

5 ornata group

*L. trivittata* Thailand

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A Revision of the *Leucophenga ornata* Species Group  
(Diptera, Drosophilidae) of the Oriental  
and Adjacent Regions

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**Abstract** Eleven species including a new species of the *Leucophenga ornata* species group of the Oriental and adjacent Regions are revised with taximetical analyses.

The *ornata* species group is the second largest species group of the genus *Leucophenga* MÜLL, next to the *mutabilis* group, including about 20 species mostly from circumtropical areas of the old world. The species of this group are characterized by having the wings ornamented with distinct black patches, palpi slender in both sexes (different from *mutabilis* group), male mesoscutum not silvery pollinose (different from *maculata* and *subpollinosa* groups), and male 3T not shortened (different from *proxima* group).

The present study treats eleven species of the *ornata* species group of the Oriental and adjacent Regions, including a new species, with taximetical analyses.

*Leucophenga ornata* SPECIES GROUP

- ♂ ♀ *Leucophenga ornata* species group: BÄCHLI, 1971: 26.  
*Leucophenga* group 4: BOCK, 1979: 33.

*Leucophenga trivittata* sp. n.

(Fig. 1 A-C)

♀. Body about 3.5 mm in length. Eye (Fig. 1 B) bare. Antenna with 2nd joint yellow, 3rd yellowish gray, distally pubescent. Arista 11/3. Palpus yellowish gray. Ocellar triangle brownish black. Periorbit and frons grayish brown, anteriorly orange brown. Frons slightly longer than broad. Face yellow. Cheek yellow, very narrow. Posterior reclinate orbital twice as long as proclinate; anterior reclinate close to proclinate, slightly longer than proclinate. Second oral short. Mesoscutum yellowish brown. Scutellum yellowish brown or dark brown, caudally white. Thoracic pleura yellow. Humerals 3, lowest one longest. Acrostichal hairs in about 14 rows. Lateral scutellars divergent, apicals nearer to each other than to laterals. Sterno-index ca. 0.5. Legs yellow. Wing (Fig. 1 A) with 3 black cross bands, inner one below  $R_1$ , middle one long, covering posterior crossvein, outer one below tip of  $R_{2+3}$ . C-index 2.4; 4V-index 2.8; 4C-

index 1.5; 5x-index 1.5; Ac-index 2.5. 3Cf 4/5. Halter yellow. Abdominal tergites (Fig. 1 C) yellow, 2T with lateral black spots, 3-5T with broad black caudal bands, which are medially protruded to reach anterior margins; 6T black, 7T yellow.

Holotype ♀, Doi Suthep, Chiang Mai, Thailand, 7.XII.1977 (IKEDA). Paratypes; 1 ♀, same data as holotype, 1 ♀, Erawan Waterfall, Thailand, 10.XI.1975 (SHINONAGA), 1 ♀, Namtok, Thailand, 18.IX.1976 (KURAHASHI). Type series will be kept in the National Science Museum (Nat. Hist.), Tokyo.

*Distribution.* Thailand.

*Relationships.* This species somewhat resembles *L. ornata* WHEELER in the wing patches, but the cross band covering posterior crossvein is larger and anterior crossvein is not clouded.

### *Leucophenga ornata* WHEELER

*Leucophenga ornata* WHEELER, 1959, Univ. Texas Publ., 5914: 184.

*Diagnosis.* Body 3-5 mm in length. Antenna yellowish brown. Arista about 9/4. Palpus yellow. Frons orange, anteriorly paler. Mesoscutum yellowish brown. Thoracic pleura paler, caudally with a black longitudinal stripe at middle. Acrostichal hairs in about 16 rows. Sterno-index 0.7. C-index 1.9; 4V-index 1.7. Halter yellow. Abdominal tergites 3-5 T with caudal black bands protruding medially and laterally. Aedeagus bare or pubescent.

Thoracic pleura often without black stripe, e.g., in the holotype and the specimens from Australia (BOCK, 1979), Papua New Guinea (present paper), some specimens from the Philippines (LIN & WHEELER, 1972), Formosa (present paper) and Java (present paper). The black stripe is sometimes faint in the specimens from Formosa.

*Previous records.* Japan (including Ryukyus, OKADA, 1956, 1964, 1968); Korea (LEE, 1964); Formosa (LIN & WHEELER, 1972); China (TODA, unpublished); Philippines (LIN & WHEELER); Nepal (OKADA, 1966); Indonesia (DE MEJERE, 1914); Australia (BOCK, 1979, 1982).

*Specimens examined.* Japan: 2 ♂, Kamiozoegawa, Fuji, Saga, 15.V, 25.IX.1973 (YAMAGISHI); 2 ♂, 3 ♀, Mt. Tachibana, Fukuoka, 19.VI, 20.VII, 8.VIII.1973 (YAMAGISHI); 1 ♂, Atsugi, Kanagawa, 23.VI.1963 (OKADA). Formosa: 1 ♀, Chiaoliping, Chia-i, 13.VI.1965 (SAIGUSA); 1 ♂, 1 ♀, Fenchihu, Chia-i, 12.IV.1965 (MIYAMOTO); 1 ♀, Wulai, Taipei, 15.XII.1977 (IKEDA); 1 ♀, Puli, Nantou, 16-17.VIII.1967 (THROCKMORTON). Indonesia: 1 ♂, 4 ♀, Tugu, Java, 29-30.VII.197 (OKADA); 1 ♀, Sembelia, Lombok, 22.XII.1973 (SHINONAGA); 1 ♀, Marino, Sulawesi, 9.XII.1979 (SHINONAGA). Papua New Guinea: 1 ♂, 1 ♀, Wau, 24 & 31.VIII.1977 (OKADA).

*Distribution.* Japan, Korea, Formosa, Nepal, China, Philippines, Indonesia, New Guinea, Australia.

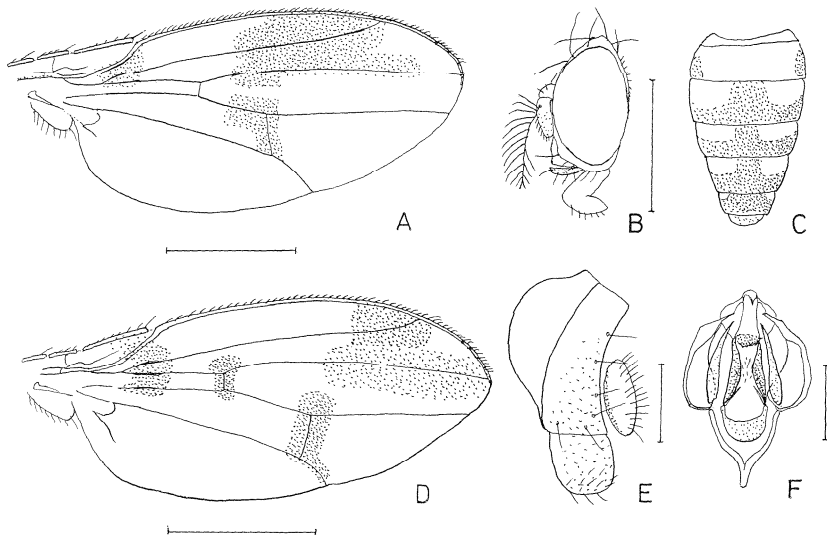


Fig. 1. A-C, *Leucophenga trivittata*; D-F, *L. digmasoma*. — A, D, Wing; B, head; C, abdomen; E, periphallallic organs; F, phallic organs. Scale 1.0 mm for wings, 0.1 mm for other figs.

***Leucophenga digmasoma* LIN et WHEELER**

(Fig. 1 D-F)

*Leucophenga digmasoma* LIN et WHEELER, 1972, Univ. Texas Publ. 7213: 244.

**Diagnosis.** Body about 2.5–3 mm in length. Antenna yellowish brown. Arista 8/4. Palpus brown. Frons tan, anteriorly paler. Mesoscutum tan to brown. Thoracic pleura tan, with dark patches. Acrostichal hairs in 12 rows. Sterno-index 0.7. Wing (Fig. 1 D) with large patches below  $R_1$ , on and outside  $R_{2+3}$ , covering distal half of  $R_{4+5}$ , and on anterior and posterior crossveins. Abdominal tergites 3–5T with black caudal bands, which are laterally and medially protruded. Aedeagus (Fig. 1 F) hairy.

**Previous records.** Formosa (LIN & WHEELER, 1972).

**Specimens examined.** 2 ♂, Wulai, Taipei, Formosa, 10.VIII.1967 (THROCKMORTON).

**Distribution.** Formosa.

***Leucophenga pentapunctata* PANIGRAHY et GUPTA**

*Leucophenga pentapunctata* PANIGRAHY et GUPTA, 1982, Entomon, 7: 487.

**Diagnosis.** Body about 3.7 mm in length. Antenna pale brown. Arista 7–

8/3. Palpus pale, brown distally. Frons pale brown. Mesoscutum yellowish brown. Thoracic pleura yellowish brown, with a broad black longitudinal stripe. Acrostichal hairs in 10 rows. Sterno-index 0.6. Wing with 5 black spots. C-index 1.5; 4V-index 2.2. Halter white. Abdominal tergites 3-5T with caudal black bands, which are medially, laterally and submedially protruded. Aedeagus hairy.

*Previous records.* India (PANIGRAHY & GUPTA, 1982).

*Specimen examined.* 1 ♂, paratype (in NSMT).

*Distribution.* India.

### *Leucophenga regina* MALLOCH

*Leucophenga regina* MALLOCH, 1935, Aust. Zool. 8: 34; BOCK, 1977, Aust. J. Zool. Suppl., (71): 34; PANIGRAHY et GUPTA, 1987, Entomon, 7: 489.

*Diagnosis.* Body about 4.3 mm in length. Antenna tan. Arista 7-9/3-4. Palpus brown. Frons tan. Mesoscutum and thoracic pleura mid brown. Acrostichal hairs in 10 rows. Sterno-index 0.6. Wing with large black patches covering R<sub>1</sub>, anterior and posterior crossveins, and at tip of R<sub>2+3</sub> extending to apical and caudal margins of wing. C-index 1.9; 4V-index 2.2. Halter white. Abdominal tergites 3-5T with black caudal spots at the insertion of setae. Aedeagus hairy.

*Previous records.* Australia (MALLOCH, 1935; BOCK, 1979, 1982); India (PANIGRAHY & GUPTA, 1987).

*Specimen examined.* 1 ♀, Narayanpur, Orissa, India (PANIGRAHY & GUPTA).

*Distribution.* Australia, India.

### *Leucophenga pectinata* OKADA

*Leucophenga pectinata* OKADA, 1968, Kontyû, Tokyo, 36: 310.

*Diagnosis.* Body about 4.0 mm in length. Antenna yellowish gray. Arista 10/4. Palpus yellowish gray. Frons yellowish gray. Mesoscutum castaneous brown. Thoracic pleura pale yellowish gray, sometimes with a dark longitudinal stripe (Sri Lankan specimens). Acrostichal hairs in 12 rows. Sterno-index 0.5. Wing spotted below R<sub>1</sub> and on anterior and posterior crossveins. Abdominal tergites 3-5T with caudal black bands protruded medially and laterally. Aedeagus pubescent.

*Previous records.* Formosa, Hong Kong (OKADA), India (GUPTA & PANIGRAHY).

*Specimens examined.* Thailand: 3 ♂, Erawan Waterfall, 10.XII.1975 (SHINONAGA); 1 ♀, Saiyok, Kanchanaburi, 10.XII.1975 (SHINONAGA); Sri Lanka: 1 ♂, 7 ♀, Peradeniya, 17-19.VIII.1971 (OKADA); 1 ♀, kandy, 18-20.VIII.1971

(OKADA).

*Distribution.* Formosa, Hong Kong, Thailand (n. loc.), India, Sri Lanka (n. loc.).

*Leucophenga saigusai* OKADA

*Leucophenga saigusai* OKADA, 1968, Kontyû, Tokyo, 36: 312.

*Diagnosis.* Body about 3 mm in length. Antenna orange brown, 3rd joint darker. Arista 5/2. Palpus velvety black. Frons dark brown. Mesoscutum dark orange brown. Thoracic pleura paler, with a dark longitudinal stripe. Acrostichal hairs in 10 rows. Sterno-index 0.8. Wing with small black patches below  $R_1$ , on anterior and posterior crossveins, sometimes also on tip of  $R_{2+3}$ . C-index 2.5; 4V-index 1.0. Halter yellowish orange. Abdominal tergites 3-5T with caudal black bands protruded laterally and medially, also submedially on 5T. Aedeagus pubescent.

*Previous records.* Japan (OKADA, 1968).

*Distribution.* Japan.

*Leucophenga quadripunctata* (DE MEIJERE, 1908)

*Drosophila quadripunctata* DE MEIJERE, 1908, Tijdschr. Ent., 51: 154.

*Diagnosis.* Body about 4.0 mm in length. Antenna yellow. Arista 5-7/2-4. Palpus yellow. Frons yellowish orange. Mesoscutum yellow. Thoracic pleura yellow, with black spots. Acrostichal hairs in 12 rows. Sterno-index 0.9. Wing spotted below  $R_1$ , at tip of  $R_{2+3}$ , and on anterior and posterior crossveins. C-index 1.9; 4V-index 2.2. Halter yellow. Abdominal tergites 3-5T with caudal black bands which are medially, submedially and laterally protruded. Aedeagus pubescent.

*Previous records.* Indonesia: Java (DE MEIJERE, 1908; DUDA, 1924), Sumatra (DUDA, 1926); Malaya (TAKADA & MOMMA, 1975); Sri Lanka (OKADA, 1988); Queensland (BOCK, 1979).

*Specimens examined.* Japan: 1 ♂, Mt Oomine, Nara, 3.V.1980 (BEPPU). Formosa: 1 ♂, Yunshuei, Chaia-i, 12-14.VIII.1967 (OKADA); 1 ♀, Taroko, Hwa Lien, 26.V.1971 (WAKAHAMA). Sarawak: 6 ♂, Muara Mongkos, 25-27.XI.1975 (SHIMA). Papua New Guinea: 2 ♂, Wau, 18.IX-5.X.1977 (OKADA).

*Distribution.* Japan, Korea, China (TODA, unpublished), Formosa, Thailand, Sri Lanka, Malaysia, Indonesia, New Guinea, Australia.

*Laucophenga atrinervis* OKADA

*Leucophenga atrinervis* OKADA, 1968, Kontyû, Tokyo, 36: 313.

*Diagnosis.* Body about 3.3 mm in length. Antenna yellowish gray. Arista 6/2. Palpus pale yellowish gray. Mesoscutum yellowish gray. Thoracic pleura yellowish gray, with a black longitudinal stripe. Acrostichal hairs in 10 rows. Sterno-index 0.8. Wing with black patches below  $R_1$ , along distal end of  $R_{2+3}$ , and on and around anterior and posterior crossveins. C-index 2.5; 4V-index 2.3. Halter white. Abdominal tergites with black caudal bands, which are medially and laterally protruded. Aedeagus pubescent.

*Previous records.* Japan (OKADA, 1968).

*Distribution.* Japan.

### *Leucophenga nigrinervis* DUDA

*Leucophenga nigrinervis* DUDA, 1924, Arch. Naturgesch., 90A(3): 186.

*Diagnosis.* Body about 3 mm in length. Antenna yellow. Arista 6/3. Palpus yellow. Frons pale yellow. Mesoscutum yellowish brown. Thoracic pleura pale yellow, with a brown patch. Acrostichal hairs in 12 rows. Wing with black clouds below  $R_1$ , at tip of  $R_{2+3}$ , at tip of  $R_{4+5}$ , and on anterior and posterior crossveins. Halter yellow. Abdominal tergites 3-5T with caudal black bands protruded medially.

*Previous records.* Formosa (DUDA, 1924; LIN & WHEELER, 1972?).

*Distribution.* Formosa.

### *Leucophenga interrupta* DUDA

*Leucophenga interrupta* DUDA, 1924, Arch. Naturgesch., 90A(3): 187.

*Diagnosis.* Body about 4 mm in length. Antenna yellow, 3rd joint gray. Arista 6-7/2. Palpus yellowish gray. Frons gray, anteriorly yellow. Mesoscutum grayish brown. Thoracic pleura pale yellow, brown spotted. Acrostichal hairs in 12 rows. Sterno-index 0.7. Wing with an interrupted stripe along costa. C-index 2.9; 4V-index 2.0. Halter yellowish brown. Abdominal tergites 3-5T with median and lateral longitudinal stripes. Aedeagus bare.

*Previous records.* Japan (OKADA, 1956, 1964, 1976); China (TODA, unpublished); Formosa (DUDA, 1924; KIKKAWA & PENG, 1938; LIN & WHEELER, 1972); India (SINGH & GUPTA, 1974); Nepal (OKADA, 1966); Sri Lanka (OKADA, 1976, 1988); Indonesia (OKADA, 1976).

*Specimens examined.* Thailand: 1 ex., Khao Yai, 4-5.X.1975 (KURAHASHI); 1 ♂, Erawan Waterfall, 10.XII.1975 (SHINONAGA). Japan: 1 ♀, Mt. Yuwan, Amami Is., 26.IV.1970 (KANMIYA); 2 ♂, 1 ♀, Aji, Tsushima, 19.X.1970 (KANMIYA); 1 ♂, 3 ♀, Ariakeyama, Tsushima, 19.X.1970 (KANMIYA).

*Distribution.* Japan, China, Formosa, Thailand (n. loc.), India, Nepal, Sri Lanka, Indonesia.

**Taximetric analyses**

Twelve diagnostic characters ( $n=12$ , A–L), each coded in two states (0, 1), for eleven species ( $t=11$ ) are taximetrically analysed. From the  $n \times t$  matrix (Table 1) a dendrogram of relationships of the species (Fig. 2) is constructed by means of  $S_{SM}$  ( $=1/n(nJK+njk)$ ) proximity analysis and UPGMA cluster analysis. A key to the species is derived from the resulting dendrogram.

- A. Palpus yellowish gray to brown (A=0) or brownish black (a=1).
- B. Frons yellowish gray (B=0) or brownish black (b=1).
- C. Thoracic pleura yellowish gray (C=0) or with dark stripe (c=1).
- D. Acrostichal hairs in 12 or less rows (D=0) or 14 or more rows (d=1).
- E. C-index 2.5 or less (E=0) or 2.8 or more (e=1).
- F. Vein  $R_{2+3}$  without (F=0) or with (f=1) black patch.
- G. Anterior crossvein not clouded (G=0) or clouded (g=1).
- H. Posterior crossvein not clouded (H=0) or clouded (h=1).
- I. Vein  $R_{4+5}$  without (I=0) or with (i=1) black patch.

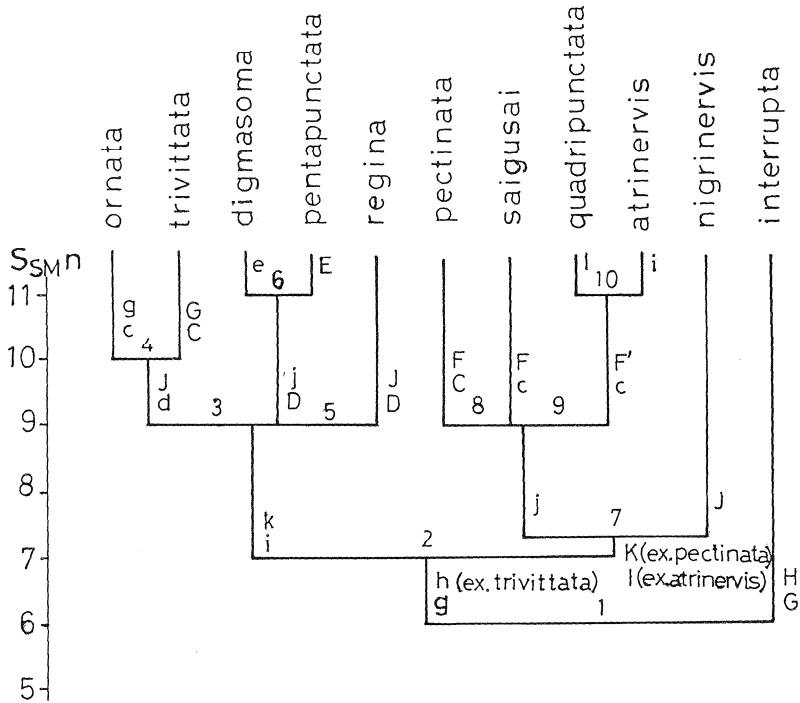


Fig. 2. A dendrogram of relationships of the species of the *Leucophenga ornata* species group. Alphabetical signs on the branches = diagnostic character states chosen from the original  $n \times t$  matrix (Table 1); numerical figures at the branching points = orders of key couplets.

Table 1. Original n (character)  $\times$  taxon (t) matrix.

t	n	A	B	C	D	E	F	G	H	I	J	K	L
<i>atrinervis</i>		0	0	1	0	0	1	1	1	1	1	0	0
<i>digmasoma</i>		0	0	1	0	1	1	1	1	1	1	1	1
<i>interrupta</i>		0	0	1	0	1	1	0	0	1	1	0	0
<i>nigrinervis</i>		0	0	1	0	NC	1	1	1	0	0	0	NC
<i>ornata</i>		0	0	1	1	0	1	1	1	1	0	1	0
<i>pectinata</i>		0	0	0	0	0	0	1	1	0	1	1	0
<i>pentapunctata</i>		0	0	1	0	0	1	1	1	1	1	1	1
<i>quadripunctata</i>		0	0	1	0	0	1	1	1	0	1	0	0
<i>regina</i>		0	0	0	0	0	1	1	1	1	0	1	1
<i>saigusai</i>		1	1	1	0	0	0	1	1	0	1	0	0
<i>trivittata</i>		0	0	0	1	0	1	0	1	1	0	1	NC

- J. Abdominal tergites 3-5T with caudal black band laterally not protruded (J=0) or protruded (j=1).  
 K. Arista with 6 or less upper branches (K=0) or 8 or more upper branches (k=1).  
 L. Aedeagus bare or merely pubescent (L=0) or hairy (l=1).

**Sequential key to the species of the *ornata* species-group  
in Oriental and adjacent Regions**

1. Anterior crossvein not clouded (G); posterior crossvein not clouded (H); black patch along costa interrupted at middle. .... *interrupta*  
 — Anterior crossvein clouded (g, except for *trivittata*); posterior crossvein clouded (h). .... 2.
2. Vein R<sub>4+5</sub> with black patch (i); arista with 8 or more upper branches (k). .... 3.  
 — Vein R<sub>4+5</sub> without black patch (I, except for *atrinervis*); arista with 6 or less upper branches (K, except for *pectinata*). .... 7.
3. Acrostichal hairs in 14 or more rows (d). .... 4.  
 — Acrostichal hairs in 12 or less rows (D). .... 6.
4. Thoracic pleura with dark patches (c); anterior crossvein usually clouded (g). .... *ornata*  
 — Thoracic pleura entirely yellowish gray (C); anterior crossvein not clouded (G). .... *trivittata*
5. 3-5T with caudal black bands laterally not protruded (J). .... *regina*  
 — 3-5T with caudal black bands laterally protruded (j). .... 6.
6. C-index 2.8 or more (e). .... *digmasoma*  
 — C-index 2.8 or less (E). .... *pentapunctata*



7. 3-5T with caudal black bands laterally not protruded (J). ..... *nigrinervis*  
 — 3-5T with caudal black bands laterally protruded (j). ..... 8.  
 8. Thoracic pleura entirely yellowish gray (C); vein  $R_{2+3}$  without black patch (F).  
 ..... *pectinata*  
 — Thoracic pleura with dark stripe (c). ..... 9.  
 9. Vein  $R_{2+3}$  without black patch (F). ..... *saigusai*  
 — Vein  $R_{2+3}$  with small black patch (f). ..... 10.  
 10. Frons yellowish gray (B); vein  $R_{4+5}$  without black patch (I). .....  
 ..... *quadripunctata*  
 — Frons brownish black (b); vein  $R_{4+5}$  with black patch (i). ..... *atrinervis*

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