

Craniophora minuscula **sp. n.**, a new species of the genus *Craniophora* Snellen, 1867
(Lepidoptera: Noctuidae: Acronictinae) from Japan

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Abstract

In the present study, a new species of *Craniophora* Snellen, 1867, *C. minuscula* **sp. n.**, is described as new to science from Japan, during course of the investigations on the *Craniophora pontica*-group. The external and genitalia morphology of both sexes is provided including the discrimination of the new species from the closely allied congeners.

Keywords

Craniophora pontica-group; taxonomy; new species; genitalia morphology

INTRODUCTION

The genus *Craniophora* Snellen, 1867 belongs to the noctuid subfamily Acronictinae, comprising more than 20 described species (Hampson 1909, Kozhanchikov 1950, Draudt 1950, Poole 1989) occurring in the Palearctic, Indo-Malayan, Australian and Afrotropical Realms (Poole 1989, Fibiger et al. 2009).

The taxa of the genus can be arranged, according to the external and genital features, to a number of monophyletic species-groups. However, the taxonomic rank of them is still disputed. One of them is the very compact lineage containing *C. pontica* (Staudinger, 1878) and its closest relatives. Most of the species of the *pontica* species-group are very similar externally. This similarity resulted in a remarkable confusion in their taxonomic interpretation and the delimitation of their distribution patterns. For instance, *C. pacifica* Filipjev, 1927 was often confused with *Cranionycta albonigra* (Herz, 1904) and *Narcotica niveosparsa* (Matsumura, 1926) (Han and Kononenko 2010). Recently, Han and Kononenko (2010) clarified the existence of a cryptic species, *C. draudti* Han and Kononenko, 2010, related to *C. taipaishana* Draudt, 1950, *C. simillima* Draudt, 1950 and *C. pacifica*.

The detailed study of the members of the *pontica*-group has shown that the Japanese specimens identified formerly as *Craniophora 'pacifica'* (Sugi 1982, Eda and Yanagita 2011) represent a distinct, hitherto undescribed species, *Craniophora minuscula* **sp. n.** This new species is very similar externally to *C. pacifica*, but is smaller in size and displays diagnostic features in the genitalia of both sexes.

Present paper contains the description of the new species, comparing it with all known members of the *C. pontica* species-group.

MATERIAL AND METHODS

The type specimens are deposited in the collection of Tomakomai Experimental Forest of Hokkaido University, Tomakomai, Hokkaido, Japan (TOEF), National Museum of Nature and Science, Tsukuba, Japan (NSMT) and the private collection of Seiji Miyake, Japan (SMC). The other examined and figured specimens of the *C. pontica*-group are preserved in the collections of the Hungarian Natural History Museum, Budapest, Hungary (HNHM); Museum of Natural History, Vienna, Austria (NHMW); Zoological Museum, University of Copenhagen, Denmark (ZMUC); Zoologische Staatssammlung München, Germany (ZSM); Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany (ZFMK). The habitus pictures of the adults were taken with Canon EOS 550D with Tamron AF 90mm F2.8 Di Macro 1:1 SP. The genital dissections are made by a slightly modified technique published by Robinson (1976). 15% potassium hydroxide (KOH) was used to macerate the full abdomen. Eosin dye was used to stain the weakly sclerotized structures. After dehydrating in 96 % ethanol, the genital apparatus with the abdominal segments was mounted to Euparal. The photos of the slides were taken by an Olympus DP70 digital microscope camera connected with an Olympus SZX12 zoom stereo microscope.

TAXONOMIC ACCOUNTS

The genus *Craniophora* comprises species of small to medium-sized moths (wingspan 27-42 mm) with relatively wide, grey or greyish-brownish coloured forewing. The main wing pattern is formed by wavy lines and/or prominent basal streak. On the hind wings, the tornal patch is usually visible. In the male genitalia, the valvae are wide, weakly sclerotized, lobe-like, rounded, in some species with corona or tilted on the apex. Androconial brushes can be found on the base of sacculus formed by tuft of dense long hairs.

The *C. pontica* species-group consists of six species, five of them are described as *Craniophora pontica*, *C. draudti*, *C. pacifica*, *C. simillima* and *C. taipaihana*. These are the smallest species of the genus with the wingspan 27-34 mm. The shared external features of the species group are the greyish-brownish ground colour of the forewing, the prominent median fascia, the moderate basal streak and the presence of the white dash at the end of Cu₂ vein. Hindwings of the males are brownish (*draudti*), white (*taipaihana*) with blackish-brownish marginal band (*minuscula*, *pacifica*, *pontica*) or suffused with brownish scales (*simillima*), in females they are brownish or whitish with stronger blackish-brownish marginal band (*pontica*).

In the male genitalia, valvae are wide, lobe-like, rounded or a little elongated (*pontica*) without corona, the vesica is short (*simillima*), medium-long (*minuscula*) or extremely long with one full loop, with numerous small, spinulose structures on its surface. In the female genitalia, ductus bursae is long, anteriorly curved, with an additional arch at the junction to corpus bursae (*draudti*, *pacifica*, *pontica*), corpus bursae and appendix bursae are fused into a common, partly coiled structure. This structure is rather simple,

recurved (*draudti*, *minuscula*, *pontica*, *simillima*) or helicoidal (*pacifica*, *taipaishana*) in which the appendix bursae is a large, more sophisticated part, being terminated in ductus seminalis.

The members of the group are mainly distributed in the Manchurian-Pacific territory, except *C. pontica*, which has a western Palearctic (Holo-Mediterranean) distribution.

Craniophora minuscula **sp. n.**

(Figs 1, 2, 8, 9, 15, 16, 27, 33)

Craniophora pacifica: Sugi 1982, **1**: 681, **2**: 347, pl. 197, figs 18, 19; Eda and Yanagita 2011, 302, pl. 2-072, figs 22, 23 (nec Filipjev, 1927).

Type. Holotype: Male, JAPAN, HOKKAIDO, Mukawa Town, Hobetsu, Fukuyama (Japanese letter), 22.06.1997; slide No.: KA1174m (coll. TOEF). LSID: 99399438-0C79-456E-8CB6-7A852D942F19.

Paratypes: JAPAN, HOKKAIDO: 1 male, Rikubetsu Town, Kunbetsu, 30.05.1998, leg. H. Kogi; slide No. KA1172m (coll. TOEF); 1 male, Hamanaka Town, Kiritappu (Japanese letter), 04.08.1989; slide No.: KA1173m (coll. TOEF); 1 female, Nemuro City, Konbumori (Japanese letter), 03.08.1989; slide No.: KA1175f (coll. TOEF); 1 male, 1 female, Kushiro, Shibeche, Fututsuyama, 12.08.1978, leg. K. Ijima; slide No.: KA946f (coll. NSMT); 02.08.1989, leg. K. Ijima; slide No.: KA1176f (coll. TOEF); 1 male, Gojikkoku, Shibeche, 01.08.1978, leg. Y. Kishida (coll. NSMT); 1 male, Nokanan, Ashibetsu, 15.08.1993, leg. H. Kobayashi (coll. NSMT); 5 males, Ashibetsu, 15.08.1993, leg. M. Owada; slide Nos.: KA942m, KA943m, KA944m (coll. NSMT); 1

male, 1 female Sharigun, Koshimizucho, 30.07.1978, leg. Y. Kishida; slide No.: KA945m (coll. NSMT); HONSHU: 1 male, 1 female, Okayama, Takahasi, Iwayakei, alt. 230 m, 30.05.2009; slide No.: KA1177m (coll. SMC); 13.06.2009; slide No.: KA1178f (coll. SMC).

Diagnosis. *Craniophora minuscula* externally resembles *C. pacifica* (Figs 3, 10), *C. taipaihana* (Figs 4, 11), *C. draudti* (Figs 5, 12), *C. simillima* (Figs 6, 13) and *C. pontica* (Figs 7, 14). Due to the high similarity, reliable separation of the six taxa could require the study of genitalia, although *C. minuscula* exhibits some unique external characters: smaller size (wingspan of 24-32 mm compared to 28-32 mm in *C. pacifica*, 30-33 mm in *C. taipaihana*, 30-32 mm in *C. draudti*, 30-32 mm in *C. simillima* and 27-33 mm in *C. pontica*), brownish-greyish ground colour of forewing with slightly stronger rosy-tint brilliance, the narrower, smaller hook-like white dash on Cu₂ vein, the crenulated postmedial line on M₁, M₃ and Cu₁ veins, the somewhat elongated hindwing. Its relatives have more brownish ground colour of forewing however *C. pacifica* could have greyish ground colour.

Craniophora pacifica differs from *C. minuscula* by its larger size; the somewhat broader, angled forewing; the weaker basal dash; the evenly darker, double antemedial line; the slightly contrasty, double medial line at costal margin; the less crenulated postmedial line; the more or less evenly darker medial field; the more irregular orbicular macule; the somewhat indistinct claviform spot; the rather comma-like white dash; the rounded whitish hindwing with evenly broader brownish or blackish terminal band ended over the tornal patch and paler postdiscal line; in females, the somewhat darker brown hindwing with slightly more visible postdiscal line.

Craniophora taipaihana can be distinguished from the new species by its larger size; broader, angled forewing with brown ground colour; the somewhat weaker basal dash; the slightly contrasting, double antemedial line; the less crenulated postmedial line; the evenly darker medial field; the more or less rounded orbicular macule; the indistinct claviform and reniform spot; the longer and rather comma-like white dash; the rounded, almost pure white hindwing suffused with few brownish scales in the terminal area near to the veins and with a hardly visible or absent postdiscal line; in females; the somewhat evenly lighter brown hindwing.

Craniophora draudti differs from *C. minuscula* by its somewhat broader, angled and more uniform, brownish forewing; the somewhat weaker basal dash; the more regular antemedial line; the somewhat contrasty postmedial line; the more conspicuous white patch in the medial field at the ventral margin; more irregular orbicular macule; the less visible claviform spot; the slightly smaller, rather comma-like white dash; the slightly angled brown hindwing with weakly visible postdiscal line; in females, the somewhat triangular hindwing.

Craniophora simillima has more brownish forewing with slightly contrasty patterns; somewhat zigzagged, contrasty medial line; less crenulated postmedial line; more indistinct claviform and reniform spot; smaller, less hook-like white dash; slightly rounded whitish hindwing with fine brownish tint in terminal band; paler postdiscal line; faint discal spot; in females, lighter brown hindwing slightly darker the terminal band.

Craniophora pontica differs from all the other congeners by its more colourful forewing; the slightly more visible reniform spot filled with ochre scales; the hardly visible or absent small white dash; the more crenulated postmedial line; the diffuse

terminal band and medial line of the whitish hindwing; in females, the whitish hindwing with diffuse brown scales in the terminal band.

Male genitalia. (Figs 15, 16). The close relationship with *C. pacifica* (Figs 23, 24), *C. taipaishana* (Figs 25, 26), *C. draudti* (Figs 17, 18) and with a lesser degree to *C. simillima* (Figs 21, 22) and *C. pontica* (Figs 19, 20) is evident, however, the differences are very conspicuous. The clasping apparatus of *C. minuscula* (Fig 15) differs from those of *C. pacifica* (Fig 24) and *C. taipaishana* (Fig 26) by its smaller size and the more rounded shape of the valvae. It can be distinguished from those of *C. draudti* (Fig 17) and *C. simillima* (Fig 21) by its more slender uncus and somewhat rounded shape of the valvae. *Craniophora pontica* (Fig 19) has shorter uncus, slightly narrower and elongated valvae than its congeners. The valvae in the *pontica* species-group show some variation in more rounded vs. elongate shape but this variation may be constant within the given species. *Craniophora minuscula* (Fig 16) has shorter vesica than *C. pacifica* (Fig 23), *C. taipaishana* (Fig 25) and *C. draudti* (Fig 18). The proximal curve of vesica is turned upwards from right to left and in the latter three species forming a full loop in dorsal position. On the surface of the proximal curve, *C. draudti* and *C. taipaishana* have one patch of numerous small, spine-like cornuti, *C. minuscula* and *C. pacifica* have two patches of them. *Craniophora minuscula* differs from *C. simillima* (Fig 22) by its larger aedeagus, much longer, curved vesica, with two separated patches on its surface covered by numerous small, spine-like cornuti. *Craniophora pontica* (Fig 20) can be distinguished from all the other relatives by its somewhat complicated structure of the vesica. The full loop is in ventral position and its surface is covered by numerous small, spine-like cornuti.

Female genitalia. (Fig 27). *Craniophora minuscula* can be distinguished from *C. pacifica* (Fig 28) and *C. taipaishana* (Fig 29) by its shorter ductus bursae; simpler appendix-corporis bursae complex with one half curve at its distal part. The new species differs from *C. pontica* (Fig 32) by its shorter ductus bursae without additional arch at the junction to corporis bursae; broader and shorter appendix-corporis bursae; from *C. draudti* (Fig 30) and *C. simillima* (Fig 31) by the orientation of ductus bursae-corporis bursae junction; simpler structure of appendix-corporis bursae complex and expressed half curve at its distal part.

Male abdomen. The eighth abdominal segments (Fig 33) show the close relationship of the above mentioned species. The bell-shaped tergite is widening by sections in *C. minuscula*, *C. pacifica* (Fig 34), *C. taipaishana* (Fig 35) and *C. simillima* (Fig 37), but gradually in *C. draudti* (Fig 36) and *C. pontica* (Fig 38). Its distal end is much broader in *C. taipaishana* and *C. simillima*. *Craniophora minuscula* has more oval “window” in the tergite than in *C. pacifica*, more regular than in *C. taipaishana*, *C. draudti* and *C. pontica* and longer than in *C. simillima*. The proximal section of the sternite is usually arcuate with exception of *C. pacifica*. The two lateral sections of the sternite are widening gradually in *C. minuscula* but they are more parallel in all other species.

Description. Male (Figs 1, 2). Wingspan 24-28 mm (forewing 12-13 mm). Head, thorax and forewing greyish with blackish, brownish scales, the latter with rosy-tint brilliance. Abdomen light brownish with three blackish hair brushes dorsally. Forewing narrow and short with obtuse apex; costa finely curved. Wing pattern clearly visible, basal line indistinct; antemedial line double, the outer line more contrasty and abrupt irregularly; medial line contrasty; postmedial line double, contrasty, crenulated at the

M1, M3 and Cu1 veins; subterminal line indistinct; terminal line traceable by black dots. Medial field lighter and filled with ground colour. Orbicular macule small or medium sized, light brownish with white and black outlines; reniform spot relative large, indistinctly outlined, inner part darker; claviform spot reduced, faint; on Cu2 vein with narrow, hook-like white dash. Hindwing whitish, elongated, terminal band brownish; postdiscal line diffuse, faint; discal spot pale. Female (Figs 8, 9). Wingspan 28-32 mm (forewing 13-15 mm). As male but somewhat larger in size, with brownish hindwing.

Male genitalia (Figs 15, 16). Clasp apparatus weakly sclerotized; uncus strong, long, with hairy and pointed tip; scaphium developed, moderately sclerotized, juxta subdeltoidal with wider basal plate and long triangular dorsal extension. Valvae symmetrical, weakly sclerotized, rounded; sacculus expressed with tuft of dense hairs; harpe reduced, substituted by oblique medial sclerite; ventral margin of the valvae weakly sclerotized. Aedeagus cylindrical. Vesica tubular, everted forward, recurved ventrally upwards from right to left and continued in a full loop turned upwards at right side from right to left; proximal curve covered with spinulose structures; distal third of vesica covered by small spinules.

Female genitalia (Fig 27). Ovipositor rounded shaped, as long as wide, tapering; papillae anales weakly sclerotized, oval, densely hairy; apophyses anterioris longer or equal long as apophyses posterioris. Ostium bursae moderately wide, dorsal plate weakly sclerotized, plate-like. Antrum short, hardly sclerotized. Ductus bursae medium long, tubular, dorso-lateral curved; sclerotized crests running evenly to apical part of corpus bursae. Corpus bursae reduced, fused with the large appendix bursae. Appendix-corporis bursae complex rather simple, tubular, recurved, distally with a loop.

Male abdomen. Eighth abdominal segments (Fig 33) with sclerotized structures; tergite “bell-like”, with two symmetrical bars; distal half more sclerotized; middle section without sclerotization, strongly oval; sternite moderately sclerotized with two curved bars, connected by a rather straight cross-bar proximally; distal part triangular, broadened; middle section without sclerotization, moderately oval and rounded.

Etymology. The name refers to its smallest body size in the genus *Craniophora*.

Bionomics and distribution. According to the relevant literature (Sugi 1982, Uno 1986, Tanaka and Umetsu 1994, Sasaki 1999, Eda and Yanagita 2011) and the collecting data, the adults are on the wing from May to September, in two generations. The larvae feed on *Ligustrum obtusifolium* (Oleaceae) (Sasaki 1999, originally referring to *C. pacifica*) and maybe also on closely related plant species in north-eastern Hokkaido where *L. obtusifolium* is not distributed. The new species is endemic to Japan, occurring only in Hokkaido and Honshu. In Hokkaido, the new species is widely distributed (Sugi 1982), but in Honshu only known from Sodeyama, Iwate Prefecture (Saito 1981), Togakushiyama, Nagano Prefecture (Sugiyama 1989, Tanaka and Umetsu 1994) and Hiroshima and Okayama Prefectures (Uno 1986).

Notes. The southernmost population (Uno 1986) differs from the other populations by its more uniform and darker ground colour of forewing and somewhat bigger size in average but without any distinctive character.

ACKNOWLEDGEMENTS

We would like to thank T. Hiura (TOEF) and S. Miyake (Okayama, Japan) for providing additional type materials, Zs. Bálint, L. Ronkay (HNHM), S. Gaal-Haszler (NHMW), A. Hausmann (ZSM), O. Karsholt (ZMUC), D. Stüning (ZFMK) for loaning materials, Zs. Bálint (HNHM) for allowing the use of photomicroscope to digitalize the slides, T. Fukuda (University of Tokyo) for information on host plants, and Z. Varga (Debrecen, Hungary) and L. Ronkay (HNHM) for their valuable suggestions and for checking the manuscript.

The paper was partially supported by the **SROP-4.2.2B-15/1/KONV-2015-0001** project. The project has been supported by the European Union, co-financed by the European Social Fund.

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Figure legends

Figures 1–7 *Craniophora* spp. male adults **1** *C. minuscula*, holotype, Japan, Hokkaido, Mukawa Town, Hobetsu, Fukuyama, slide No.: KA1174m, coll. TOEF **2** *C. minuscula*, paratype, Japan, Honshu, Okayama Pref., Takahashi City, Bicchuu, Fuka, Iwayakei, slide No.: KA1177m, coll. SMC **3** *C. pacifica*, Russia, Far East, Pogradichny, slide No.: KA826m, coll. HNHM **4** *C. taipaihana*, China, Shaanxi, Taibaishan [Tapaishan], slide No.: KA671m, coll. ZFMK **5** *C. draudti*, China, Hubei, Wudang-Shan Mts., slide No.: KA505m, coll. HNHM **6** *C. simillima*, China, Yunnan, Lijiang [Likiang], slide No.: KA676m, coll. ZFMK **7** *C. pontica*, Turkey, Malatya-Tecde, slide No.: MV 18 788, coll. NHMW. Scale bar, 10 mm.

Figures 8–14 *Craniophora* spp. female adults **8** *C. minuscula*, paratype, Japan, Hokkaido, Kushiro, Shibeche, Fututsuyama, slide No.: KA1176f, coll. TOEF **9** *C. minuscula*, paratype, Japan, Honshu, Okayama Pref., Takahashi, Bicchuu, Fuka, Iwayakei, slide No.: KA1178f, coll. SMC **10** *C. pacifica*, China, Liaoning, Baishilazi Nature Reserve, slide No.: KA1048f, coll. HNHM **11** *C. taipaihana*, China, Shaanxi, Taibaishan [Tapaishan], slide No.: KA670f, coll. ZFMK **12** *C. draudti*, China, Yunnan, Lijiang [Likiang], slide No.: KA685f, coll. ZFMK **13** *C. simillima*, China, Yunnan, Lijiang [Likiang], slide No.: KA971f, coll. ZSM **14** *C. pontica*, Turkey, Malatya-Tecde, slide No.: MV 18 789, coll. NHMW. Scale bar, 10 mm.

Figures 15–22 *Craniophora* spp. male genitalia **15–16** *C. minuscula*, paratype, Japan, Hokkaido, Ashibetsu, slide No.: KA944m, coll. NSMT **15** valvae **16** aedeagus. **17–18**

C. draudti, China, Hubei, Wudang-shan Mts., slide No.: KA507m, coll. HNHM **17** valvae **18** aedeagus. **19–20** *C. pontica*, Turkey, Kizilcahaman, slide No.: KA900m coll. ZMUC **19** valvae **20** aedeagus. **21–22** *C. simillima*, China, Yunnan, A-tun-tse, slide No.: KA674m, coll. ZFMK **21** valvae **22** aedeagus. Scale bar, 1 mm.

Figures 23–26 *Craniophora* spp. male genitalia **23–24** *C. pacifica*, Russia, Far East, Razdelnoje, slide No.: KA503m, coll. HNHM **23** aedeagus **24** valvae. **25–26** *C. taipaiashana*, China, Shaanxi, Taibaishan [Tapaishan], slide No.: KA671m, coll. ZFMK **25** aedeagus **26** valvae. Scale bar, 1 mm.

Figures 27–32 *Craniophora* spp. female genitalia **27** *C. minuscula*, paratype, Japan, Hokkaido, Kushiro, Shibeche, Fututsuyama, slide No.: KA946f, coll. NSMT **28** *C. draudti*, China, Yunnan, Lijiang [Likiang], slide No.: KA685f, coll. ZFMK **29** *C. simillima*, China, Yunnan, Lijiang [Likiang], slide No.: KA971f, coll. ZSM **30** *C. pacifica*, China, Liaoning, Baishilazi Nature Reserve, slide No.: KA1048f, coll. HNHM **31** *C. taipaiashana*, China, Shaanxi, Taibaishan [Tapaishan], slide No.: KA670f, coll. ZFMK **32** *C. pontica*, Turkey, Kizilcahaman, slide No.: MV 18 669, coll. NHMW. Scale bar, 1 mm.

Figures 33–38 *Craniophora* spp. male 8th abdominal segments **33** *C. minuscula*, holotype, Japan, Hokkaido, Ashibetsu, slide No.: KA944m, coll. NSMT **34** *C. pacifica*, Russia, Far East, Pogranichny, slide No.: KA826m, coll. HNHM **35** *C. taipaiashana*, male, China, Shanxi, Mianshan [Mienshan], slide No.: KA669m, coll. ZFMK **36** *C. draudti*, paratype, China, Shaanxi, Taibaishan [Tapaishan], slide No.: KA689m, coll.

ZFMK **37** *C. simillima*, China, Yunnan, A-tun-tse, slide No.: KA674m, coll. ZFMK **38**
C. pontica, Turkey, Kizilcahaman, slide No.: KA900m, coll. ZMUC. Left side sternite,
right side tergite. Scale bar, 1 mm.