Two new species of *Goniophyto* from Honshu, Japan (Diptera: Sarcophagidae)

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Abstract: Two new species of flesh flies, *Goniophyto kakinumai* sp. nov. and *G. ubeensis* sp. nov. are described and keyed. Male genitalia and head profiles are illustrated for a practical identification.

Key words: *Goniophyto*, new species, flesh fly, Sarcophagidae, Japan

INTRODUCTION

Through the courtesy of Mr. Susumu Kakinuma, I had an opportunity to examine a number of his sarcophagid specimens collected in Ube City, Yamaguchi Pref., Honshu, Japan. Among them, I found several specimens of unknown species of the genus *Goniophyto* (Diptera: Sarcophagidae). After examined enough number of specimens, I was able to distinguish two new species among these specimens. One of them has very similar features showing affinity to the previously known species, *Goniophyto shanghaiensis* Deng, Chen & Fan, 2007 and another to *G. horii* Kurahashi & Suenaga, 1994. However, two new species differ from the previous ones in parafacials largely setulosed. Descriptions and illustrations of these new species are given hereinafter. The previous key to the four Japanese species (Kurahashi and Suenaga, 1994) is revised to include the new species.

Key to the species of *Goniophyto* from Japan

1. Parafacial largely setulose on entire length (Fig. 1); median marginal bristles (*mb*) on tergite 3 weakly developed, the length less than 1/2 of those on tergite 4 in ♀....2
- Parafacial setulose on only limited area of upper part; median *mb* on tergite 3 well developed, the length usually more than 1/2 of those on tergite 4 in ♀3
2. Aedeagus with vesica well developed, rounded, and lobulated; postgonite (pp) with distinct pointed apex like claw; vein R₁ usually yellowish brown.....*G. kakinumai* sp. nov.
- Aedeagus with vesica less developed and triangular in shape; pp with truncate apex; vein R₁ usually fuscous brown*G. ubeensis* sp. nov.
3. Tibiae distinctly paler than femora and tarsi; mid tibia usually with 3 *ad*; sternopleuron largely covered with yellowish hairs on lower parts; lower parts of pteropleuron with yellowish hairs posteriorly; 3rd arisal segment slender on apical 1/2 to 2/3..
- Legs including tibiae, black, sometimes entirely fuscous brown in teneral specimens; sternopleuron usually clothed with black hairs, sometimes intermixed with a few

Fig. 1. Male head, lateral view. — A, *Goniophyto kakinumai* sp. nov.; B, *G. ubeensis* sp. nov.

- yellowish brown ones, or the hairs becoming pale brown apically; lower parts of pteropleuron blackish setulose4
4. Frontal stripe blackish, more or less yellowish-grey dusted in front view, not sharply limited; median longitudinal stripe fuscous, not distinct on tergites 3 and 4; 3rd aristal segment slender on more than apical 1/2; mid tibia with 2–3 *ad.* Nansei Is.*G. yaeyamaensis* Kano & Shinonaga
- Frontal stripe submetallic black, sharply limited; median longitudinal stripe on tergites 3 and 4 blackish, distinct, coalesced at hind margin5
5. Parafacial narrow, at narrowest point, less than width of ocellar triangle in ♂ (cf Kurahashi and Suenaga, 1994: 228, Fig. 1b); tergite 6 with a pair of median *mb* in ♂; tergite 1+2 usually with strong median *mb*; 3rd aristal segment slender on more than apical 2/3; mid tibia with 2–3 *ad.* Ogasawara Is.*G. boninensis* Lopes
- Parafacial broad, at narrowest point, more than width of ocellar triangle in ♂ (cf Kurahashi and Suenaga, 1994: 228, Fig. 1a); tergite 6 with two pairs of bristles in ♂; tergite 1+2 without median marginal bristle; 3rd aristal segment slender on less than apical 1/2; mid tibia usually with 2 *ad.* Kyushu and western parts of Honshu*G. horii* Kurahashi & Suenaga

***Goniophyto kakinumai* sp. nov.**

(Japanese name: Kakinuma-hosonikubae)

DISCRIPTION. Male.— **Head:** dichoptic; eyes bare, widely separated at narrowest point by more than width of one eye; frons index 0.40–0.44 ($M=0.44$, $n=5$); frontal stripe fuscous black, rather densely yellowish-grey dusted in front view, not sharply limited on lateral margins, broad, parallel-sided, slightly narrowed toward antennal base; parafr-

ntal broad, densely brownish-grey dusted, with fine black setulae on entire length, provided with *ca.* 6 pairs of *ori*, upper most one strongest, directed outward, 3 proclinate *ors* weakly developed; parafacial narrower than width of AS_3 , but broader than width of ocellar triangle, at narrowest part, densely grey-dusted, more or less brown tinged above, largely clothed with black setulae on entire length; face black, densely silver-grey dusted, without facial carina; facialia black, densely silver-grey dusted, bare except for several black setulae just above vibrissae; mediana densely silver-grey dusted, bare; vibrissaria very narrow, black, silver-grey dusted, at most with several black setulae; vibrissa well developed; epistome brown, grey-dusted, not projecting forward in lateral view; gena narrow, less than width of AS_3 , black, grey-dusted, clothed with rather long black hairs; postgena concolorous with gena, clothed with black long hairs anteriorly except for several yellowish brown ones posteriorly; occiput concolorous with gena, clothed with black setulose hairs except for several yellowish ones on central portion; AS_2 black, brownish-grey dusted, with black setulae; AS_3 black, brownish-grey dusted, about 3.0 times as long as AS_2 ; arista blackish, stout, pubescent except apical 1/5 of 3rd segment, 2nd segment long, longer than 1.5 x as long as 1st; palpus entirely blackish, with black bristly hairs as well as ordinary black ones.

Thorax: black, grey-dusted, more or less brownish-tinged, clothed with black setulae; dorsum with single fuscous median and submedian vittae, lateral vitta broad, fuscous, but obscure on presutural area; humerus, notopleuron and sternopleuron concolorous with dorsum, densely grey-dusted, with black setulae, but several on anterior part of notopleuron; postalar callus and scutellum also concolorous with dorsum, with black setulae; prosternum bare; propleuron bare; supraspiracular convexity bare, greyish dusted; hypopleuron largely bare, but sometimes with a few black minute hairs along row of 4–5 hypopleural bristles; mesopleural, pteropleural and sternopleural hairs black; mesothoracic spiracle small, blackish with yellowish brown fringe; metathoracic spiracle small, blackish, posterior opercurum with yellowish brown fringe; postalar declivity bare; tympanic tuft absent; suprasquamal ridge without either anterior or posterior parasquamal tufts. Chaetotaxy: presutural row of *ac* more or less developed, distinct from ground hairs, prescutellar *ac* fine; *dc* 2+3 strongly developed; *ia* 0+2; *h* 2–4, 2 of them usually developed; *ph* 1–2; *prs* 1; *sa* 3; *pa* 2; *st* 1+1; *sc* 2+1, discal one very fine; *n* 2; *pp* 1–2; *pst* 1–2, *pp* and *pst* accompanying with a few bristly hairs.

Wings: hyaline; veins fuscous brown; epaulet brown, silver pubescence basally; basicosta yellowish white, with silver pubescence; subcostal sclerite yellowish white, with silver pubescence; first longitudinal vein (R_1) bare; costal spine developed; node of 2nd (R_{2+3}) and 3rd longitudinal veins with a few black setulae below; 3rd longitudinal vein (R_{4+5}) with about 7 black setulae from node of 2nd and 3rd veins to anterior cross vein (r-m); 4th longitudinal vein (M_{1+2}) bent with right angle, with trace of stalk; section of 4th bend to wing edge gently curved inward near bend. Alar and thoracic squamae pale brown, thoracic one lobulate, bare, with more or less fuscous margin. Halteres pale brown.

Legs: black, dark-grey dusted, black haired; fore tibia with 1 *p*, 1 *pd* and 3 *ad*; mid tibia with 2 *ad*, 2 *pd* and 1 *v*; hind tibia with 2–3 *ad*, 2 *pd* and 1 *av*.

Abdomen: black, grey-dusted, especially on anterior parts of tergites; tergite 1+2 grey-dusted laterally; tergites 3–4 with 3 (1 median black and 2 lateral triangular dark) spots which coalesce at hind margin; tergite 1+2 with 1 strong lateral *mb*; tergite 3 with a pair of strong median *mb*, single lateral *mb* also developed; tergite 4 with a pair of strong median *mb*, two strong lateral *mb* also developed; tergite 5 with row of strong *mb*; sternites black, dark-grey dusted; sternite 1 and anterior part of sternite 2 black haired. Hypopygium prominent; tergite 6 combined with genital segments, submetallic, with 4

Fig. 2. *Goniophyto kakinumai* sp. nov., male genitalia.—A, epandrium, cercus, surstylus, hypandrium (hyp) and pregonite (ap), lateral view; B, cerci and surstyli, caudal view; C, pregonite (ap), lateral view; D, postgonite (pp), lateral view; E, aedeagus, lateral view; F, sternite 5, ventral view.

fine *mb*; genital segment 1 (GS₁) and genital segment 2 (GS₂) or epandrium submetallic, less dark-grey dusted; GS₁ with a pair of rather strong *mb*. Male genitalia as shown in Fig. 2A–E.

Female.— **Head:** eyes bare, widely separated at vertex by more than width of one eye; frons index 0.45 (n=1); frontal stripe broad, parallel-sided, slightly narrowed above level of strong proclinate *ors*, brownish-grey dusted, broader than width of parafrontal at level of anterior ocellus; parafrontal broad, broader than width of frontal stripe at level of lower strong proclinate *ors*, grey-dusted, brownish tinged posteriorly, provided with 6 pairs of strong *ori*; *ors* 2+0; *oc* weakly developed; *acoc* fine; *pooc* weakly developed; *iv* strongly developed; *ov* less developed, length subequal to 1/2 that of *iv*; *poc* parallel; *occ* 1, strongly developed.

Abdomen: more robust than that of male. Ovipositor short. Otherwise same as for ♂.
Length. 4.8–7.5 mm.

Holotype ♂, HONSHU: Yamaguchi Pref., Ube City, Okinodan, Koto River, 4.iii. 2009, S. Kakinuma, NSMT-I-Dip6733.

Paratypes. HONSHU: 3♂ 1♀, same locality as for holotype, 3.iv. 2008, 13.iv. 2009, 28.iv. 2009; 1♂, Yamaguchi Pref., Ube City, Okinodan, 0 m, river side, 8.iii. 2010, H. Kurahashi.

Type depository. Holotype and paratypes (1♂ 1♀) are deposited in the National Museum of Nature and Science, Tokyo (NSMT). 1♂, Bishop Museum, Honolulu (BPBM); 1♂, Natural History Museum, London (BMNH); 1♂, Zoological Museum University of Copenhagen (ZMUC).

Etymology. The specific epithet is named in honour of Mr. Susumu Kakinuma who is a local entomologist and first discovered this interesting new species.

Relationships. The present new species is closely allied to *Goniophyto shanghaiensis* Deng, Chen & Fan, 2007 in the general morphology of male genitalia, but it is easily distinguished by the parafacials entirely setulose and the black coloration of tibiae. *Goniophyto kakinumai* sp. nov. is also similar to *G. horii* Kurahashi & Suenaga, 1994, but it can be easily differentiated by the parafacials entirely setulosed, the first sternite clothed with black hairs and no reclinate *ors* developed in ♀.

Bionomics. Adults are found in the marshes near the river mouth flowing into the inner sea of Setonaikai, Japan.

Distribution. Palaearctic Region: Japan (Honshu).

***Goniophyto ubeensis* sp. nov.**
(Japanese name: Ube-hosonikubae)

DISCRIPTION. Male.— **Head:** dichoptic; eyes bare, widely separated at narrowest point by more than width of one eye; frons index 0.43–0.46 (M=0.44, n=20); frontal stripe fuscous black, rather densely yellowish-grey dusted in front view, not sharply limited on lateral margins, broad, parallel-sided; parafrontal broad, brownish-grey dusted, with fine black setulae on entire length, provided with *ca.* 6 pairs of *ori*, upper most one strong, directed outward, 2–3 proclinate *ors* weakly developed; parafacial narrower than width of AS₃, but broader than width of ocellar triangle, at narrowest part, grey-dusted, more or less brown tinged above, entirely blackish setulosed; face black, densely silver-grey dusted, without facial carina; facialia black, densely silver-grey dusted, bare except for several black setulae just above vibrissa; mediana densely silver-grey dusted, bare; vibrissaria very narrow, black, silver-grey dusted, at most with several black setulae; vibrissa well developed; epistome brown, grey-dusted, not projecting forward in lateral view; gena narrow, less than width of AS₃, black, grey-dusted, clothed with rather long black hairs; postgena concolorous with gena, clothed with black long hairs anteriorly

Fig. 3. *Goniophyto ubeensis* sp. nov., male genitalia.—A, epandrium, surstylus and cercus, lateral view; B, cerci and surstyli, caudal view; C, pregonite (ap), lateral view; D, postgonite (pp), lateral view; E, aedeagus, lateral view; F, sternite 5, ventral view.

except for several yellowish brown ones posteriorly; occiput concolorous with gena, clothed with black setulose hairs except for a few yellowish ones on central portion; AS₂ black, brownish-grey dusted, with black setulae; AS₃ black, slightly brownish-grey dusted, about 3.0 times as long as AS₂; arista blackish, stout, pubescent except apical 1/5 of 3rd segment, 2nd segment long, longer than 1.5 x as long as 1st; palpus entirely blackish, with black bristly hairs as well as ordinary black ones.

Thorax: black, grey-dusted, more or less brownish-tinged, clothed with black setulae; dorsum with single fuscous median and submedian vittae; lateral vitta broad, fuscous, but obscure on presutural area; humerus, notopleuron and sternopleuron concolorous with dorsum, densely grey-dusted, with black setulae, but several on anterior part of notopleuron; postalar callus and scutellum also concolorous with dorsum, with black setulae; prosternum bare; propleuron bare; supraspiracular convexity bare, greyish dusted; hypopleuron largely bare except for a few black minute hairs around row of 4–5 hypopleural bristles; mesopleural, pteropleural and sternopleural hairs black; mesothoracic spiracle small, blackish with yellowish brown fringe; metathoracic spiracle small, blackish, posterior opercurum with yellowish brown fringe; postalar declivity bare; tympanic tuft absent; suprasquamal ridge without either anterior or posterior parasquamal tufts. Chaetotaxy: presutural row of *ac* not so much developed, but distinct from ground hairs, prescutellar *ac* absent or weakly developed; *dc* 2+3 strongly developed; *ia* 0+2; *h* 2–4, 2 of them usually developed; *ph* 1; *prs* 1; *sa* 2, 1 fine additional present between strong 2; *pa* 2; *st* 1+1; *sc* 2+1, discal one very fine; *n* 2; *pp* 1; *pst* 1, *pp* and *pst* accompanying with a few bristly hairs.

Wings: hyaline; veins fuscous brown; epaulet brown, silver pubescence basally; basicosta yellowish white, with silver pubescence; subcostal sclerite yellowish white, with silver pubescence; vein R₁ bare; costal spine developed; node of veins R₂₊₃ and R₄₊₅ with a few black setulae below; vein R₄₊₅ with about 7 black setulae from node of veins R₂₊₃ and R₄₊₅ to r-m; vein M₁₊₂ bent with right angle, with trace of stalk; section of M₁₊₂ bend to wing edge gently curved inward near bend. Alar and thoracic squamae pale brown, thoracic one lobulate, bare, with more or less fuscous margin. Halteres pale brown.

Legs: black, dark-grey dusted, black haired; fore tibia with 1 *p*, 1 *pd* and 3 *ad*; mid tibia with 2–3 *ad*, 2 *pd* and 1 *v*; hind tibia with 2–3 *ad*, 2 *pd* and 1 *av*.

Abdomen: black, grey-dusted, especially on anterior parts of tergites; tergite 1+2 grey-dusted laterally; tergites 3–4 with 3 (1 median black and 2 lateral triangular dark) spots which coalesce at hind margin; tergite 1+2 with 1 strong lateral *mb*; tergite 3 with a pair of strong median *mb*, single lateral *mb* also developed; tergite 4 with a pair of strong median *mb*, two strong lateral *mb* also developed; tergite 5 with row of strong *mb*; sternites black, dark-grey dusted; sternite 1 and anterior part of sternite 2 fuscous black haired. Hypopygium prominent; tergite 6 combined with genital segments, submetallic, with 2–4 fine *mb*; GS₁ and GS₂ or epandrium submetallic, more or less dark-grey dusted; GS₁ with a pair of rather strong *mb*; GS₂ with 1–2 *mb*. Male genitalia as shown in Fig. 3 A–E.

Female. unknown.

Length. 5.5–7.5 mm.

Holotype ♂, HONSHU: Yamaguchi Pref., Ube City, Okinodan, Koto River, 21.ii. 2010, S. Kakinuma, NSMT-I-Dip6734.

Paratypes. HONSHU: 3♂, same data as holotype; 7♂, same locality as holotype, 14.iv. 2008, S. Kakinuma; 4♂, same locality as holotype, 13.iv. 2009, S. Kakinuma; 4♂, same locality as holotype, 3.iv. 2008, S. Kakinuma; 3♂, same locality as holotype, 4.iii. 2009, S. Kakinuma; 1♂, same locality as holotype, 24.v. 2007, S. Kakinuma; 2♂, same locality as holotype, 6.iv. 2009, S. Kakinuma; 4♂, Yamaguchi Pref., Ube City, Okinodan, 0 m, river

side, 8.iii. 2010, H. Kurahashi.

Type depository. Holotype and paratypes (20♂) are deposited in the National Museum of Nature and Science, Tokyo (NSMT). 2♂, Bishop Museum, Honolulu (BPBM); 2♂, Natural History Museum, London (BMNH); 2♂, Zoological Museum University of Copenhagen (ZMUC); 2♂, Carnegie Museum of Natural History, Pittsburgh (CMNH).

Etymology. The specific epithet is named after the type locality “Ube City”.

Relationships. The present new species is closely allied to *Goniophyto horii* Kurahashi & Suenaga, 1994 in the general morphology of male genitalia, but it is easily distinguished by the parafacials entirely clothed with blackish setulae. *Goniophyto ubeensis* sp. nov. is very similar to *G. kakinumai* sp. nov., and it can be hardly identified without examining the male genitalia.

Bionomics. Adults are found in the marshes near the river mouth flowing into the inner sea of Setonaikai, Japan.

Distribution. Palaearctic Region: Japan (Honshu).

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