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## Records of Cleptoparasitic Bees from North Korea, with a Redescription of *Nomada shoyozana* Tsuneki, 1983

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**Abstract.** Collecting data are given for six species of the genus *Nomada* and two species of the genus *Epeolus* from North Korea. One of them, *Nomada shoyozana* Tsuneki, 1983, is recorded for the first time since the original description, therefore a redescription of this species is given with illustrations.

**Key words:** taxonomy, Hymenoptera, Cleptoparasitic, North Korea, *Nomada*, *Epeolus*, redescription.

The “cleptoparasitic bee” means solitary bees which do not build their own nests but enter nests of other bees for the purpose of laying their eggs. The first instars kill the host eggs or larvae immediately after hatch and feed pollen mass stored by the host females. However, the detail of cleptoparasitic behaviors, the host range, and the morphology of their larvae are unknown in many species.

Despite such interesting bionomics, the taxonomic study of the cleptoparasitic bee has not fully progressed about species from the middle to the eastern part of the Eurasia. Especially, North Korea is completely unknown about the cleptoparasitic bee fauna to the foreign entomologists because it is difficult to access for the purpose to collect scientific specimens.

We had an opportunity of examining some specimens of cleptoparasitic bees from North Korea, and identified them as members of two cosmopolitan cleptoparasitic genera, *Nomada* and *Epeolus*. Here we are going to report the collecting data of them, and give the redescription of *Nomada shoyozana* Tsuneki, 1983. All the specimens examined are deposited in the collections of Museum and Institute of Zoology of Polish Academy of Sciences in Warsaw.

### Genus *Nomada* Scopoli, 1774

#### 1. *Nomada esana* Tsuneki, 1973

*Specimens examined.* 2♂, “Onpho ad Chongjin” (probably Onpo, near Cheongjin, Hamgyeongbuk-do), 14. viii. 1959 (B. Pisarski and J. Prószyński); 1♂, the same locality, 20. viii. 1959 (the same collectors).

*Distribution.* Japan (Hokkaido, Honshu); North Korea.

*Remarks.* This species is originally described based on two females collected from Mt. Esan, Hokkaido, Japan, and later has been obtained in central Honshu, Japan (Mitai and Tadauchi, 2007). This is the first record from the Eurasian continent.

#### 2. *Nomada ginran* Tsuneki, 1973

*Specimen examined.* 1♀, “Prov. Phjöngan, na[?]do” (Sökam-Juvöndži, distr. Sunan), 21. v. 1965 (M. Mroczkowski and A. Riedel).

*Distribution.* Japan; Korean Peninsula (North and South Korea), Far East Russia (Primorsky).

*Remarks.* This species is widespread and common in Japan. Tsuneki (1986) and Mitai & Tadauchi (2007) already reported the occurrence of it in South Korea, and

Mitai had examined a female from Primorski Kray, Russia (unpublished data). This is the first record from North Korea.

### 3. *Nomada opaca* Alfken, 1913

*Specimen examined.* 1♀, Prov. Čhōngdžin-si (Przexecz Musan-Chōngdžin), 2. vi. 1965 (M. Mroczkowski and A. Riedel).

*Distribution.* Japan; North Korea, southern and central Europe.

*Remarks.* This species has hitherto been known from Europe (Alexander & Schwarz, 1994). This is the first record from eastern Asia.

### 4. *Nomada roberjeotiana aino* Tsuneki, 1973

*Specimens examined.* 1♀, “Onpho ad Chongjin” (probably Onpo, near Cheongjin, Hamgyeongbuk-do), 14. viii. 1959 (B. Pisarski and J. Prószyński); 1♀, “Pekdu-san, Samyjon” (probably Samjiyeon, Mt. Pekdu-san), 23. Og[?]. 1992 (A. Palaczyk).

*Distribution.* Japan; North Korea.

*Remarks.* This species is widespread from Europe to the Far East, Japan. The examined specimens from North Korea belong to the subspecies *roberjeotiana aino*, not to the nominated subspecies *roberjeotiana roberjeotiana* Panzer, 1799. The subspecies-level differences, however, is based on coloration of the body only, so that the sub-specific division is in need of revision based on much more specimens from various areas.

### 5. *Nomada sexfasciata* Panzer, 1799

*Specimens examined.* 2♂, Čhaju-riong, 700-900m, 9. vii. 1993 (E. Palik).

*Distribution.* Eurasia, north Africa.

*Remarks.* This is the first record from eastern Asia.

### 6. *Nomada shoyozana* Tsuneki, 1986

The present record of two specimens (female and male) is the first record after the original description which was based on a male from South Korea. We redescribe this species as follows. The morphological terms used in descriptions generally followed Alexander (1994) and Michener (2007).

The abbreviations used are as follows: CD, clypeocellar distance (distance from apicomedian margin of clypeus to apical margin of median ocellus); UID, upper interocular distance; LID, lower interocular distance;

OCD, ocelloccipital distance; LOD, lateral ocellar diameter.

#### Redescription.

##### Female (new to science).

*Color:* Head and mesosoma black with the following portions yellow: paraocular area below level of lower margin of antennal sockets, malar space, outer-basal surface of mandible, collar on the top except for medial portion, pronotal lobe, tegula except for blackish inner border and medial translucent spot, axilla, two maculae on scutellum. Antenna black posteriorly, somewhat paler anteriorly.

Metasoma black with the following portions yellow: a pair of small spots on lateral side of first tergum, a pair of transversely elongate, widely-separated maculae on each of second to fourth terga, band on fifth tergum; those maculae on second to fourth terga roughly same in shape; band on fifth tergum, which occupies almost fifth tergum except for black apical margin. Sterna without yellow portion. Pygidial plate dark brown apically; other portions not observable in the examined specimens.

Legs black with the following portions colored as follows: fore coxa at apex paler; mid and hind coxae at apex tinged with yellow; all femora brown on apical portions, all tibiae brown on outer surfaces with a yellow spot outer-basal surface of each tibia.

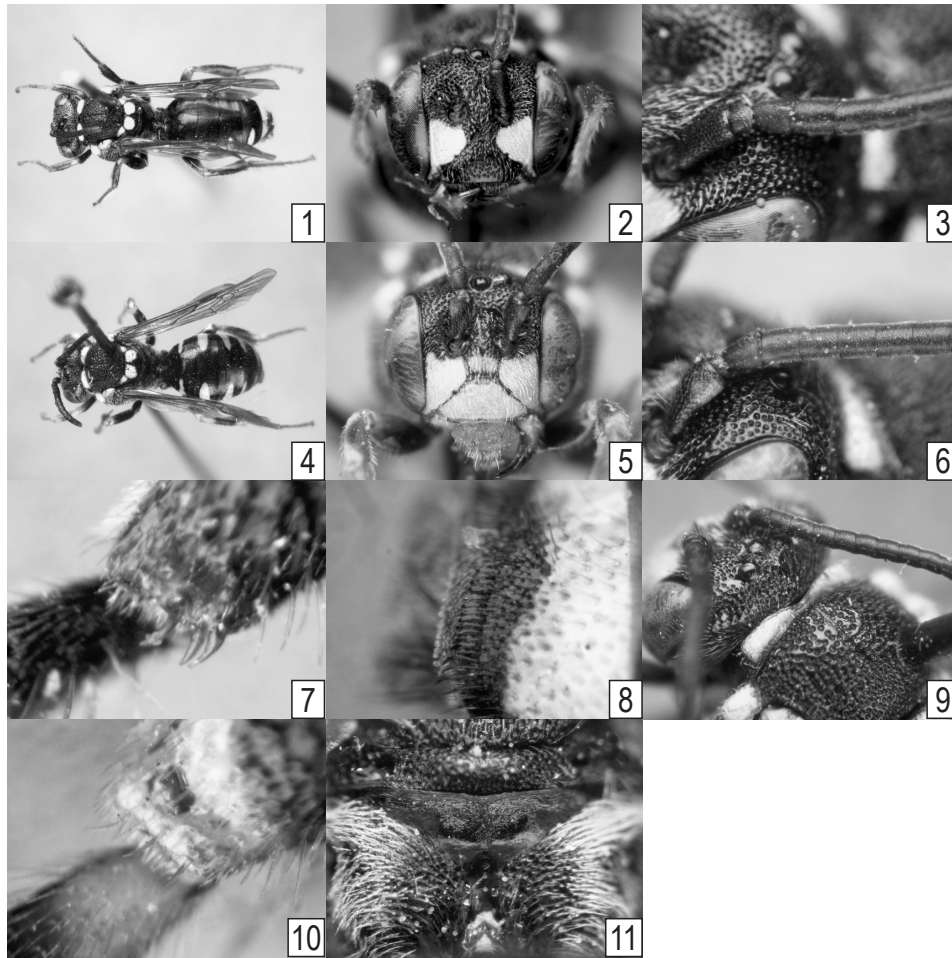
*Sculpture:* Punctures on labrum shallow, dense. Those on face evenly dense, separated at most by a puncture diameter, evidently larger and deeper than those on labrum.

Punctures on scutum, scutellum, mesopleuron deep and dense. Propodeum irregularly punctate except for propodeal triangle, the punctures below propodeal spiracle separated by several punctures widths; propodeal triangle transversely striate basally, tessellate below the striation, and smooth and polished apically.

Punctules on all terga distinct except for basal half of impunctate first tergum. Those on apical half of first tergum much sparser than those on second to fourth terga whose punctules are equal in density. Detail surface of pygidial plate not observable in the examined specimens.

*Vestiture:* Vestiture on labrum white, short and moderately dense, slightly longer apically. That on clypeus and supraclypeal area simple, short, appressed, sparse and thin, therefore indistinct. That on lower genal area near hypostoma plumose, sparser.

Vestiture on scutum and scutellum white to golden, short, sparse, nearly indiscernible in dorsal view. That on mesopleuron same as that on scutum. That on lateral sides of metanotum long, erect. That on posterolateral to



**Figs. 1-11.** *Nomada shoyozana* Tsuneki. 1-3, 7, 8, female; 4-6, 9-11, male. 1, 4, dorsal view; 2, 5, face; 3, 6, antenna; 7, 10, apicomedian setae on hind tibia; 8, pseudopygidium; 9, collar; 11, propodeal triangle.

dorsal surface of propodeum outside propodeal triangle not forming hair patch, weakly plumose, much longer than that on mesopleuron, appressed toward laterally on dorsal surface of propodeum, appressed downward on lateral side.

Vestiture on terga very short and sparse. Pseudopygidium well developed, silvery shining strongly, with a fringe of black and robust setae on the upper border of pseudopygidium; the setae are sharply pointed and upcurved at apex. That on pygidial plate not observable in the examined specimens.

*Structure:* Body length 7.5 mm. CD:UID:LID 50:50:47. OCD/LOD 2.0.

Interantennal elevation moderately raised and broadly flattened on top; a longitudinal distinct carina present on flattened portion. Inner eye margins nearly straight, weakly convergent below. Paraocular ridge distinct.

Preoccipital ridge distinctly carinated. Clypeus highly raised, but weakly produced anteriorly; apicolateral margin distinctly turn up, connecting with paraocular ridge. Labrum of the examined specimen largely covered with closed mandibles and extracted mouthparts, but small labral tooth recognized subapically. Mandible largely covered with extracted mouthparts, therefore, not observable. Scape considerably compressed anteroposteriorly, narrower basally. Relative length of first to third flagellar segments 1:1:1 (1:0.95:0.95 when strictly measured), relative length to apical width of first segment 1.1, second 1.2, third 1.3 times.

Pronotum with lateral keeled ridge on lateral side; apicolateral margin not observable. Collar highly raised, distinctly notched medially. Scutellum roundly and highly raised; median furrow deep. Hypoepimeral area shallowly convex. Area around propodeal spiracle flat without

ridge.

Fore femur moderately built. Procoxal spine distinct, acute at apex. Apicomedian setae on hind tibia four in number, brown to pale brown, short; posteriormost setae thin and straight; other setae shorter and robust anteriorly; their arrangement variable, spaced evenly in left tibia and irregularly in right tibia. Hind basitarsus relatively wide for *Nomada* female without ridge on posterior surface. Pygidial plate widely rounded and not emarginated at apex.

#### Male.

**Color:** Head black with the following portions yellow: lower half of face below lower margin of antennal socket except for black lines along subantennal and epistomal sutures, malar space, labrum, basal half of mandible. Antenna as female except for dim yellow portion on apicolateral surface of scape.

Mesosoma as in female.

Metasoma similar in color pattern to that of female, but fifth tergum similar to fourth in color, sixth tergum with simple yellow band.

Legs roughly similar to that of female but yellow portions more developed as follows: apical portions of all coxae, outer surface of fore tibia largely, apical portions of mid and hind tibiae yellow.

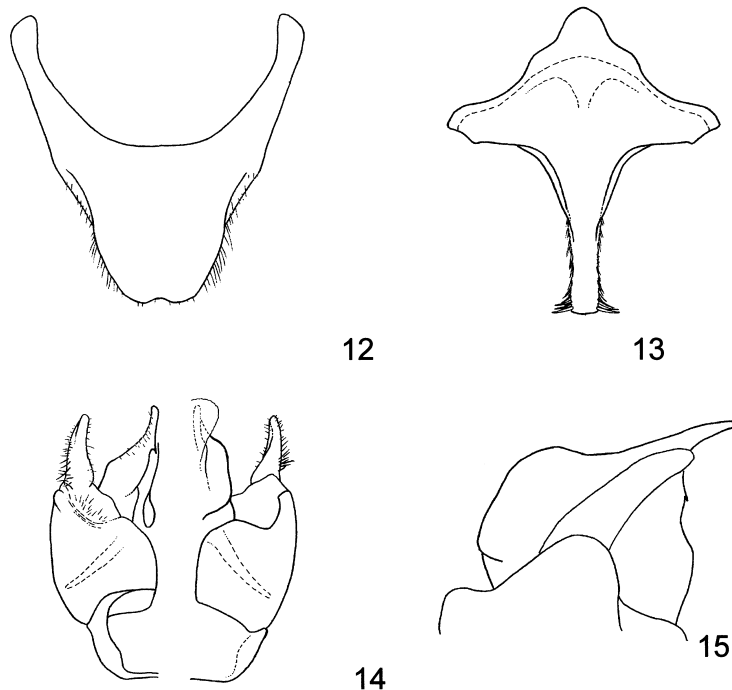
**Sculpture:** As in female.

**Vestiture:** Vestiture in generally similar to that in female except as follows: that on face somewhat denser; procoxal spine covered with short, plumose dense hairs; that on ventral surface of hind femur sparse, short hairs which distinctly longer than those of female.

**Structure:** Body length 7.5–8.0 mm (7.5 mm in Holotype). CD:UID:LID 50:53:47. OCD/LOD 2.5.

Different from female in the following aspects: scape similar in shape to that in female, but evidently wider; relative length of first to third flagellar segments 1:1:0.9, relative length to apical width of first flagellar segment 1.0, second 1.2, third 1.2 times; tyloidea discernible as step-like boundary between anterior and posterior surfaces, all connected to appear a thin ridge from second flagellar segment to ultimate segment; procoxal spine as in female but densely covered with plumose hairs; apicomedian setae on hind tibia two to three in number, transparent or pale brown, short, much thinner than in female, evenly well-spaced; hind femur strongly dilated; basoventral surface not flattened; pygidial plate not emarginated at apex.

Male terminalia (Figs. 12–14: metasomal seventh sternum as in Fig. 12, eighth sternum as in Fig. 13, Gonostylus flattened apically, roughly cylindrical in



**Figs. 12–15.** Male terminalia of *Nomada shoyozana* Tsuneki. 12, 7th sternum, ventral view; 13, 8th sternum, dorsal view; 14, genital capsule (left, ventral view; right, dorsal view); 15, penis valve and gonostylus, lateral view (vestiture on gonostylus omitted).



lateral view; vestiture very short, sparse, simple; that on basal portion of gonostylus rather thicker than that on apical portion; basoventral lobe absent but sparse vestiture present on the correspond portion. Penis valve strongly narrowed apically, produced posteriorly beyond gonostylus; apex extending beyond apex of gonostylus in lateral view (Fig. 15); ventral hook present. Dorsal invagination and inner dorsal lobe of gonocoxite indistinct.

**Distribution.** Korean Peninsula (North and South Korea).

**Specimens examined.** Holotype (Museum of Nature and Human Activities, Sanda, Japan), ♂, attached three labels as follows: “Shoyozan (in Chinese characters)/ 1942./ ix. 3. (white rectangular with handwritten letters)”, “Nomada/ shoyozana/ Tsuneki ♂/ HOLOTYPE (red rectangular with handwritten letters)”.

Other specimens: 1♀1♂, Pyongyang, North Korea, 12. ix. 1959, B. Pisarski.

**Biology.** It is a rare, univoltine species, collected from early to mid September.

**Remarks.** This species is very similar in structure and color to *Nomada yanoi* Tsuneki, 1973 although Tsuneki (1986), in the original description of *N. shoyozana*, made no comments on the similarity with *N. yanoi*. This species can be separated from *N. yanoi* by the smaller body size, the widely flattened portion of interantennal elevation, and the thicker collar. Other diagnostic characters may be the sparser punctures on the thorax and abdomen and bright yellow portion on the clypeus and supraclypeal area, although those characteristics might vary intraspecifically.

## Genus *Epeolus* Latreille, 1802

### 1. *Epeolus coreanus* Yasumatsu, 1933

**Specimen examined.** 1♂, “Ora 19 km NW [?]amnyang” (probably Oro, a small village near Hamheung, Hamgyeongbuk-do), 15. ix. 1966 (H. Szelegiewicz and C. Dziadosz).

**Distribution.** Japan (Honshu, Kyushu); Korean Peninsula (North and South Korea), Sakhalin.

### 2. *Epeolus tarsalis himukanus* Hirashima, 1955

**Specimens examined.** 1♂, Choŋgdžin, 12. ix. 1966 (H. Szelegiewicz and C. Dziadosz); 1♂, “Pekdu-san, Samyjon” (probably Samijiyeon, Mt. Pekdu-san), 23. Og[?]. 1992 (A. Palaczyk).

**Distribution.** Japan (Honshu, Kyushu); North Korea.

**Remarks.** Bischoff (1930) revised the Palaearctic species of the genus *Epeolus*, and he placed the species with characteristic structure of the interantennal elevation in *sibiricus* group. Later, van Lith (1956) made taxonomic notes on this group under the name of *tarsalis* group. However, the definitions of species or subspecies in this group are based on their punctuation or color on the body, which are often variable intraspecifically. We were able to compare the specimens reported here with the holotype of *Epeolus himukanus* (= *E. tarsalis hinumanus*) which had been collected only from Japan hitherto, and concluded that they should belong to the same subspecies. This is the first record of this subspecies from the Eurasian Continent.

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