New or Unrecorded Species of Stegana (Steganina) (Diptera, Drosophilidae) from the Old World, Especially Japan and Russia

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Abstract Five new species of Stegana (Steganina) (Diptera, Drosophilidae) from the Old World are described: masanoritodai (Japan, Russia), toyoversis (Japan), kamnnyai (Formosa), ikeda (Ethiopia) and papuan (Papua New Guinea). S. (S.) setenaria Nishiharu and S. (S.) nigritorax Strobl are recorded from Russia for the first time.

Key words: Drosophilidae; Stegana (Steganina); Old World; taximetry.

More than 50 species of Stegana (Steganina) are known from various regions of the world (Wheeler, 1981, 1986; Tsacas, 1990). Present report is to add to this subgenus five new species from Russia, Japan, Formosa, Ethiopia and Papua New Guinea. Taximetical analyses of these species and other related species are made.

Types of new species are deposited in the Entomological Institute, Hokkaido University, Sapporo, Japan (EIU), National Science Museum, Tokyo, Japan (NSM), Institute of Biology and Pedology, Russian Academy of Sciences, Vladivostok, Russia (IBP) and Bernice P. Bishop Museum, Honolulu, Hawaii, USA (BM).

Descriptions of New Species

Stegana (Steganina) masanoritodai sp. n.

(Fig. 1 A–F)

around ocellar triangle, which is pale brown. Face yellow, with two black bands medially and near buccal margin, lower cross band broadened medially. Carina short. Cheek yellowish white. Anterior reclinate orbital 2/3 as long as other orbitals. Vibrissa long and strong, or, 1/2 as long as vibrissa. Mesoscutum brownish yellow, with brownish black longitudinal markings. Thoracic pleura white, with a broad black longitudinal stripe. Humerals 2, lower longer. Scutellum brownish black. Acrostichal hairs in 10–12 irregular rows. Sterna-index 0.6–0.7. Legs yellowish white, knee joints fuscous. Preapicals on all tibiae, apicals
prominent on mid. Wing black, paler toward caudal margin, apically yellow. C-index 2.2 (2.0–2.5); 4 C-index 1.0 (1.0–1.1); 4 V-index 1.7 (1.7–1.8); 5 x-index 1.2 (1.0–1.4); Ac-index 11.2 (9.1–14.0). C 3-fringe on basal 3/4. Halter yellowish white. Abdominal tergites entirely black, subshining.

Periphalic organs (Fig. 1 A): Epandrium acute triangular below. Cerci oval. Surrstylus (Fig. 1 B) dark brown, micropubescent, distally deeply excavated, with 3–5 flat apical teeth and long hairs ventrally. Phallic organ (Fig. 1 C): Aedeagus cylindrical, apically with hair crown, medioventrally serrated with large and complicated processes. Anterior hypandrial lobe basally as wide as hypandrium. Female cercus (Fig. 1 D–E) elongate oval, with long hairs apically. Spermatheca as in Fig. 1 F.

Holotype: ♂, Russia, Primorye, Ussurian Reserve, Valley of stream, 17. VIII. 1988 (SIDORENKO) (IBP). Paratypes: 2 ♀, same data as holotype, 13. VIII. 1988; 1 ♂, Primorye, mouth of Armu River, 15. VI. 1990 (SIDORENKO); 1 ♀, Japan, Hokkaido, Tomakomai, 17. VII. 1984 (TODA); 2 ♀, ibid., 20. VII. 1984 (TODA). Types in EHU and IBP.

Distribution. Russia (Primorye); Japan (Hokkaido).

Relationships. This species is closely related to S. ctenaria NISHIHARA in having complicated processes of aedeagus but differs from the latter in having black clypeus, fewer teeth of surrstylus, and wider abdominal sternites of male and female.

Remarks. This species is named in honor of Dr. Masanori TODA (Sapporo, Japan) who provided the junior author with the Japanese specimens.

j Stegana (Steganina) toyaensis sp. n. (Fig. 2 A–E)

Fig. 2 A–E. Stegana (Steganina) toyaensis.—A, Periphalic organs, lateral view; B, apex of aedeagus, dorsal view; C, ibid., lateral view; D, surstylus; E, hypandrium, ventral view.

Holotype: ♂, Japan, Hokkaido, Lake Tōya, 6. VIII. 1964 (Toda) (Ehu).

Distribution. Japan (Hokkaido).

Relationships. This species is closely related to S. (S.) longifibula Takada, especially in the pattern of mesoscutum, but differs from the latter by the shapes of surstylus and aedeagus.

Stegana (Steganina) papuana sp. n. (Fig. 3 A–C)

♂, ♀. Body about 2.2 mm in length. Eye dark red, bare. Antenna with 2nd joint yellowish gray; 3rd black, basally yellowish gray. Arista with about 8 upper and 6 lower rather short branches. Palpus yellowish gray. Ocellar triangle black. Frons subshiny black. Clypeus gray. Face (Fig. 3 A) grayish white, black above. Carina low. Cheek white, about 1/3 as broad as eye length. Anterior reclinate orbital as long as and at middle of others. Vibrissa long, other orals short. Mesoscutum subshiny brownish black. Scutellum reddish brown. Thoracic pleura white, with a broad black longitudinal stripe above. Humeral
1. Prescutellars well developed. Acrostichal hairs in about 12 rows. Anterior dorsocentrals 1/3 posterior; length distance of dorsocentrals about 1/4 cross distance. Lateral scutellars parallel, slightly longer than apicals, which are nearer to each other than to laterals. Sterno-index about 1.0. Legs yellow, femora apically black, mid tibia with about 12 spicules above. Wing dark brown especially anteriorly. C-index 2.6; 4V-index 1.8; 4C-index 1.4; 5x-index 1.7; Ac-index 10.0. C3-fringe 2/3. Halter yellowish white, knob black. Abdominal tergites subshiny black.

Male genitalia as in Fig. 3 B–C. Surstylus without teeth. Aedeagus cylindrical, bare. Paramere slender, laterally serrated. Hypandrium as broad as long.


Relationships. This species resembles S. (S.) varipes TSACAS, 1990, in the shape of male genitalia, but differs by leg coloration and absence of surstylus teeth.

♂ Stegana (Steganina) kanmiyai sp. n.

(Fig. 3 D–G)

♂. Body about 3 mm in length, subshining dark brownish black. Eye red, bare. Antenna with 2nd joint yellowish gray, third grayish black. Palpus pale. Ocellar triangle black. Periorbit orange brown, anteriorly narrowing. Frons shiny black, laterally orange brown. Face (Fig. 3 D) black, lower 1/3 yellowish white. Clypeus brown. Cheek shiny silvery white with yellow, broad, about 1/3 eye length. Orbitals 3, long. 2nd oral 1/3 vibrissa. Mesoscutum brownish black, laterally paler. Scutellum brownish black. Thoracic pleura pale below, with a broad black longitudinal stripe above. Hemeral 1 long and 2 upper shorter. Acrostichal hairs in about 8 rows. Lateral scutellars divergent, apicals shorter than and nearer to each other than to laterals. Sterno-index about 1.0. Legs yellowish white, femora distally and tibiae proximally black. Wing black especially anteriorly. C-index 2.5; 4V-index 1.5; 4C-index 0.9; 5x-index 1.2; Ac-index 10.0. C3-fringe 1/2. Halter gray. Abdominal tergites dark brownish black. Periphallic organs (Fig. 3 E): Epandrium broad below; surstylus quadrate, without teeth. Phallic organs (Fig. 3 F–G): aedeagus distally hairy; hypandrium narrower than long.


Distribution. Formosa, Japan (Honshu).

Relationships. This species resembles S. (S.) ctenaria NISHIHARU in the shapes
Fig. 3 A–C. Stegana (Steganina) papuana; D–G. S. (S.) kanmiyai; H–J. S. (S.) ikedai. —
A, D, H, Frons and clypeus; B, E, J, periphalic organs; C, F, G, I, phalic organs.
Scale: 0.1 mm.

of aedeagus and surstylus, but differs from the latter by having no teeth of surstylus.

♀ Stegana (Steganina) ikedai sp. n.
(Fig. 3 H–J)

♂, ♀. Body about 2.2 (♂) to 2.5 (♀) mm in length. Eye red black, bare. Antenna with 2nd joint brown, 3rd yellowish brown. Arista with about 6 upper and 5 lower rather short branches. Palpus deep black, with short setae. Ocellar triangle black. Periorbit yellowish brown. Frons brownish black, anterior half orange brown. Face (Fig. 3 H) dark brown, buccal margin narrowly yellowish brown. Clypeus yellowish gray. Carina short, low. Cheek yellowish gray, about 1/9 as broad as eye length. Orbitals 3, long. 2nd oral half vibrissa. Meso-
scutum dark brown, subshining. Scutellum darker. Thoracic pleura pal brown, with black patches on mesopleura and sternopleura. Humeral 1, long. Acer-
tichal hairs in 12 rows. Anterior dorsocentrals 1/3 as long as posteriors, cross distance of dorsocentrals 1/5 length distance. Lateral scutellars slightly divergent, longer than apicals, which are nearer to each other than to laterals. Sterno-index about 0.8. Legs yellow. Wing dark, paler caudally. C-index 2.7; 4V-index
Steganata (Steganina) of the Old World

1.9; 4C-index 1.1; 5x-index 1.1; Ac-index 6.0. C3-fringe 1/2. Halter orange brown. Abdominal tergites dark brownish black, anteriorly brownish orange.

Male genitalia (Fig. 3 I-J) dark brown. Epandrium broad below. Surstylus oval, with a black tooth. Aedeagus fusiform; paramere slender, serrated marginally, hypandrium broader than long.


Distribution. Ethiopia.

Relationships. This species resembles S. (S.) variipes TSACAS especially in the shape of male genitalia, but body is darker and paramere is longer.

New Distribution Records

(New record is indicated by an asterisk.)

✓ Stegana (Steganina) ctenaria NISHIWARU

Steeana (Steganina) ctenaria NISHIWARU, 1979, Konty, Tokyo, 47: 38.


Distribution. Russia* (Far East), Japan (Honshu).

Steegana (Steganina) nigritorax STROBL


Distribution. Europe, Russia* (Far East), Korea, Japan (Hokkaido*, Honshu).

Taximetrical Analyses

Five new species described above and 15 known species of the Old World (n=20) are put in taximetrical analyses, using 14 diagnostic characters (n=14) adopted from OKADA (1971) and LAŠTOVKA and MÁCA (1982) as listed below.

A. Face parallel-sided (A=0) or broadened below (a=1).

B. Face with conspicuous black bands below (B=0) or without such band (b=1).
C. Carina short and low (c=0) or long and high (s=1).
D. Clypeus black (D=0) or yellow or yellowish brown (d=1).
E. Mesoscutum often striped (E=0) or not striped (e=1).
F. Scutellum unicolorous (F=0) or apically or laterally pale (f=1).
G. Halter yellow (G=0) or brownish black (g=1).
H. Ac-index 15.0 or less (H=0) or 20.0 or more (h=1).
I. Surstylus globular, distally not deeply excavated (l=0) or deeply excavated (i=1).
J. Surstylus with or without 1 tooth (j=0) or 3 or more teeth (j=1).
K. Periandrium with or without short anterior process (K=0) or with long process (k=1).
L. Aedeagus apically not haired (L=0) or haired (l=1).
M. Aedeagus without (M=0) or with (m=1) complicated processes.
N. Anterior hypandrial lobe as broad as or broader than hypandrium (N=0) or narrower than hypandrium (n=1).

Basing on n × t matrix (Table 1), a dendrogram of relationships of the species is constructed by means of S_{min} proximity analysis and UPGMA cluster analysis (Fig. 4). A key to the species is automatically provided from the dendrogram.

This subgenus is subdivided into 3 unnamed groups (1-3) by OKADA (1971), and the coleoptrata group (1c) is proposed by Laštovka and Máca (1982) for most of the first group. The dendrogram shows, however, these groups excepting

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Fig. 4. A dendrogram of relationships of 20 species of Stegana (Steganina), based on S_{sm} proximity analysis and UPGMA cluster analysis. Alphabetical signs on the branches: character states selected from the original n\times t matrix. Numerical figures at the branching points: key couplets.

the coleoptrata group are not well discriminated from each other.

Diagnosis of groups:  1, IBl or iBl (1c); 2, IbL or Ibl; 3, IBL.

A list of species used in the taximetrical analyses

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<th>Species</th>
<th>Group Distribution</th>
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<td>Stegana (Steganina) castanea OKADA, 1988</td>
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<td>S. (S.) coleoptrata (SCOROLI, 1768)</td>
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<td>S. (S.) etenaria NISHIHARU, 1979</td>
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<td>S. (S.) hypoleuca MEIGEN, 1830</td>
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<td>S. (S.) kanniyai n. sp.</td>
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<td>S. (S.) longifibula TAKADA, 1968</td>
<td>1c Japan, Europe</td>
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<td>S. (S.) masanoritodai n. sp.</td>
<td>1c Japan, Russia</td>
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S. (S.) nigrifrons MEIJERE, 1911
S. (S.) nigrithorax STROBL, 1898
S. (S.) nigrolimbata DUDA, 1924
S. (S.) ornatipes WHEELER et TAKADA, 1964
S. (S.) papuana n. sp.
S. (S.) penihextata GUPTA et PANIGRAHY, 1987
S. (S.) scutellata MEIJERE, 1911
S. (S.) shirozui OKADA, 1971
S. (S.) subexscavata VAIDIA et GODBOLE, 1976
S. (S.) toyoensis n. sp.
S. (S.) undulata MEIJEN, 1911
S. (S.) unidentata TAKADA, 1968

2 Formosa, Sri Lanka, Indonesia
1c Europe, Russia, Japan, Korea
3 Formosa
1* Micronesia
2 Papua New Guinea
1 India
2 Japan, Nepal, Indonesia
1 Formosa, India
1c India
1c Japan
1 Indonesia
1 Japan
* formerly placed in group 3.

Key to the Species of Stegana (Steganina) under Consideration

1. Ac-index 20.0 or more (h); anterior hypandrial lobe as broad as hypandrium (N); aedeagus apically haired (l) .................................................. nigrifrons
   — Ac-index 15.0 or less (H); anterior hypandrial lobe narrower than hypandrium if Ac-index is 20.0 or more (n if h) ........................................... 2
2. Ac-index 20.0 or more (h) .................................................. penihextata
   — Ac-index 15.0 or less (H) .................................................. 3
3. Surstylus with 3 or more teeth (j); anterior hypandrial lobe narrower than hypandrium (n) .................................................. nigrolimbata
   — Not simultaneously surstylus with 3 or more teeth and anterior hypandrial lobe narrower than hypandrium (not jn) ........................................... 4
4. Halter brownish black (g); clypeus black (D); mesoscutum not striped (e) ... 5
   — Halter yellow (G) (excluding papuana) ........................................... 6
5. Face with conspicuous black band below (B); carina short and low (C); periandrium without short anterior process (K); aedeagus apically haired (l) .................................................. ornatipes
   — Face without black band (b); carina long and high (c); periandrium with long process anteriorly (k); aedeagus apically not haired (L) ................. scutellata
6. Surstylus globular, distally not deeply excavated (l); not simultaneously face with conspicuous black band below and aedeagus apically haired (not Bl excluding undulata) .................................................. 7
   — Face with conspicuous black band below (B); aedeagus apically haired (l) ... 11
7. Face broadened below (a) and with conspicuous black band below (B); mesoscutum striped (E) .................................................. undulata
   — Face parallel-sided (A) and without conspicuous black band below (b); mesoscutum not striped (e) .................................................. 8
8. Clypeus black (D); surstylus deeply excavated distally (l); carina short and
low (C) ........................................... kannivai
— Clypeus yellowish (d); aedeagus apically not haired (L) .......... 9
9. Carina long and high (c); halter yellow (G) ...................... castanea
— Carina short and low (C) ................................ ikedai
10. Halter brownish black (g) ....................................... papuana
— Halter yellow (G) ............................................... masanortodat
— Surstylus with 3 or more teeth (j); surstylus distally deeply excavated (i) .... 12
— Surstylus with or without a tooth (J) ............................ ctenaria
— Clypeus black (D) ............................................... 13
12. Clypeus yellow or yellowish brown (d) ......................... toyaensis
— Clypeus black (D) ............................................... 14
13. Surstylus distally deeply excavated (i) ......................... 15
— Surstylus globular, distally not deeply excavated (I) .............. 16
14. Carina long and high (c) ...................................... 17
— Carina short and low (C) ...................................... 18
15. Face parallel-sided (A); scutellum unicolorous (F); periantrium with long process anteriorly (k) ................. longifibula
— Face broadened below (a); scutellum not unicolorous, apically or laterally pale (f); periantrium with or without short anterior process (K) .. hyooleuca
16. Clypeus black (D); anterior hypandrial lobe as broad as hypandrium (N) ..... nigrithorax
— Clypeus yellowish (d) .......................................... 19
— Clypeus yellowish (d); scutellum unicolorous, apically or laterally pale (f); anterior hypandrial lobe as broad as hypandrium (N) ..... subexcavata
17. Mesoscutum striped (E); scutellum unicolorous, apically or laterally pale (f); anterior hypandrial lobe as broad as hypandrium (N) ..... coleopterata
18. Anterior hypandrial lobe as broad as hypandrium (N) .......... shirozai
— Anterior hypandrial lobe narrower than hypandrium (n) ........... subexcavata
19. Aedeagus with complicated processes (m); clypeus yellowish (d); anterior hypandrial lobe narrower than hypandrium (n) .......... unidentata

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