [Temreshev et al., 2016] that beetles and pupae may also overwinter. Beetles are active during all summer period starting from May, mass flight period is restricted by mid-May and beginning of June. The species frequently uses galleries of *Ips hauseri* Reitter, 1895 for penetration under the bark and for maturation feeding [Temreshev et al., 2016]. Beetles build a longitudinal parental gallery under the bark, where larval galleries are tightly spaced, crossing and fusing into one cavity filled by frass. Imagines emerge at the beginning of August. Maturation feeding then occurs in the galleries and also in the bark of root necks and roots of young spruces and pines [Temreshev et al., 2016]. *H. substriatus* is a very common species in *Picea schrenkiana* windbreak sites in Ile-Alatau National Natural Park [Temreshev, Kolov, 2013]. Besides, the species was found on pine and spruce logs in lumber yards in Almaty Province of Kazakhstan.

Genus *Hylurgops* LeConte, 1876

Six species of *Hylurgops* are recorded from Russia and neighboring countries.

KEY TO THE SPECIES OF *HYLURGOPS* IN RUSSIA AND NEIGHBORING COUNTRIES.

1. First and third elytral declivital interstriae elevated; second interstriae impressed. All interstriae in posterior half of elytra with single rows of loosely set pointed tubercles and long erect setae. Body color uniformly light red. 4.3–4.5 mm *H. interstitialis*
 - None out of declivital interstriae elevated, all interstriae of same height 2
2. Second elytral declivital interstriae without tubercles and raised setae, covered with dense scales only. Elytral interstriae in basal half of elytra with dense recumbent golden hair-like setae, very short and sparse inclined erect setae are present only on declivity, sometimes in obscure rows. Body color very dark brown, nearly black. Beetles robust (Fig. 20), 4.5–5.5 mm *H. glabratus*
 - All elytral declivital interstriae with small tubercles and erect or inclined hair-like setae. Elytral interstriae in basal half of elytra with sparse recumbent hairs, or declivity with conspicuous erect or inclined setae, or beetles bicolored. Beetles usually smaller 3
3. Upper side of beetles uniformly colored, blackish-brown or reddish brown with the exception of black head 4
 - Upper side of beetles usually bicolored, head and pronotum black, elytra dark-red or rusty red, anterior pronotum margin rufous 5
4. Each interstria in apical half of elytra and on declivity with single row of long thin erect hair-like setae oriented nearly vertically, each hair length exceeding width of interstria.

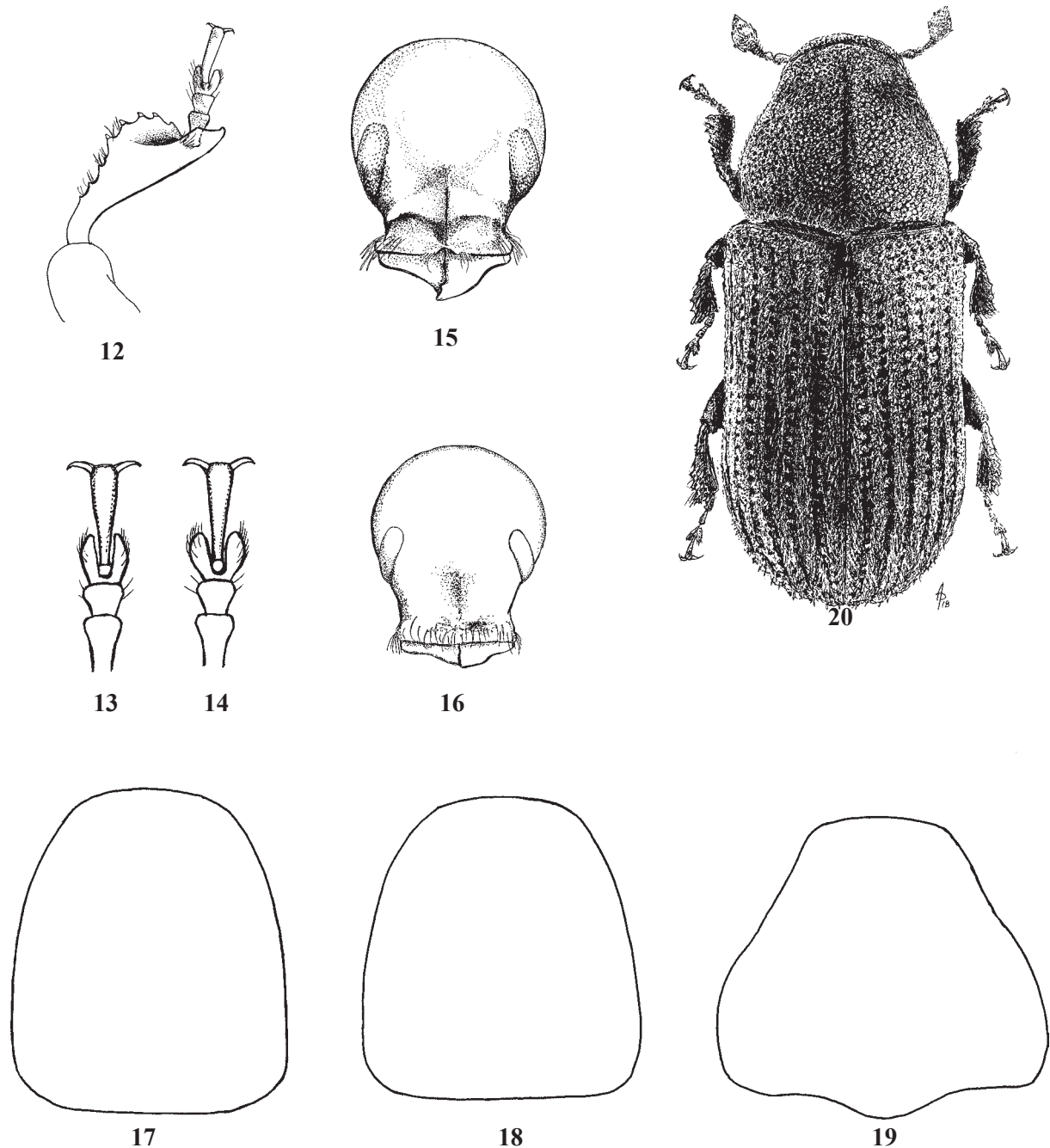
Elytral striae deep and wide, interstriae of same width as striae or slightly wider. Beetles shorter and wider, elytra wider posteriorly, 1.5x as long as wide. 3.2–4.0 mm

..... *H. longipillus**

* All dissected *H. longipillus* specimens were males and all *H. spessiwzeffi* specimens were found to be females. It may turn out that these morphologically different forms represent only one biological species.

— Each interstria in apical half of elytra and on declivity with single row of short thick inclined, semi-recumbent bristle-like setae much shorter than interstitial width. Elytral interstriae significantly wider than striae. Beetles long and slender, with sides parallel, elytra 2x as long as wide. 3.5–4.5 mm

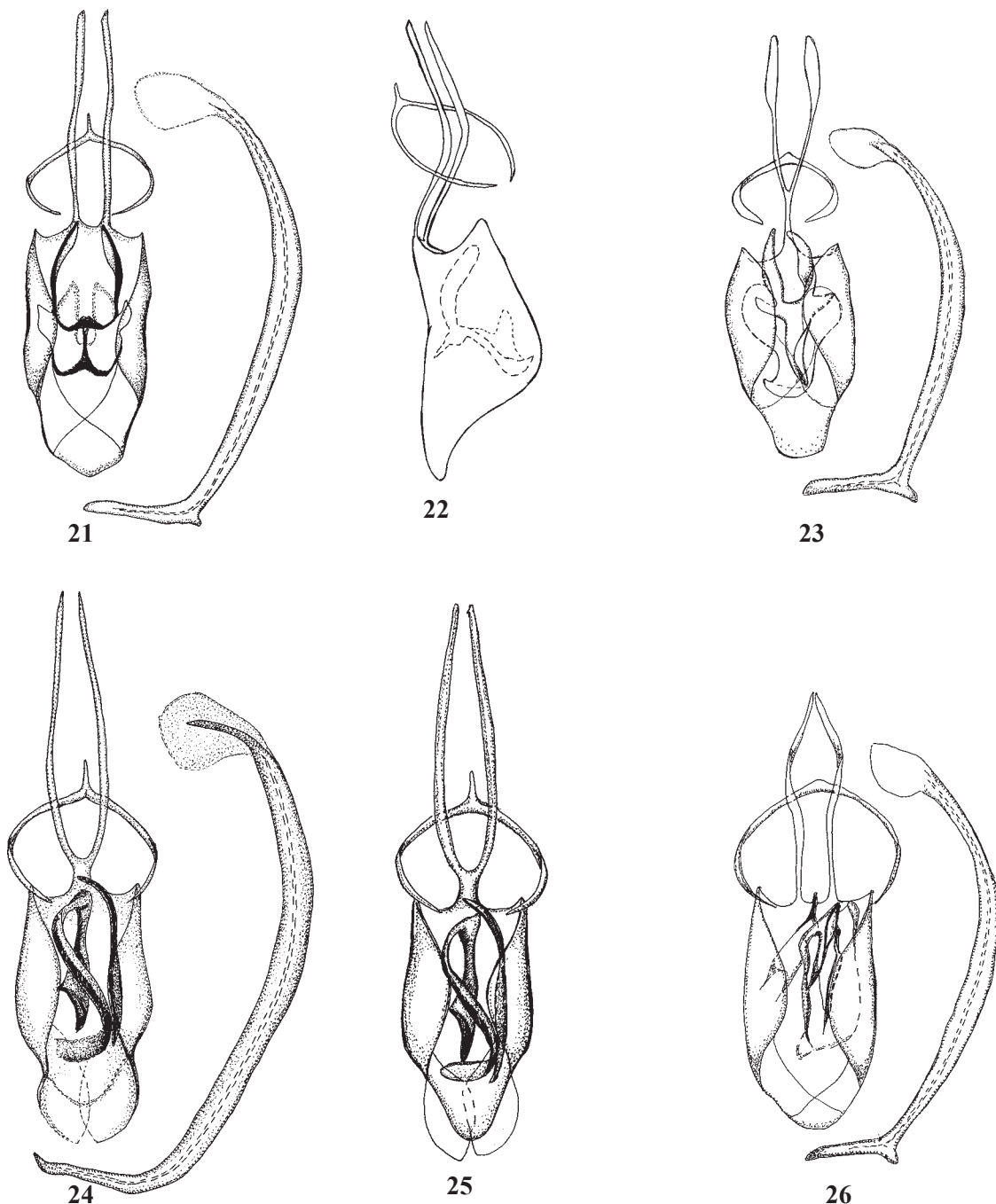
..... *H. spessiwzeffi*



Figs 12–20. Habitus and details of bark beetles of the genus *Hylastes* and *Hylurgops*: 12, 15, 17 — *Hylastes substriatus*; 13 — *Hylastes ater*; 14 — *Hylurgops palliatus*; 16 — *Hylastes attenuatus*; 18 — *Hylastes cunicularius*; 19–20 — *Hylurgops glabratus*; 12 — protibia and tarsus; 13–14 — tarsi; 15–16 — head; 17–19 — pronotum; 20 — habitus, dorsal view.

Рис. 12–20. Габитус и детали строения короедов родов *Hylastes* и *Hylurgops*: 12, 15, 17 — *Hylastes substriatus*; 13 — *Hylastes ater*; 14 — *Hylurgops palliatus*; 16 — *Hylastes attenuatus*; 18 — *Hylastes cunicularius*; 19–20 — *Hylurgops glabratus*; 12 — передняя голень и лапка; 13–14 — лапки; 15–16 — голова; 17–19 — переднеспинка; 20 — габитус, сверху.

5. Body larger 4.0–5.0 mm. Inclined erect, conspicuous bristle-like setae narrowing apically, often of reddish shade present in apical half of elytra and on declivity only, each interstria with one row of erect setae. Interstriae 1.5–2.0x wider than striae, in the anterior half look glabrous, microscopic setae covering interstriae in anterior half of elytra inconspicuous and only barely noticeable. Body surface shining, whole body blackish-brown, broad *H. transbaicalicus*
- Body smaller, less than 3.2 mm. Both basal and apical halves of elytra with rows of inclined erect interstitial bristle-like setae. 6
6. Interstriae along whole elytral length from base to apex with one row of inclined erect hair-like setae. Besides, anterior two thirds of elytra with recumbent setae or hair-like scales (in old rubbed beetles these recumbent setae may be partially lost), declivity with dense scales. Beetles reddish-brown, only head may be black. Beetles at least



Figs 21–26. Male genitalia of bark beetles from genera *Hylastes* and *Hylurgops*: 21–22 — *Hylastes substriatus*; 23 — *Hylastes linearis*; 24 — *Hylastes ater*; 25 — *Hylastes brunneus*; 26 — *Hylurgops palliatus*; 21, 23–26 — dorsal view; 22 — lateral view.

Рис. 21–26. Гениталии самцов короедов родов *Hylastes* и *Hylurgops*: 21–22 — *Hylastes substriatus*; 23 — *Hylastes linearis*; 24 — *Hylastes ater*; 25 — *Hylastes brunneus*; 26 — *Hylurgops palliatus*; 21, 23–26 — сверху; 22 — сбоку.

- faintly shining. Front with or without longitudinal carina. 2.0–3.2 mm *H. palliatus*
 — Elytra without ground scales and hair-like ground vestiture, only with rather short erect hair-like setae forming one interstitial row on elytral disc and 1–2 rows on declivital interstriae. Beetles almost opaque. Front without longitudinal carina. 2.0 mm *H. inouyei*

Annotated list of species of *Hylurgops* of Russia and neighboring countries.

1. *H. glabratus* (Zetterstedt, 1828)

Figs 19–20.

- = *decumanus* (Erichson, 1836).
 = *paykulli* (Duftschmidt, 1825).
 = *tenebrosus* (C.R. Sahlberg, 1836).

DISTRIBUTION. Russia: European part (where spruce grows, in the north up to Murmansk Prov.); Western and Eastern Siberia, including Altay, Tuva, southern Baikal Region, Sakha Republic, Amur Prov., Khabarovsk Terr., Primorsk Terr., Sakhalin Island; European countries of the former USSR (Belarus, Estonia, Latvia, Ukraine: Carpathians), Middle Asia (Eastern Kazakhstan); Northern Europe, Central and Southern Europe (in high mountains); Western Asia (Turkey), Eastern Asia (China, including Northeast provinces: Heilongjiang, Jilin, Taiwan; Japan, Mongolia, North Korea, South Korea,).

HOSTS. *Picea abies*, *P. jezoensis*, *P. obovata*, less commonly on *Pinus cembra*, *P. densiflora*, *P. koraiensis*, *P. mugo*, *P. pentaphylla*, *P. pumila*, *P. sylvestris*, *P. sibirica*, rarely on *Abies pectinata*, *Abies sibirica*.

2. *H. inouyei* Nobuchi, 1959

DISTRIBUTION: Japan (Hokkaido).

HOSTS. *Picea jezoensis*, *P. glehnii*, *P. abies*, *Pinus sylvestris*, *P. strobus*.

NOTES: This species is not recorded from Russia, but can be found in the future in the Kurils (Kunashir Island), Sakhalin Island or Primorsk Terr. as these places are close to its current distribution.

3. *H. interstitialis* (Chapuis, 1875).

- = *imitator* (Reitter, 1900).
 = *niponicus* Murayama, 1936.

DISTRIBUTION. Russia: Amur Prov., southern part of Khabarovsk Terr., Primorsk Terr., Magadan prov. (imported with wood), Kamchatka Prov. (imported with wood); Asia (China, including Northeast provinces: Heilongjiang, Jilin, etc. including Taiwan; Japan, North Korea, South Korea).

HOSTS. *Pinus koraiensis*, *Pinus funebris*, *Pinus densiflora*, *Pinus pentaphylla*, *Pinus* sp., *Picea jezoensis*, *Abies* sp.

NOTES. Our study of Reitter's type of *Hylastes imitator* type preserved in NHMB has demonstrated its identity with *Hylurgops interstitialis*: both species are similar in structure of elytral declivity having raised first and third interstriae and thus *H. imitator* (Reitter, 1900) is considered as a synonym of *H. interstitialis*, **syn. nov.**

4. *H. longipillus* Reitter, 1895.

= *likiangensis* Tsai et Hwang, 1964.

DISTRIBUTION. Russia: Amur Prov., Khabarovsk Terr., Primorsk Terr., Sakhalin Island, Kamchatka Prov. (imported with wood); Asia (China, including Northeast provinces: Heilongjiang, Liaoning, etc.; Japan, North Korea).

HOSTS. *Pinus koraiensis*, less commonly on *Picea jezoensis*, *Pinus* sp., and *Larix* sp.

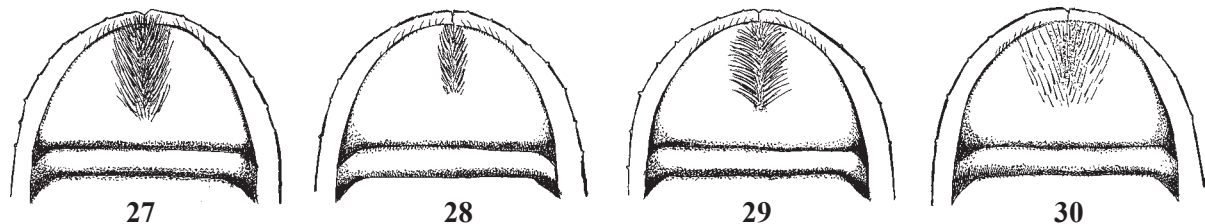
NOTES. All dissected specimens of *H. longipillus* were found to be males and all dissected specimens of *H. spessiwzeffi* were females. Profound sexual dimorphism is untypical for the genus *Hylurgops*. *H. longipillus* is characterized by stout body and long erect declivital hair-like setae and *H. spessiwzeffi* — by slim body and minute semi recumbent declivital setae. These forms as a rule are collected together, have the same distribution and same host-plants in the Russian Far-East. Further observations in the nature and DNA analysis is required to confirm the synonymy of *H. longipillus* and *H. spessiwzeffi* that is quite probable. *H. longipillus* was erroneously synonymized with *H. imitator* by Knížek [2011], but as have demonstrated investigation of type from NHMB, *H. imitator* is a synonym of *H. interstitialis* and not of *H. longipillus*.

5. *H. palliatus* (Gyllenhal, 1813)

Figs 8, 14, 26.

- = *abietiperda* Bechstein, 1818.
 = *fuscus* Duftschmidt, 1825.
 = *helferi* A. Villa et G. B. Villa, 1835.
 = *marginatus* Duftschmidt, 1825.
 = *parvus* Eggers, 1933.
 = *piceus* Marsham, 1802.
 = *rufescens* Stephens, 1830.
 = *rufus* Marsham, 1802.

DISTRIBUTION. Russia: European part, Crimea, North Caucasus, Western and Eastern Siberia, including Transbaikalia and Sakha Republic, Khabarovsk Terr., Primorsk Terr., Sakhalin Island, Kunashir Island; European countries of the former USSR (Belarus, Estonia, Latvia, Lithuania, Moldova, Ukraine), Caucasus, Middle Asia (Eastern Kazakhstan, Almaty Region :Trans-Ili Alatau); Northern, Central and Southern Europe; Asia (China, including Northeast provinces: Heilongjiang, etc.; Japan, North Korea, South Korea, Turkey); North Africa (Algeria); North America (introduced).



Figs 27–30. Male ventrites 5 of bark beetles of the genus *Hylastes*: 27 — *H. ater*; 28 — *H. substriatus*; 29 — *H. brunneus*; 30 — *H. cunicularius*.

Рис. 27–30. Пятые членики брюшка самцов короедов рода *Hylastes*: 27 — *H. ater*; 28 — *H. substriatus*; 29 — *H. brunneus*; 30 — *H. cunicularius*.

HOSTS. Preferentially on *Picea abies*, *P. glehnii*, *P. jezoensis*, *P. obovata*, *P. orientalis*, *Picea* sp. and *Pinus sylvestris*, less commonly on *Pinus koraiensis*, *P. mugo*, *P. pumila*, *P. sibirica*, *Pinus* spp., *Larix* sp., *Abies* spp., rarely on *Juniperus communis*.

6. *H. spessiwzeffi* Eggers, 1914

= *modestus* Murayama, 1937.

= *squamosus* Murayama, 1942.

DISTRIBUTION. Russia: eastern parts of Sakha Republic, Amur Prov., Khabarovsk Terr., Primorsk Terr., Sakhalin Island; Asia (China: Northeast territories and Taiwan; Japan, North Korea, South Korea).

HOSTS. *Pinus koraiensis*, less commonly on *Picea* sp., *Pinus* sp., and *Larix* sp.

NOTES. *H. spessiwzeffi* may only represent a female of *H. longipillus*.

7. *H. transbaicalicus* Eggers, 1941

DISTRIBUTION. Russia: southern parts of Sakha Republic, Khabarovsk Terr., Primorsk Terr., Kamchatka Prov. (imported with wood); Asia (Japan).

HOSTS. *Pinus koraiensis*, less commonly on *Picea jezoensis* and *Larix* sp.

NOTES. This species was erroneously referred to as *Hylurgops imitator* in most Russian entomological literature [e.g. Kurentsov, 1941; Stark, 1952; Krivolutsкая, 1996 and other uncited sources], but as we have demonstrated by the investigation of types in NHMB and USNM, *H. imitator* is a synonym of *H. interstitialis* and, hence, *H. transbaicalicus* is a valid species.

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References

- Beaver R.A. 1970. On *Hylastes ater* Payk. and *H. brunneus* Er. (Coleoptera: Scolytidae), with description of the larva of *H. ater* // *Entomologist*. Vol.103. P.198–206.
- Grocholski J., Michalski J., Novak W. 1976. Notes on intraspecific variation and sexual dimorphism of some Palearctic species in the genus *Hylastes* Er. (Col., Scolytidae) // *Acta Zoologica Cracoviensia*. Vol.21. No.17. P.553–584.
- Grocholski J., Michalski J., Novak W. 1977. Kilka uwag o morfologii i rozszedzeniu zakorka brunatnego, *Hylastes brunneus* Er. (Coleoptera, Scolytidae) // *Polskie Pismo Entomologiczne*. T.47. No.4. P.703–710.
- Hansen V. 1956. Notes on some species of *Hylastes* Er. and *Trypophloeus* Fairm. (Coleopt. Scolytidae) // *Entomologiske Meddelelser*. Vol.27. P.169–185.
- Knížek M. 2011. Scolytinae // Löbl I., Smetana A. (eds.). Catalogue of Palearctic Coleoptera. Vol.7. Stenstrup: Apollo Books. P.86–87, 204–251.
- Kostin I.A. 1973. Zhuki-dendrofagi Kazakhstana (Koroedy, drovoseki, zlatki) [The dendrophagous beetles of Kazakhstan (Buprestidae, Cerambycidae, Ipidae)]. Alma-Ata: Izdatelstvo "Nauka" Kazakhskoy SSR. 288 pp. [In Russian, with English summary]
- Krivolutsкая G.O. 1958. [Bark beetles of Sakhalin Island]. Moskva-Leningrad: Akademia nauk SSSR. 196 pp. [In Russian]
- Krivolutsкая G.O. 1983. Ekologo-geograficheskaya kharakteristika fauny koroedov (Coleoptera, Scolytidae) Severnoy Azii [Ecological-geographical characteristics of the fauna of bark beetles of Northern Asia] // *Entomologicheskoe Obozrenie*. Vol.62. No.2. P.287–301 [in Russian].
- Krivolutsкая G.O. 1996. [Family Scolytidae — bark-beetles] // Lehr P.A. (ed.). *Opredelitel' nasekomykh Dal'nego Vostoka Rossii* [Keys to the insects of the Russian Far East]. Vol.3. Pt.3. Vladivostok: Dal'nauka. P.312–373 [in Russian].
- Kurentsov A.I. 1941. [Bark-beetles of the USSR Far East] Moscow-Leningrad: Izdatel'stvo Akademii Nauk SSSR. 234 pp. [In Russian, with English descriptions of new species]
- Lekander B. 1965. On the small *Hylastes* species in the nordic countries and description of a new one, *Hylastes scandinavicus* // *Entomologisk Tidskrift*. Vol.86. P.196–201.
- López-Buenfil J.A., Valdéz-Carrasco J., Equihua-Martínez A., Burgos-Solorio A. 2001. El proventriculo como estructura para identificar géneros Mexicanos de Scolytidae (Coleoptera) // *Folia Entomol. Mex.* Vol.40. No.3. P.325–372.
- Mandelshtam M.Yu., Popovichev B.G. 2000. Annotated list of bark beetles (Coleoptera, Scolytidae) of Leningrad Province // *Entomological Review*. Vol.80. No. 8. P.887–903. (Translated from *Entomologicheskoe Obozrenie*. 2000. Vol.79. No.3. P. 599–618).
- Mandelshtam M.Yu., Khairtdinov R.R. 2017. Additions to the check list of bark beetles (Coleoptera, Curculionidae: Scolytinae) from Leningrad Province, Russia // *Entomological Review*. Vol.97. No.7, P.893–899. (Translated from *Entomologicheskoe Obozrenie*. 2017. Vol.96. No.3. P.512–521).
- Marikovskiy P.I. 1956. [Interspecies relationships of bark beetles breeding on Tien-Shan spruce] // *Trudy Instituta zoologii i parazitologii*. No.5. Frunze: Academy of Sciences of Kirghiz SSR. P.73–78 [in Russian].
- Mercado-Vélez J.E., Negrón J.F. 2014. Revision of the new world species of *Hylurgops* LeConte, 1876 with the description of a new genus in the Hylastini (Coleoptera: Scolytinae) and comments on some Palearctic species // *Zootaxa*. Vol.3785. No.3. P.301–342.
- Michalski J., Grocholski J., Novak W. 1983. The male of *Hylastes linearis* Er.: genital organ and some morphological data (Coleoptera, Scolytidae) // *Polskie Pismo Entomologiczne*. T.53. P.307–309.
- Murayama J. 1940. Nouvelle note sur la Scolytides du Manchoukuo // *Annot. Zool. Japon*. Vol.19. No.3. P.229–237.
- Murayama J. 1962. Studies in the Scolytid fauna of the Northern half of the Far East. V. Hylesininae. Fukuoka, Japan: Shukosha Press. 72 pp.
- Nikulina T., Mandelshtam M., Petrov A., Nazarenko V., Yunakov N. 2015. A survey of the weevils of Ukraine. Bark and ambrosia beetles (Coleoptera: Curculionidae: Platypodinae and Scolytinae). Monograph // *Zootaxa*. Vol.3912. No.1. 61 pp.
- Nobuchi A. 1969. A comparative morphological study of the proventriculus in the adult of the superfamily Scolytoidea (Coleoptera) // *Bulletin of the Government Forest Experiment Station*. No.224. P.39–110, 17 pls.
- Nobuchi A. 1959. Four new species of Scolytidae from Japan // *Akitu*. Vol.8. No.1. P.9–13.
- Nunberg M. 1981. Klucze do oznaczania owadów Polski, Część XIX, Chrząszcze — Coleoptera, Zeszyt 99–100, Korniki —

- Scolytidae, Wyrzyniki — Platypodidae. Warszawa, Wrocław: Wrocławska drukarnia naukowa. 115 pp.
- Parfent'ev V.Ya. 1951. [Bark beetles and longhorn beetles inhabiting Schrenk's spruce] // Entomologicheskoe obozrenie. Vol.31. No.3-4. P.428-434 [in Russian].
- Petrov A.V. 2005. [Fauna of the bark beetles (Coleoptera: Scolytidae) of Daghestan] // Russian Entomological Journal. Vol.14. No.3. P.217-222 [in Russian, with English summary].
- Pfeffer A. 1944. Príspevek k poznani rodu *Hylastes* Erichs. a *Hylurgops* Lec. (Col., Ipidae) // Entomologické Listy (Folia Entomologica). Vol.7. No.4. P.97-105.
- Pfeffer A. 1995. Zentral- und Westpaläarktische Borken- und Kernkäfer (Coleoptera: Scolytidae, Platypodidae) // Entomologica Basiliensia. Bd.17. S.5-310.
- Schedl K.E. 1947. Die Borkenkäfer Baltischen Bernsteins // Zentralblatt für das Gesamtgebiet der Entomologie. Vol.2. No.1. P.12-45.
- Schedl K.E. 1968. Die Gattung *Hylastes* Er. // Anzeiger für Schädlingskunde. Bd.41. No.10. P.155-158.
- Schedl K.E. 1981. 91. Familie: Scolytidae (Borken- und Ambrosiakäfer) (Ipidae) // Freude H., Harde K.W., Lohse G.A. (eds.). Die Käfer Mitteleuropas. Bd.10. Krefeld: Goecke and Evers. P.34-99.
- Stark V.N. 1952. [Bark beetles] // Fauna SSSR. Zhestkokrylye. Vol.31. Moscow-Leningrad: Izdatel'stvo Akademii Nauk SSSR. 462 pp. [in Russian].
- Temreshev I.I., Kolov C.V. 2013. [Insects from windbreak sites in the State National Natural Park "Ile-Alatau", Almaty Oblast, Kazakhstan] // Euroasian Entomol. J. Vol.12. No.2. P.125-131 [in Russian, with English summary].
- Temreshev I.I., Kazenas V.L., Esenbekova P.A. 2016. [Key to trunk pests of Ile-Alatau State national nature park forests and adjacent territories]. Almaty: Nur-Print. 245 pp. [In Russian]
- Voolma K., Mandelshtam M.Yu., Shcherbakov A.N., Yakovlev E.B., Öunap H., Süda I., Popovichev B.G., Sharapa T.V., Galasjeva T.V., Khairtdinov R.R., Lipatkin V.A., Mozolevskaya E.G. 2004. Distribution and spread of bark beetles (Coleoptera: Scolytidae) around the Gulf of Finland: a comparative study with notes on rare species of Estonia, Finland and North-Western Russia // Entomologica Fennica. Vol.15. No.4. P.198-210.
- Wood S.L. 1982. The bark and ambrosia beetles of North and Central America (Coleoptera: Scolytidae), a taxonomic monograph // Great Basin Naturalist Memoirs. No.6. Provo, Utah: Brigham Young Univ. 1359 pp.
- Wood S.L. 1986. A reclassification of the genera of Scolytidae (Coleoptera) // Great Basin Naturalist Memoirs. No.10. Provo, Utah: Brigham Young Univ. 126 pp.
- Wood S.L., Bright D.E. 1992. A Catalog of Scolytidae and Platypodidae (Coleoptera), Part 2: Taxonomic Index // Great Basin Naturalist Memoirs. Vol.13(A). P.1-833.