

# To the Knowledge of the *Sphecodes hyalinatus* Hagens Species-Group (Hymenoptera, Halictidae)

Yu. V. Astafurova and M. Yu. Proshchalykin

Zoological Institute, Russian Academy of Sciences, St. Petersburg, 199034 Russia

e-mail: Yulia.Astafurova@zin.ru

Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far Eastern Branch, Russian Academy of Sciences, Vladivostok, 690022 Russia

e-mail: proshchalikin@biosoil.ru

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**Abstract**—Five species of the *hyalinatus* species-group of the genus *Sphecodes* Latreille 1804 (Hymenoptera, Halictidae) are reviewed. *Sphecodes maruyamanus* Tsuneki and *S. murotai* Tsuneki are found in Russia for the first time, and *S. hyalinatus* Hagens is newly recorded from the Kuril Islands (Kunashir). Illustrated keys to males and females of all the species of the *S. hyalinatus* species-group are provided. An updated checklist of 37 species of the genus *Sphecodes* is given.

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The cleptoparasitic genus *Sphecodes* Latreille, 1804, numbering about 70 species in the Palearctic Region, is a least known group of bees of the family Halictidae, especially in Russia and adjacent territories (on the Korean Peninsula and in China and Middle Asia). To a considerable extent, this is due to the difficulty in the identification of species of this genus since these bees are characterized by a wide intraspecific variation on the one hand, and by a close morphological similarity between species, on the other. The situation is also complicated by the absence of keys to the whole of the Palearctic Region and for most of its parts. The present communication continues the series of publications dealing with this group of bees in the fauna of Russia and adjacent territories (Astafurova and Proshchalykin, 2014, 2015a, 2015b, 2015c, 2016a, 2016b; Astafurova et al., 2014, 2015). In addition to the previously published data on the *Sphecodes* fauna of the Russian Far East (Astafurova and Proshchalykin, 2014), new data are reported on the distribution of the species of the *Sphecodes hyalinatus* Hagens group among which *S. maruyamanus* Tsuneki and *S. murotai* Tsuneki are recorded for the first time for the fauna of Russia, and *S. hyalinatus* Hagens, for the Kuril Islands (Kunashir Island). Thus, with the new data taken into account, 37 species of the genus *Sphecodes* (Table 1) are known from Russia.

The *S. hyalinatus* group comprises five species of which two (*S. ferruginatus* Hagens and *S. hyalinatus* Hagens) are widely distributed in the temperate zone

of the Palearctic Region (Figs. 1, 2), and the three others (*S. maruyamanus* Tsuneki, *S. murotai* Tsuneki, and *S. tanoi* Tsuneki) are known only from the Russian Far East and Japan (Figs. 3, 4); all the five species of this group occur in Primorskii Territory. Since the morphological similarity of the females can complicate the identification of the species, a key based on the distinctive characters of the females (Table 2) is given here in addition to the general key.

The morphological terminology follows that in the book by C. Michener (2007). The following designations are used in the text: T1, T2, T3, etc.—I, II, III, and the other metasomal terga; S1, S2, S3, etc.—I, II, III, and the other metasomal sterna. The distribution of the species is given according to Mitai and Tadauchi, 2013; Astafurova and Proshchalykin, 2014, 2015, 2016; Astafurova et al., 2015, 2017.

The following abbreviations are used for the depositories of the entomological collections: CBEA, the Federal Scientific Center of the East Asia Terrestrial Biodiversity, the Far Eastern Branch, the Russian Academy of Sciences, Vladivostok; ELKU, Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan; MNHAH, Museum of Nature and Human Activities, Sanda, Japan; MNHU, Museum für Naturkunde an der Humboldt Universität zu Berlin, Germany; ZIN, the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; ZMMU, the Zoological Museum of Moscow State University, Moscow, Russia.

Among the material listed, the countries and regions for which the species is recorded for the first time are designated with an asterisk (\*).

#### TAXONOMIC PART

**Diagnosis.** Pronotum rounded between dorsal and lateral surfaces (Fig. 5), not forming sharp carina typical of the other congeners (Fig. 6).

Hind wing with strongly curved basal vein (*M*) forming nearly right angle with cubital vein; 5 or 6 hamuli present. Metasoma with sparser punctation.

**Female.** Head transverse-oval. Clypeus densely punctate; interspaces between punctures less than a puncture diameter. 1st flagellar segment transverse, about 1.5 times as wide as long; 2nd subquadrate, slightly wider than long; other flagellar segments longer than wide. Sculpture of posterior vertical surface of propodeum smoothed (in comparison with that on sides of thorax). Metapostnotum semi-lunar, separated from rest of propodeum surface by sharp margination. Posterior vertical surface of propodeum more or less smoothed, with shining intervals between fine wrinkles. T1 impunctate; T2–T4 impunctate or with sparse microscopic superficial punctures. Pygidium narrow, its width not exceeding maximum width of hind basitarsus.

**Male.** Head weakly transverse-oval. Flagellar segments of antenna with rhinaria (depressions very densely covered with very short setae) developed to varying extent in different species. Scutum densely and finely punctate; punctures separated by at most a puncture diameter. T1 impunctate; other visible metasomal terga with or without sparse fine superficial punctation. Gonocoxite with depression on dorsal surface.

#### *A Key to Species of the Sphecodes hyalinatus Group*

##### Males

1. Rhinaria poorly developed, occupying at most 1/4 of surface of flagellar segment (Fig. 9). Membranous part of gonostylus large, trapezoidal (Fig. 17). 6–9 mm ..... *S. ferruginatus* Hagens.
- Rhinaria well developed, occupying more than 1/3 of surface of flagellar segment (Fig. 10) Membranous part of gonostylus smaller, oval or subquadrate (Figs. 18, 19) ..... 2.

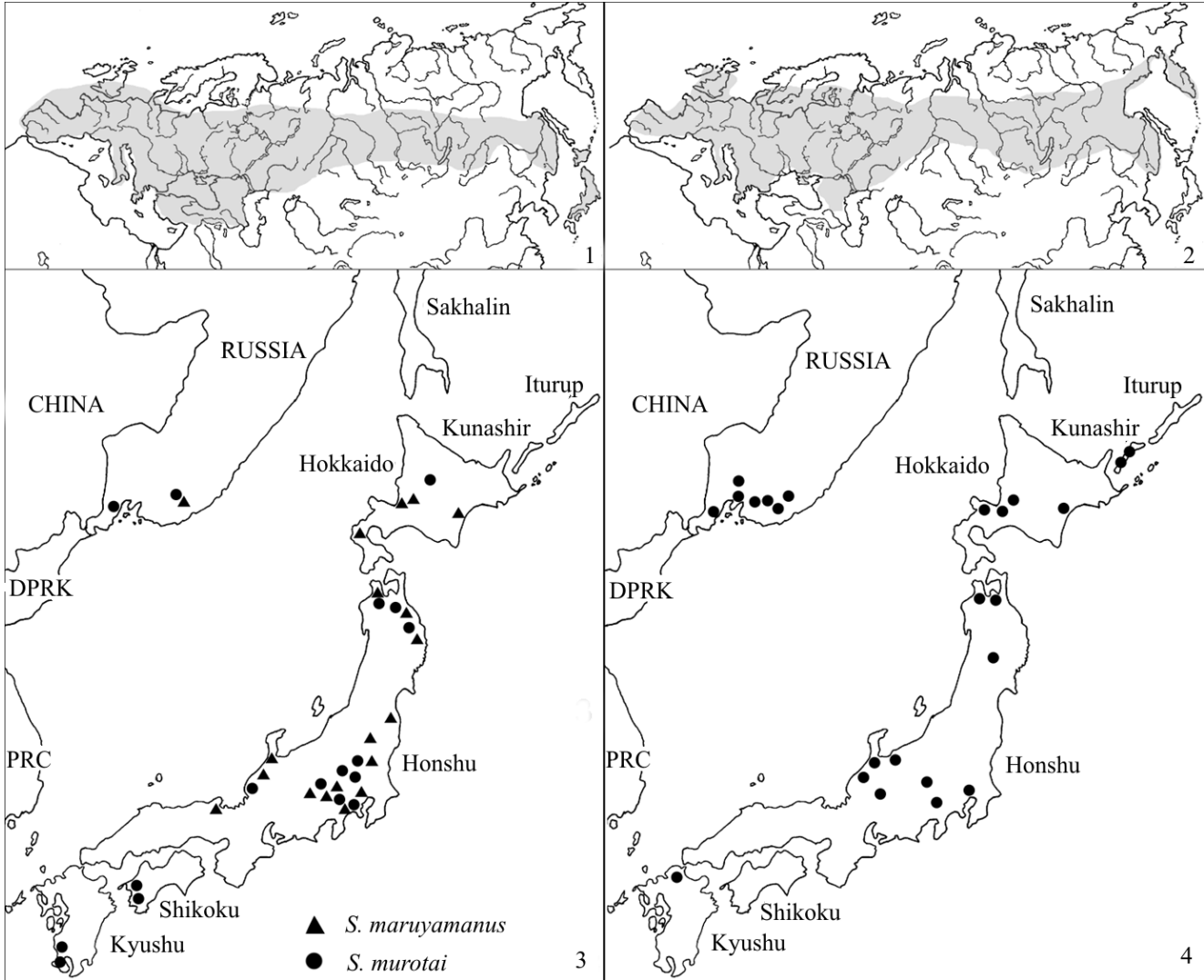
2. Clypeus covered with fine, simple, and sparsely plumose hairs, sculpture of its surface clearly visible. Membranous part of gonostylus square (Fig. 19). S7 weakly convex apically (Fig. 13). 6–7 mm ..... *S. maruyamanus* Tsuneki.
- Clypeus covered with thickened, densely plumose hairs partly concealing sculpture of its surface. S7 emarginate apically (Fig. 14). Membranous part of gonostylus oval (Fig. 18) ..... 3.
3. Antennae short; middle segments as long as or slightly longer than wide. Rhinaria occupying entire ventral surface of flagellar segment. Thorax ventrally with sculpture as coarse as that on its sides. 5.5–6.5 mm ..... *S. murotai* Tsuneki.
- Antennae longer; flagellar segments (beginning with 3rd) 1.2–1.3 times as long as wide. Rhinaria occupying about 1/3–3/4 of ventral surface of flagellar segment, less frequently (in *S. tanoi*) nearly entire ventral surface. Thorax ventrally with fine, smoothed sculpture ..... 4.
4. Rhinaria occupying about 1/2–3/4 of ventral surface of flagellar segment. Metasoma black or dark brown. Apical part of S8 widely triangular; apex rounded (Fig. 16). 6–7 mm ..... *S. tanoi* Tsuneki.
- Rhinaria occupying about 1/3–1/2 of ventral surface of flagellar segment. T1–T3 red. Apical part of S8 narrowly triangular; apex tapered (Fig. 15). 5–7 mm ..... *S. hyalinatus* Hagens.

##### Females

1. Hind femur narrow, regularly narrowed toward distal end; its length more than 3.5 times its maximum width (Fig. 12). 6–7.5 mm ..... *S. maruyamanus* Tsuneki.
- Hind femur widened in proximal half; its length not more than 3 times its maximum width (Fig. 11) ..... 2.
2. Vertex weakly convex, projecting beyond ocelli in front view (Fig. 7). 6–9 mm ..... *S. ferruginatus* Hagens.
- Vertex flat, not projecting beyond ocelli in front view (Fig. 8) ..... 3.
3. Thorax ventrally with sculpture as coarse as that on its sides. Pygidium wider, subequal in width to hind basitarsus. 5–6.5 mm ..... *S. murotai* Tsuneki.

**Table 1.** Distribution of species of the genus *Sphecodes* Latr. in the regions of Russia

Species	Crimea	North Caucasus	European part	Ural	Siberia	Far East
<i>Sphecodes albilabris</i> (Fabricius, 1793)	+	+	+	+	+	+
<i>S. alternatus</i> Smith, 1853	+	+	+	+	+	
<i>S. crassus</i> Thomson, 1870	+	+	+	+	+	+
<i>S. cristatus</i> Hagens, 1882		+	+	+	+	+
<i>S. croaticus</i> Meyer, 1922	+	+	+			
<i>S. ephippius</i> (Linnaeus, 1767)	+	+	+	+	+	
<i>S. ferruginatus</i> Hagens, 1882	+	+	+	+	+	+
<i>S. geoffrellus</i> (Kirby, 1802)		+	+	+	+	+
<i>S. gibbus</i> (Linnaeus, 1758)	+	+	+	+	+	
<i>S. hyalinatus</i> Hagens, 1882	+	+	+	+	+	+
<i>S. intermedius</i> Blüthgen, 1923	+		+	+		
<i>S. laticaudatus</i> Tsuneki, 1983						+
<i>S. longulus</i> Hagens, 1882		+	+	+	+	+
<i>S. majalis</i> Pérez, 1903	+	+	+			
<i>S. maruyamanus</i> Tsuneki, 1983						+
<i>S. miniatus</i> Hagens, 1882	+	+	+	+	+	+
<i>S. monilicornis</i> (Kirby, 1802)	+	+	+	+	+	+
<i>S. murotai</i> Tsuneki, 1983						+
<i>S. niger</i> Hagens, 1874		+	+			
<i>S. nippon</i> Meyer, 1922					+	+
<i>S. nomioidis</i> Pesenko, 1979			+			
<i>S. okuyetsu</i> Tsuneki, 1983						+
<i>S. olivieri</i> Lepeletier de Saint-Fargeau, 1825		+	+			
<i>S. orientalis</i> Astafurova et Proshchalykin, 2014						+
<i>S. pellucidus</i> Smith, 1845	+	+	+	+	+	+
<i>S. pingiculus</i> Pérez, 1903			+		+	
<i>S. pseudofasciatus</i> Blüthgen, 1924		+	+			
<i>S. puncticeps</i> Thomson, 1870	+	+	+		+	+
<i>S. reticulatus</i> Thomson, 1870	+	+	+	+	+	
<i>S. rubicundus</i> Hagens, 1875		+	+			
<i>S. rufiventris</i> (Panzer, 1798)	+	+	+	+	+	
<i>S. scabricollis</i> Wesmael, 1835	+		+	+	+	+
<i>S. schwarzi</i> Astafurova et Proshchalykin, 2015					+	
<i>S. schenckii</i> Hagens, 1882	+	+	+			
<i>S. simillimus</i> Smith, 1873						+
<i>S. spinulosus</i> Hagens, 1875	+		+	+	+	
<i>S. tanoi</i> Tsuneki, 1983						+
Total number of the species in the region	19	23	28	17	21	21



**Figs. 1–4.** Distribution of the *Sphecodes hyalinatus* Hagens species-group: (1) *S. ferruginatus* Hagens, (2) *S. hyalinatus* Hagens, (3) *S. maruyamanus* Tsuneki and *S. murotai* Tsuneki, (4) *S. tanoi* Tsuneki.

- Thorax ventrally with sculpture finer than that on its sides. Pygidium slightly narrower than hind basitarsus ..... 4.
- 4. Thorax ventrally with very fine and smoothed sculpture sharply differing from that on its sides. 5–7.5 mm ..... ***S. hyalinatus*** Hagens.
- Thorax ventrally with coarser sculpture. 6–7.5 mm .  
..... ***S. tanoi*** Tsuneki.

*An Annotated List of the Species  
of the Sphecodes hyalinatus Group*

***Sphecodes ferruginatus*** Hagens, 1882

*Sphecodes ferruginatus* Hagens, 1882 : 221, ♀, ♂ (syntypes: ♀♀, ♂♂, Germany).

*Sphecodes rufescens* var. *alpestris* Frey-Gessner, 1903 : 107, ♀, ♂ (lectotype: ♀, designated in Warncke, 1992 : 29, “Airolo, 27.6” [Switzerland], MNHU).  
Synonymy: Warncke, 1992 : 3.

*Sphecodes koikensis* Tsuneki, 1983 : 27, figs. 228–230, ♀ (holotype: ♀, Japan, “Fukui Pref., Koike, 600 m, 26.VII.1973, leg. K. Tsuneki,” MNHAH).  
Synonymy: Astafurova and Proshchalykin, 2014 : 509.

*Sphecodes hanedai* Tsuneki, 1983 : 35, figs. 38–40, ♂ (holotype: ♂, Japan, “Fukui Pref., Koike, 27.VIII.1975, leg. Y. Haneda,” MNHAH).  
Synonymy: Astafurova and Proshchalykin, 2014 : 509.

*Sphecodes baratonis* Tsuneki, 1983 : 34, figs. 34–37, ♂ (holotype: ♂, Japan, “Hokkaido, Barato in the suburbs of Sapporo, 17.IX.1956, leg. T. Nambu, MNHAH).  
Synonymy: Mitai and Tadauchi, 2013 : 31.

**Table 2.** Distinctive characters of the females of species of the *Sphecodes hyalinatus* group

Structure or character	<i>S. hyalinatus</i>	<i>S. tanoi</i>	<i>S. maruyamanus</i>	<i>S. murotai</i>	<i>S. ferruginatus</i>
Vertex (front view)	Not convex, not projecting beyond ocelli				Weakly convex, projecting beyond eyes
Hind femur	Convex in proximal half; its length 2.6–2.8 times its maximum width		Narrow, parallel-sided	Convex in proximal half; its length 2.6–2.9 times its maximum width	
Sculpture of ventral side of thorax	Fine, smoothened	Coarse but more delicate than that on sides		As coarse as that on sides	
Pygidium to hind basitarsus width ratio	0.8–0.9	0.8–0.9	0.8	1.0	0.7–0.9

*Sphecodes sudai* Tsuneki, 1983 : 38, figs. 47–49, ♂ (holotype: ♂, Japan, “Yamanashi Pref., Mt. Tennyozan, 23.VIII.1978, leg. H. Suda,” MNHAH). Synonymy: Mitai and Tadauchi, 2013 : 32.

*Sphecodes chibaensis* Tsuneki, 1984 : 8, figs. 13, 14, ♀ (holotype: ♀, Japan, “Chiba Pref., Sakura, Dyonai, 17.IV.1977, leg. H. Suda,” MNHAH). Synonymy: Mitai and Tadauchi, 2013 : 35.

*Sphecodes izumindus* Tsuneki 1986 : 45, ♀ (holotype: ♀, Japan, “Fukui Pref., Izumi-mura, Maezaki, 12.VII.1984, leg. Y. Haneda,” MNHAH). Synonymy: Mitai and Tadauchi, 2013 : 35.

**Distribution.** This species is widely distributed in the temperate zone of the Palaearctic Region but it is rare and occurs mainly in the mountains in the south of the range. Russia: as far to the north as Leningrad Province, as far to the east as the Kuril Islands; Europe (as far to the north as 66°N), the Caucasus, Turkey, Kazakhstan, Mongolia, Japan (Hokkaido, Honshu, and Shikoku islands).

**Material. Russia.** *Khabarovsk Territory*: 1 ♀, Beryozovka-Nekrasovka, VI.1930 (Prinada) (ZMMU); 1 ♀, Botchi River, Sikhote Alin, 31.VII.1914 (Emeljjanov) (ZMMU). *Primorskii Terr.*: 1 ♂, Khasanskii District, Vityaz, 8.IX.1982 (I.M. Kerzhner) (ZIN).

#### *Sphecodes hyalinatus* Hagens, 1882

*Sphecodes hyalinatus* Hagens, 1882 : 222, ♀, ♂ (syntypes: ♀♀, ♂♂, Germany).

**Distribution.** This species is widely distributed in the temperate zone of the Palaearctic Region, but it is rare and occurs mainly in the mountains in the south of the range. Russia: as far to the north as Murmansk Province, the Republic of Komi, and Magadan Prov-

ince; Europe (as far to the north as 68°N), the Transcaucasia, Kazakhstan.

**Material. Russia.** \**Kuril Islands*: 1 ♀, Kunashir Island, Yuzhno-Kurilsk, 25.VIII.1996 (A.S. Lelej) (CBEA).

#### *Sphecodes maruyamanus* Tsuneki, 1983

*Sphecodes maruyamanus* Tsuneki, 1983 : 46, figs. 73–75, 236–237, ♀, ♂ (holotype: ♀, Japan, “Hokkaido, Sapporo, Maruyama, 27.V.1973, leg. K. Tsuneki,” MNHAH).

*Sphecodes convergens* Tsuneki, 1983 : 64, figs. 258–260, ♀ (holotype: ♀, Japan, “Fukui Pref., Ohno-Arashi, 28.VI.1974, leg. T. Tano,” MNHAH). Synonymy: Mitai and Tadauchi, 2013 : 31.

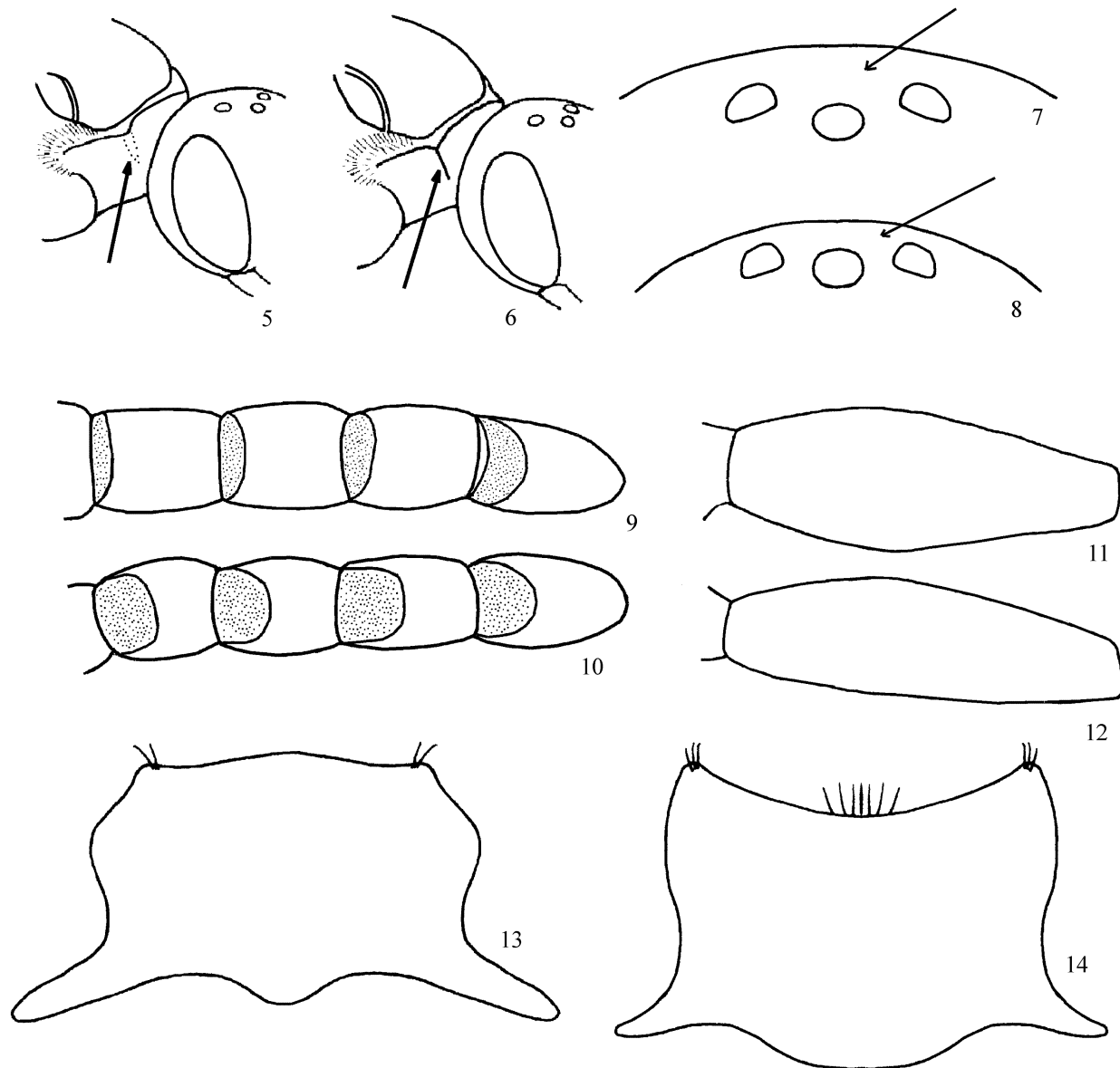
**Distribution.** \*Russia (Primorskii Territory); Japan (Hokkaido and Honshu islands).

**Material. Russia.** *Primorskii Terr.*: 1 ♂, Lazovskii Nature Reserve, 10 km SW of Sokolchi, 22 and 24.VII.1993 (S.A. Belokobylskij) (ZIN); 1 ♀, Lazovskii Nature Reserve, 15 km NE of Benevskii locality, 23.V.1980 (T.G. Romankova) (ZIN). **Japan:** *Honshu Island*: 1 ♂, Fukushima Pref., Hinoemata, 16.VIII.1999 (S.A. Belokobylskij) (ZIN); 1 ♀, Kamikoike, Ono-Shi, Fukui, 14.V.2002 (K. Mitai) [*S. maruyamanus* det. K. Mitai] (ELKU).

#### *Sphecodes murotai* Tsuneki, 1983

*Sphecodes murotai* Tsuneki, 1983 : 49, figs. 87–90, ♂ (holotype: ♂, Japan, “Hokkaido, Asahigawa, Arashiyama, 6.VIII.1977, leg. T. Murota,” MNHAH).

*Sphecodes akitanus* Tsuneki, 1983 : 52, figs. 91–93, ♂ (holotype: ♂, Japan, “Akita Pref., the Nyudoh Pro-



**Figs. 5–14.** *Sphecodes hyalinatus* Hagens species-group: (5, 7, 9, 11) *S. ferruginatus* Hagens, (6) *S. miniatus* Hagens, (8, 10, 14) *S. hyalinatus* Hagens, (12, 13) *S. maruyamanus* Tsuneki [(5, 6) pronotum, (7, 8) vertex of female, (9, 10) antenna of male, (11, 12) hind femur of female, (13, 14) S7 of male].

montry, 31.VII.1969, leg. Y. Haneda," MNHAH).  
Synonymy: Mitai and Tadauchi, 2013 : 42.

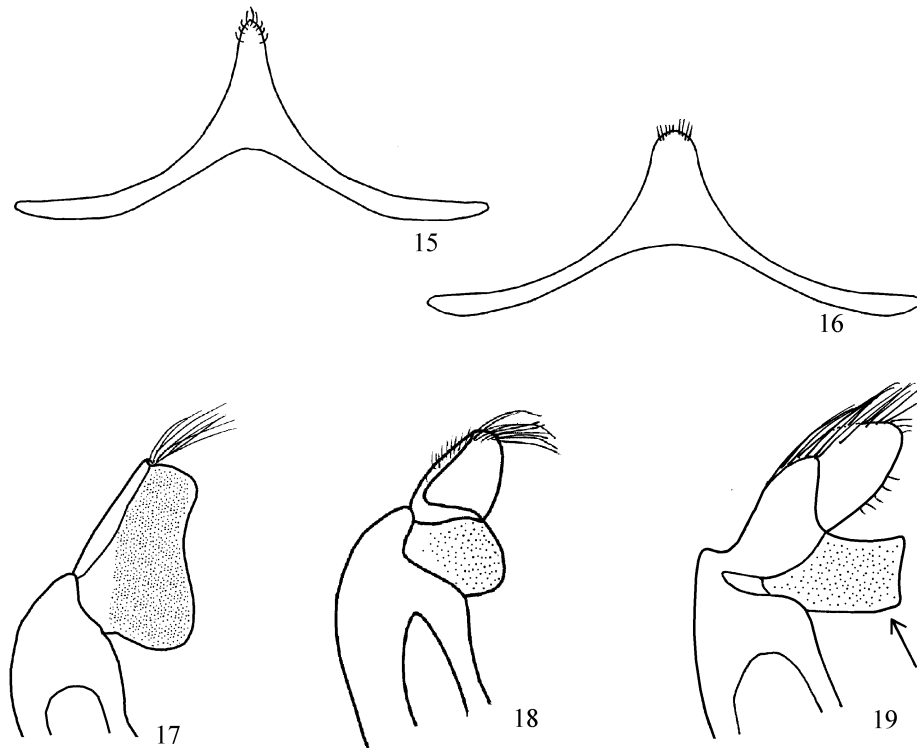
*Sphecodes kaiensis* Tsuneki, 1983 : 56, figs. 109–111, ♂ (holotype: ♂, Japan, "Yamanashi Pref., Hirokawara, 13.VIII.1969, leg. Y. Haneda," MNHAH).  
Synonymy: Mitai and Tadauchi, 2013 : 42.

*Sphecodes mutsuoides* Tsuneki, 1984 : 2, figs. 1, 2, ♂ (holotype: ♂, Japan, "Fukui Pref., Mt. Kyogatake, 17.IX.1982, leg. Y. Haneda," MNHAH).  
Synonymy: Mitai and Tadauchi, 2013 : 42.

*Sphecodes maetai* Tsuneki, 1984 : 5, figs. 10–12, ♂, ♀ (holotype: ♂, Japan, "Iwate Pref., Morioka City, Kuriyagawa, 7.VIII.1981, leg. Y. Maeta," MNHAH).  
Synonymy: Mitai and Tadauchi, 2013 : 42.

**Distribution.** \*Russia (Primorskii Territory); Japan (Honshu, Shikoku and Kyushu islands).

**Material.** **Russia.** *Primorskii Terr.:* 12 ♂, "Kedrovaya Pad" Nature Reserve, 10.VIII.1962 (L.V. Zimina) (ZMMU); 1 ♀, Lazovskii Nature Reserve, Amerika locality, 20.V.2001 (M. Quest) (CBEA).



**Figs. 15–19.** *Sphecodes hyalinatus* Hagens species-group, male: (15, 18) *S. hyalinatus* Hagens, (16) *S. tanoi* Tsuneki, (17) *S. ferruginatus* Hagens, (19) *S. maruyamanus* Tsuneki [(15, 16) S8, (17–19) gonostylus].

**Taxonomic note.** Tsuneki (1984) described *Sphecodes maetai* based on four females and four males taken from two nests of *Lasioglossum baleicum* (Cockerell) and noted a close morphological similarity of the females of this species to those of *S. okuyetsu* Tsuneki. After examination of the holotype (male), Mitai and Tadauchi (2013) reduced the name *S. maetai* to a synonym of *S. murotai* and identified the females from the type series as *S. okuyetsu*. Nevertheless, some facts call into question the validity of such identification of the females by Mitai and Tadauchi and support Tsuneki's viewpoint that they belong to *S. maetai*. First, they were found together with the males in a nest of one host. Second, the females of *S. okuyetsu* demonstrate a close morphological similarity to the females of the *S. hyalinatus* species-group, which could lead Mitai and Tadauchi into error. The absence of the females in the material of the Japanese researchers, whereas the males of *S. murotai* are abundantly present there, suggests that the females of *S. murotai* (= *S. maetai*) might be confused with females of *S. okuyetsu* or other species of the group. In addition, as noted by Mitai and Tadauchi (2013), Haneda in 1984, before the description of *S. maetai*, identified the females of the type series as *S. koikensis* Tsuneki (= *S. ferrugina-*

*tus*), i.e., as one of the species of the *S. hyalinatus* group. In addition to a series of males of *S. murotai* from Primorskiy Territory, we found a female belonging to the *S. hyalinatus* species-group but similar to *S. okuyetsu* in the shape of its rather wide pygidium; we attribute it to *S. murotai*.

#### *Sphecodes tanoi* Tsuneki, 1983

*Sphecodes tanoi* Tsuneki, 1983 : 49, figs. 79–85, ♂ (holotype: ♂, Japan, “Ishikawa Pref., Iwama Spa, at the foot of Mt. Haku, 25.VII.1959, leg. T. Tano,” MNHAH).

*Sphecodes coptis* Tsuneki, 1983 : 29, fig. 231, ♀ (holotype: ♀, Japan, “Fukui Pref., Koike, 26.VII.1973,” MNHAH). Synonymy: Astafurova and Proshchalykin, 2014 : 521.

*Sphecodes mutsu* Tsuneki, 1983 : 22, figs. 23–25, ♂ (holotype: ♂, Japan, “Aomori Pref., Towada, 22.IX.1957, leg. K. Simoyama,” MNHAH). Synonymy: Mitai and Tadauchi, 2013 : 75.

*Sphecodes fukuensis* Tsuneki, 1983 : 44, figs. 65–67, ♂ (holotype: ♂, Japan, “Fukui Pref., Tochinoki

Pass, Imajo, 11.VII.1981, leg. T. Murota," MNHAH).  
Synonymy: Mitai and Tadauchi, 2013 : 75.

*Sphecodes fudzi* Tsuneki, 1983 : 45, figs. 69, 70, ♂  
(holotype: ♂, Japan, "Yamanashi Pref., Mt. Fudzi,  
Narusawa, 19.IX.1980, leg. H. Suda," MNHAH). Syn-  
onymy: Mitai and Tadauchi, 2013 : 75.

*Sphecodes chichibuus* Tsuneki, 1984 : 46, figs. 80–  
82, ♂ (holotype: ♂, Japan, "Saitama Pref., Chichibu  
mountain region, Tochimoto Village, 16.VII.1960, leg.  
H. Nagase," MNHAH). Synonymy: Mitai and Ta-  
dauchi, 2013 : 75.

*Sphecodes kamafuse* Tsuneki, 1983 : 65, figs. 261–  
264, ♀ (holotype: ♀, Japan, "Amori Pref., Shimokita  
Peninsula, Ohminato, Mt. Kamafuse, 5.VI.1975,  
leg. K. Tsuneki," MNHAH). Synonymy: Mitai and  
Tadauchi, 2013 : 27.

*Sphecodes ohtsukius* Tsuneki, 1984 : 9, ♀ (holo-  
type: ♀, Japan, "Yamanashi Pref., Tomihama, Ohtsuki  
City, 23.IV.1979, leg. H. Suda," MNHAH). Synon-  
ymy: Mitai and Tadauchi, 2013 : 27.

*Sphecodes chichibuensis* Tsuneki, 1986 : 45,  
fig. 79, ♀ (holotype: ♀, Japan, "Saitama Pref., Chi-  
chibu Village, Tochimoto, 16.VII.1960, leg. H. Na-  
gase," coll. Nagase). Synonymy: Mitai and Tadauchi,  
2013 : 28.

**Distribution.** Russia (Primorskii Territory, Kun-  
ashir Island), Japan (Hokkaido, Honshu, and Kyushu  
islands).

**Material.** 32 spms. from Russia (Primorskii Terr.  
and Kunashir Island) and 3 spms. from Japan (Hok-  
kaido, Honshu, and Kyushu islands) (see Astafurova  
and Proshchalykin, 2014 : 521–522) were examined.

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*codes* for examination.

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