

The *Leucophenga proxima* Species Group of
Southeast Asia and New Guinea
(Diptera, Drosophilidae)

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Abstract The *proxima* species group of the genus *Leucophenga* of Southeast Asia and New Guinea is revised with descriptions of 4 new species.

The *proxima* species group of BÄCHLI (1971) or the group 1 of BOCK (1979) is a distinct supraspecific taxon of the genus *Leucophenga* MIK, 1896, having male 3rd abdominal tergite very short, discolored, and usually non-setigerous. Twelve species have been known in this group, five from Africa: *proxima* (ADAMS, 1905), *mansura* (ADAMS, 1905), *hasilaris* (ADAMS, 1905), *imminuta* RÄCHLI, 1971, *munroi* DUDA, 1939, four from Australia: *albofasciata* (MACQUART, 1851), *scutellata* MALLOCH, 1923, *gibbosa* (DE MEIJERE, 1914), *janicae* BOCK, 1979, and five from Southeast Asia: *albofasciata*, *gibbosa*, *albifascia* OKADA, 1966, *jacobsoni* DUDA, 1926 and *varinervis* DUDA, 1923.

The present study will add four new species, one from New Guinea and three from Southeast Asia, and describe the structures of male genitalia of the four new and four known species.

Leucophenga meredithiana n. sp.

(Fig. 1 A-D)

♂. Body 5-6 mm in length. Eye castaneous red. Antenna orange yellow, 3rd joint elongate. Arista with 9-10 upper and 4-5 lower branches and a small fork. Palpus orange yellow, slender. Ocellar triangle small, black. Periorbits grayish brown, gray pruinose. Frons mat orange gray, parallel-sided, as broad as length down middle, 1/4 as broad as head width. Face and clypeus yellowish white. Cheek very narrow, yellowish white. 2nd orals 1/3 as long as vibissa. Mesoscutum deep orange brown, gray pruinose. Scutellum darker. Thoracic pleura pale yellowish white. Humerals 3-5. Acrostichal hairs in about 18 rows. Anterior dorsocentrals 1/4 as long as posteriors; length distance of dorsocentrals 1/4 cross distance. Lateral scutellars slightly divergent, apicals nearly as long as laterals, equally apart from each other and from laterals. Sterno-index 0.4. Legs yellow. Fore and mid metatarsi longer than rest of tarsal joints; hind metatarsus as long as rest of tarsal joints. Wing (Fig. 1 A) medially with a large black patch,

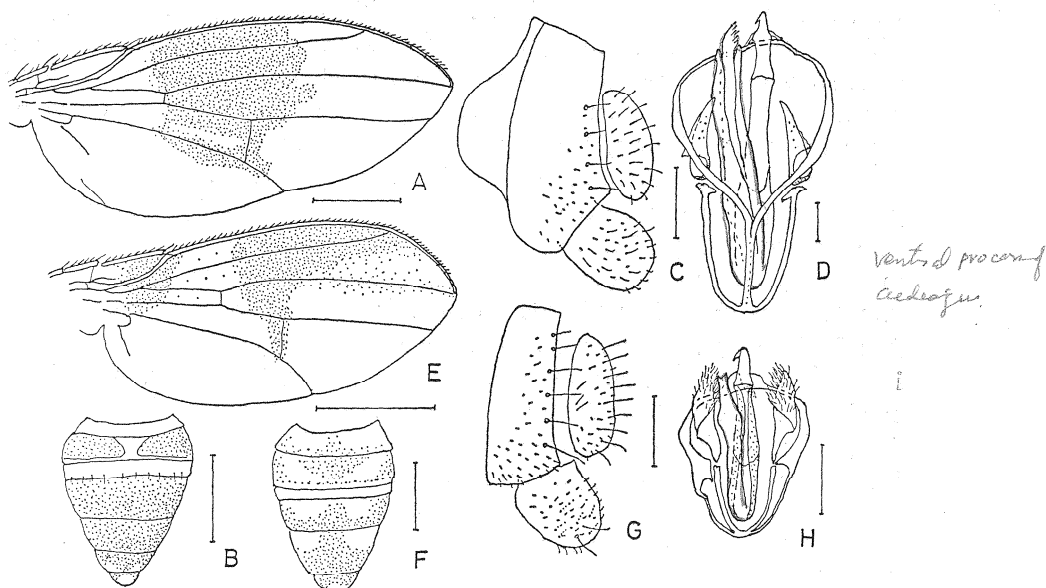


Fig. 1. A-D, *Leucophenga meredithiana*; E-H, *L. kurashii*. A, E, Wing; B, F, ♂ abdomen; C, G, peripheral organs; D, H, phallic organs. Scales 1.0 mm in wings, 0.1 mm in other figs.

covering both anterior and posterior crossveins. R_{2+3} straight, R_{4+5} and M slightly convergent. C-index 2.3; 4 V-index 1.6-2.0; 4C-index 1.2; 5x-index 1.0; Ac-index 3.0-3.5. C1-bristle 1, C3-fringe 4/5. Halter yellowish white. Abdominal tergites (Fig. 1 B) mat black, 1T yellow, 2T medially and caudally yellow, 3T short, silvery white, finely setigerous along caudal margin, 7T medially yellow. Peripheral phallic organs (Fig. 1 C) yellow, surstylus rounded below. Phallic organs (Fig. 1 D) yellow, ventral process of aedeagus tripartite, with median piece distally hairy.

Holotype ♂, Bird forest, Wau, Papua New Guinea, VIII. 1977 (M. S. CARSON), on a leaf of a tree; 1 ♂ paratype, Warris, S of Hollandia, 450-500 m, NW New Guinea, 17. VIII. 1959 (MAA). Types in Bishop Museum.

Distribution. New Guinea.

Relationships. This species differs from other known species of the *proxima* group in having a large black patch on wing. The specific name is dedicated to Mrs. Meredith S. CARSON.

***Leucophenga kurashii* n. sp.**

(Fig. 1 E-H)

♂. Body about 3.3 mm in length. Antenna yellowish white, 3rd joint somewhat fuscous. Arista with about 8 upper and about 3 lower branches and a fork.

Palpus yellow. Ocellar triangle black. Periorbit yellowish white. Frons yellowish white, anteriorly orange yellow, 4/5 as broad as length down middle, 1/3 as broad as head width. Face and clypeus yellowish white. Cheek narrow, yellowish white. Postverticals rather long. 2nd orals fine. Mesoscutum orange brown. Scutellum orange brown, laterally somewhat darker, apically yellow. Thoracic pleura pale yellow. Acrostichal hairs in about 8 rows. Lateral scutellars divergent, apicals shorter than laterals, slightly nearer to each other than to laterals. Legs yellow. Wing (Fig. 1 E) with large dark patch subbasally and medially, median one larger and caudally narrowing. R_{4+5} and M parallel. C-index about 2.4; 4V-index about 2.4; 4C-index about 1.4; 5x-index about 1.1; Ac-index about 2.2; C3-fringe 4/5. Halter yellowish orange. Abdomen (Fig. 1 F) with 1T yellowish orange, 2T black, laterally and caudally yellow, 3T yellow, narrow, silvery shining. 4-5T black laterally paler, 6T black, caudally yellow. Periphallallic organs (Fig. 1 G) pale brown, surstylus rounded below. Phallic organs (Fig. 1 H) yellowish brown; aedeagus oblong, dorsal plate black and bilobed, ventral process simple; paramere densely hairy; basal arch of hypandrium absent.

Holotype ♂ and 2 ♂ paratypes, Namtok, Thailand, 18. IX. 1975 (KURAHASHI). Types in National Science Museum, Tokyo.

Distribution. Thailand.

Relationships. This species resembles *L. meredithiana* in having large black wing patch, but differs from the latter by the shape and number (2) of wing patches, paramere hairy, ventral process of aedeagus simple, and basal arch absent. The specific name is dedicated to Dr. Hiromu KURAHASHI.

Leucophenga spinifera n. sp.

(Fig. 2 A-E)

Leucophenga leucozona: OKADA, 1966, Bull. Br. Mus. nat. Hist., (Ent.), Suppl., (6): 21 (not DUDA, 1923, misidentified) (Nepal).

♂, ♀. Body 2.5-3.0 mm in length. Antenna with 2nd joint yellow, 3rd grayish. Arista with 5-8 upper and 2-3 lower branches and a large fork. Palpus yellowish orange. Ocellar triangle black. Periorbit yellowish gray. Frons mat yellowish gray, anteriorly narrower than length down middle, about 2/5 as broad as head width. Face yellowish white. Cheek very narrow, yellow. Vibrissa strong, other orals fine. Postverticals fine. Mesoscutum mat dark yellowish brown, humeral callus paler. Scutellum dark yellowish orange, laterally black, apically yellow. Thoracic pleura pale yellow, somewhat silvery pruinose, with a broad black longitudinal stripe. Sterno-index about 0.8. Legs yellow, mid and hind knee joints slightly fuscous. Wing (Fig. 2 A) hyaline, somewhat fuscous anteriorly. R_{2+3} gently curved to costa apically; R_{4+5} and M slightly divergent distally. C-index 2.3; 4V-index 1.5-2.0; 4C-index 1.2; 5x-index 0.9; Ac-index 1.8. C3-fringe 3/5. Halter yellow. Abdominal tergites (Fig. 2 B-C) mostly

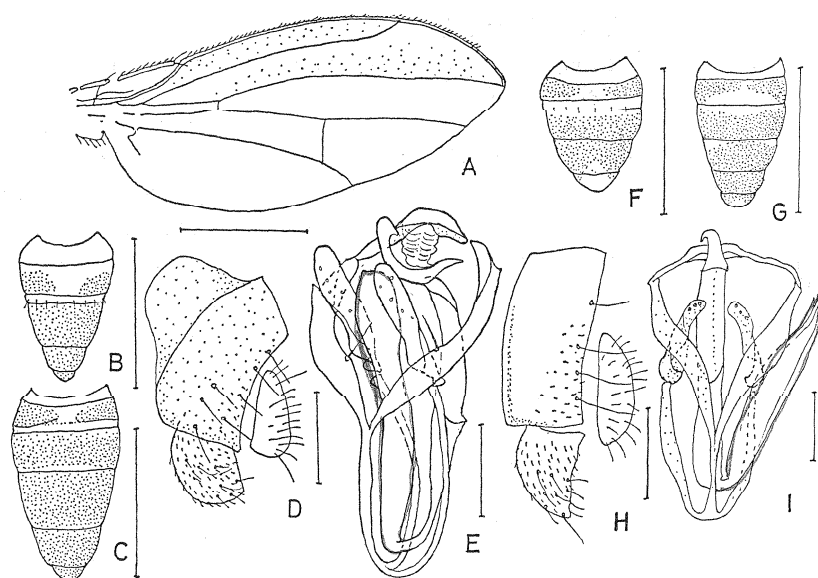


Fig. 2. A-E, *Leucophenga spinifera*; F-I, *L. jacobsoni*. A, Wing; B, F, ♂ abdomen; C, G, ♀ abdomen; D, H, peripheral phallic organs; E, I, phallic organs. Scales as in Fig. 1.

black, 1T yellow, 2T yellow and laterally black; 3T of ♂ narrow, pale and setigerous. Peripheral phallic organs (Fig. 2 D) black, surstylus paler and slightly angular below. Phallic organs (Fig. 2 E) yellowish brown; ventral process of aedeagus paler, simple; hypandrium with submedian spine, thus the specific name.

Holotype ♂, Chitau, Nantow, Taiwan, 16-17. VIII. 1966 (THROCKMORTON); 1 ♂, 4 ♀ paratypes, Wulai, Taipei, Taiwan, 10. VIII. 1966 (OKADA, THROCKMORTON); 2 ♂, 2 ♀, Puli, Nantow, Taiwan, 19. VIII. 1966 (OKADA). Types in National Science Museum, Tokyo.

Distribution. Taiwan, Nepal.

Relationships. This species resembles *L. salatigae* de MEIJERE in having scutellum apically pale, thoracic pleura with dark longitudinal stripe and knob of halter not black, but differs from the latter in having 4V-index lower (2.3 in *salatigae*), and scutellum laterally black. The submedian spine of hypandrium is present also in *L. leucozona* of OKADA from Nepal (*op. cit.*), although it is not figured.

Leucophenga jacobsoni DUDA

(Fig. 2 F-I)

Leucophenga jacobsoni DUDA, 1926, Suppl. ent., 14: 50 (Sumatra); OKADA, 1976, Makumagi, (8): 2 (Malaya, Singapore).

♂, ♀. Body 2.5-3.0 mm in length. Arista with 6-7 upper and 3-4 lower

branches and a large fork. Palpus black or dark brown. Scutellum brown, laterally black, apically pale. Thoracic pleura paler than mesoscutum. Sterno-index about 0.7. Legs yellow. Wing hyaline, R_{4+5} and M slightly divergent. C-index 2.0–2.5; 4V-index 1.8–2.1; 5x-index 1.4; Ac-index 2.2, C3-fringe 3/4. Halter yellow. Abdominal tergites (Fig. 2 F, G): 1T yellow; 2T yellow, laterally black; 3T narrow, silvery yellow and setigerous in ♂, broad, black and anteriorly yellow in ♀; 4–6T mostly black, 4T silvery shining in ♂. Periphalllic organs (Fig. 2 H) pale brown; epandrium truncate below; surstylus pointed below. Phallic organs (Fig. 2 I) yellowish brown, ventral process of aedeagus tripartite; paramere brownish black, club-shaped.

Specimens examined. 1 ♂, 1 ♀, Bogor, Java, 27. VII. 1971 (OKADA, IKEDA); 1 ♂, Pekambaru, Sumatra, 2–4. VIII. 1971 (OKADA); 1 ♂, 3 ♀, Penang, Malaya, 20. VII. 1971 (OKADA, IKEDA); 1 ♂, 3 ♀, Singapore, 5–8. VIII. 1971 (OKADA, IKEDA); 1 ♂, Khao Yai, Thailand, 25. XII. 1975 (SHIMA).

Distribution. Indonesia, Malaysia, Singapore, Thailand (n. loc.).

Leucophenga albofasciata (MACQUART)

Drosophila albofasciata MACQUART, 1851, Men. Soc. nat. Sci. Arts, Lille, 1850: 277 (Australia).

Leucophenga albofasciata: MALLOCH, 1924, Proc. Linn. Soc. NSW, 49: 349 (Australia); BOCK, 1979, Austr. J. Zool., Suppl., (71): 4 (Australia); BOCK, 1982, *ibid.*, Suppl., (89): 24 (Australia); BOCK, 1984, *ibid.*, 32: 122 (Australia).

Leucophenga albifascia OKADA, 1966, Bull. Br. Mus. nat. Hist., (Ent.), Suppl., (6): 22 (Nepal).
N. syn.

♂, ♀. Body 2.5–3.5 mm in length. Antenna, palpus and frons tan. Arista with 6–7 upper and 3–4 lower branches. Mesoscutum tan to dark brown. Scutellum tan, usually unicolorous. Thoracic pleura paler, with median dark patch. Wing hyaline. Leg yellow, hind knee black. C-index 2.7; 4V-index 1.8; 5x-index 1.1; Ac-index 2.2; C3-fringe 3/4. Halter tan, knob black.

Distribution. Australia, New Guinea, Java, India, Nepal.

Leucophenga papuana n. sp.

(Fig. 3 A, B)

♂, ♀. Body about 4 mm in length. Antenna tan; arista with about 8 upper and 5–6 lower branches. Palpus grayish brown. Ocellar triangle black. Frons mat grayish brown, anteriorly twice as long as broad, 1/2 as broad as head width. Face yellow. Clypeus grayish brown. Cheek yellowish gray, narrow. Mesonotum dark brown, scutellum unicolorous. Thoracic pleura pale yellowish brown, without dark patch. Sterno-index about 0.7. Legs yellow, hind knee not black. Wing hyaline, somewhat fuscous anteriorly. C-index 2.7; 4V-index 1.7; 4C-index 1.0; 5x-index 1.1; Ac-index 2.2; C3-fringe 3/4. Halter tan, knob black. Abdominal tergites mostly black; in ♂, 1T medially, 2T caudally, 3T entirely, 4T anteriorly

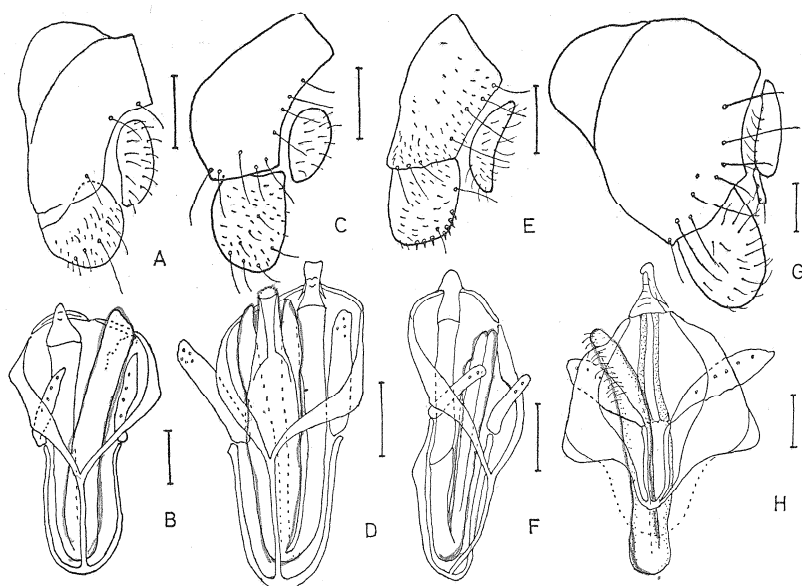


Fig. 3. A, B, *Leucophenga papuana*; C, D, *L. scutellata*; E, F, *L. gibbosa*; G, H, *L. fenchihuensis*. A, C, E, G, Periphallallic organs; B, D, F, H, phallic organs. Scales as in Fig. 1.

yellow, 3T very narrow as usual; in ♀, 1T, 2-4T anteriorly yellow. Periphallallic organs pale brown, surstylus rounded below (Fig. 3 A). Phallic organs (Fig. 3 B) pale brown, ventral process of aedeagus simple.

Holotype ♂, Wau, Papua New Guinea, 24. IX. 1977 (OKADA), by sweeping; 1 ♂ paratype, same place, 20. VIII. 1977 (OKADA), light trap; 1 ♂, 1 ♀ paratypes, same place, 16. IX. 1977 (OKADA), by sweeping. Types in Bishop Museum, 1 ♂ paratype in National Science Museum, Tokyo.

Relationships. This species resembles the foregoing species, *L. albofasciata*, in the coloration of mesoscutum and scutellum, wing venation, and black knob of halter, but differs from the latter by having palpus and frons dark brown, thoracic pleura without dark patch, and knee of hind leg not dark.

Leucophenga fenchihuensis n. sp.

(Fig. 3 G, H)

♂. Body about 3 mm in length. Antenna pale yellowish gray. Arista with about 4-5 upper and 2 lower branches. Palpus yellow. Ocellar triangle black. Frons yellowish white, anteriorly pale orange yellow and 2/7 as broad as head width. Face yellowish white. Clypeus yellowish gray. Cheek narrow, yellowish white. Mesoscutum dark yellowish brown, silvery pruinose. Scutellum brownish black, apical 1/3 yellow. Thoracic pleura paler, with black patches on pteropleuron

and sternopleuron. Humeralis 3. Acrostichal hairs in *ca.* 10 rows. Anterior dorsocentrals half as long as posteriors. Lateral scutellars somewhat convergent, longer than apicals, which are slightly nearer to each other than to laterals. Sterno-index 0.8. Legs yellow, hind knee joint fuscous. C-index *ca.* 2.8; 4V index 1.7; 4C-index 1.0; 5x-index 1.0; Ac-index 1.7; C3-fringe 7/10. Halter yellowish orange. Abdominal tergites mostly black, 3T narrow, bare, yellowish gray, silvery pruinose, 4T anterior half yellowish gray, silvery pruinose. Periphallalic organs (Fig. 3 G) with surstylus rounded below, cercus narrowly elongated below. Phallic organs (Fig. 3 H): aedeagus with ventral process pale, single, oblong, hairy distally; dorsal plate bilobed, black, long; paramere large, oblong; hypandrium without basal arch.

Holotype. ♂, Fenchihu, Chia-i, Taiwan, 1,400 m, 12. IV. 1965 (MIYAMOTO).

Relationships. This species resembles *L. kurahashii* in having the basal arch of hypandrium undeveloped, but different from the latter by having the wing not patched, the thoracic pleura black patched, the paramere bare, and the ventral process of aedeagus hairy.

Leucophenga scutellata MALLOCH

(Fig. 3 C, D)

Leucophenga scutellata MALLOCH, 1923, Proc. Linn. Soc. NSW, **48**: 614; BOCK, 1979; Austr. J. Zool., Suppl., (71): 8; MCEVEY, 1981, *ibid.*, **29**: 916; BOCK, 1982, *ibid.*, Suppl., (89): 26; BOCK, 1984, *ibid.*, **32**: 123 (Australia).

♂, ♀. Body about 3 mm in length. Arista with 6–7 upper and 3 lower branches. Palpus yellowish white. Mesoscutum yellowish brown. Scutellum yellowish brown, laterally black, apically white. Thoracic pleura pale yellowish brown, without dark stripes. Anterior dorsocentrals half as long as posteriors. Lateral scutellars divergent, longer than apicals, which are equally apart from each other and from laterals. Wing hyaline. C-index 3.0; 4V-index 1.7; 4C-index 0.9; 5x-index 1.0; Ac-index 2.3; C3-fringe 4/5. Halter with knob apically black. Abdominal tergites black with yellowish patches, 3T in male short, silvery pruinose. Periphallalic organs (Fig. 3 C) brownish, surstylus oval, with a few long setae. Phallic organs (Fig. 3 D): ventral process of aedeagus tripartite; paramere oblong; basal arch of hypandrium developed.

Specimens examined. 2 ♂, 4 ♀, Wau, Papua New Guinea, 8. IX–7. X. 1977 (OKADA), by sweeping; 1 ♂, 1 ♀, Mc Adams Park, Wau, Papua New Guinea, 22. IX. 1977 (OKADA), by sweeping.

Distribution. Australia, New Guinea (n. loc.).

Leucophenga gibbosa (DE MEIJERE)

(Fig. 3 E, F)

Drosophila gibbosa DE MEIJERE, 1914, Tijdsch. Ent., **57**: 264 (Java).

Leucophenga gibbosa: DUDA, 1924, Arch. Naturg., 90A (3): 187 (Java); TAKADA et MOMMA, 1975, J. Fac. Sci. Hokkaido Univ., (VI), 20: 16 (Malaya); OKADA, 1976, Makunagi, (8): 2 (Singapore); BOCK, 1979, Austr. J. Zool., Suppl., (71): 12 (Australia, New Guinea); BOCK, 1982, ibid., Suppl., (89): 25 (Australia); TAKADA, 1983, J. Fac. general Educ. Sapporo Univ., (22): 140 (Solomon Is.); BOCK, 1984, Austr. J. Zool., 32: 122 (Australia).

♂, ♀. Body about 2.5–4.5 mm in length. Arista with about 8 upper and 5 lower branches. Palpus yellowish orange. Mesoscutum and scutellum entirely yellowish brown, thoracic pleura paler. Scutellars equal in length and mutual distance. Wing fuscous toward costa. C-index 2.4; 4V-index 2.0; 4C-index 2.0; 5x-index 1.2; Ac-index 3.0; C3-fringe ca. 3/4. Halter apically brownish black. Abdominal tergites mostly black. Periphallallic organs (Fig. 3 E) brown; surstylus with a few short strong setae on caudal margin. Phallic organs (Fig. 3 F) brown, ventral process of aedeagus apparently tripartite; paramere short, rod-shaped; basal arch of hypandrium well developed.

Specimens examined. 1 ♂, 1 ♀, Wau, Papua New Guinea, 23–24. IX. 1977 (OKADA), by sweeping.

Distribution. Malaya, Singapore, Java, New Guinea, Solomon Is., Australia.

Leucophenga varinervis DUDA

Leucophenga varinervis DUDA, 1923, Ann. Mus. hist.-nat. Mus. natn. hung., 20: 31 (Formosa); DUDA, 1924, Arch. Naturg., 90A (3): 189 (Formosa); LIN & WHEELER, 1972, Univ. Texas Publ., (7213): 254 (Formosa); BÄCHLI, 1985, Folia ent. hung., 44: 40 (Formosa).

Remarks. This species is characterized by having the proximal half of R_{2+3} , proximal half of R_{4+5} , and posterior crossvein black. 3T yellow, short, half as long as 4T and 5T, characteristic of the male of the *proxima* group species. Although DUDA mentioned that this species was described on a “♀” specimen from “Sokotra”, BÄCHLI found that it (holotype) was a ♂ and Sokotra should be a misprint of Sokotsu.

Specimen examined. None.

Distribution. Formosa.

Taximetric Analysis

Ten diagnostic characters (t=10; A–H) each coded in 2 states (0, 1) are used, as listed below, for constructing a dendrogram of the relationships of 9 species in consideration. *L. varinervis* is excluded from the analysis due to insufficient informations. MCD proximity analysis and UPGMA cluster analysis are applied and from the resulting dendrogram a key to the species is established (Fig. 4).

A: Palpus yellow (A=0) or black (a=1).

B: Scutellum unicolorously yellow (B=0) or laterally black and apically pale (b=1).

C: Thoracic pleura without (C=0) or with (c=1) black patches.

- D: Wing clear (D=0) or black patterned (d=1).
- E: Halter with knob yellow (E=0) or black (e=1).
- F: Surstylus rounded (F=0) or angular below (f=1).
- G: Ventral process of aedeagus tripartite (G=0) or single (g=1).
- H: Paramere bare (H=0) or hairy (h=1).
- I: Submedian spine of hypandrium present (I=0) or absent (i=1).
- J: Basal arch of hypandrium undeveloped (J=0) or developed (j=1).

Original $n \times t$ matrix

Species	Characters									
	A	B	C	D	E	F	G	H	I	J
<i>L. meredithtana</i>	0	0	0	1	0	0	0	0	0	1
<i>L. kurahashii</i>	0	1	0	1	0	0	1	1	0	0
<i>L. spinifera</i>	0	1	1	0	0	1	1	0	1	1
<i>L. jacobsoni</i>	1	1	0	0	0	1	0	0	0	1
<i>L. scutellata</i>	0	1	0	0	1	0	0	0	0	1
<i>L. gibbosa</i>	0	0	0	0	1	0	0	0	0	1
<i>L. albofasciata</i>	0	0	1	0	1	0	1	0	0	1
<i>L. papuana</i>	1	0	0	0	1	0	1	0	0	1
<i>L. fenchihuensis</i>	0	1	1	0	0	0	1	0	0	0

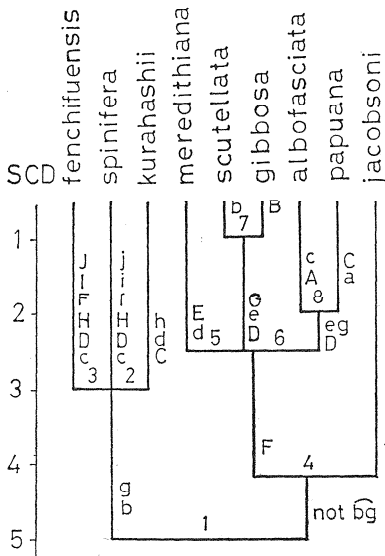


Fig. 4. A dendrogram of the relationships of the *proxima* group species, constructed by means of SCD proximity analysis and UPGMA cluster analysis. Numerical figures on the branching points of dendrogram correspond to the orders of key couplets; alphabetical signs on the branches are the diagnostic character states chosen from the original $n \times t$ matrix.

Key to Species

1. Scutellum laterally black and apically pale (b=1); ventral process of aedeagus single (g=1). 2

- Not simultaneously as above (not bg) 4
- 2. Thoracic pleura without black patches (C=0); wing black patterned (d=1); paramere hairy (h=1).....*kurahashii*
- Thoracic pleura with black patches (c=1); wing clear (D=0); paramere bare (H=0). 3
- 3. Surstylus rounded (F=0); submedian spine of hypandrium present (i=0); basal arch of hypandrium undeveloped (J=0).....*fenchiuensis*
- Surstylus angular below (f=1); submedian spine of hypandrium absent (i=1); basal arch of hypandrium developed (j=1).....*spinata*
- 4. Surstylus angular below (f=1).....*jacobsoni*
- Surstylus rounded (F=0). 5
- 5. Wing black patterned (d=1); halter with knob yellow (E=0).....*meredithiana*
- Wing clear (D=0); halter with knob black (e=1). 6
- 6. Ventral process of aedeagus tripartite (G=0). 7
- Ventral process of aedeagus single (g=1). 8
- 7. Scutellum laterally black and apically pale (b=1).....*scutellata*
- Scutellum unicolorously yellow (B=0).....*gibbosa*
- 8. Palpus yellow (A=0); thoracic pleura with black patches (c=1).. *albofasciata*
- Palpus black (a=1); thoracic pleura without black patches (C=0).....*papuana*

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