

The Drosophilidae (Diptera) of Hainan Island (China)¹

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ABSTRACT: Specimens were collected in November 1991 at six sites ranging from 200 to 1000 m altitude. We have identified 35 species (297 specimens) of 12 genera; 8 species are recorded from China for the first time. We have added notes on the status of additional specimens belonging to the genera *Scaptodrosophila* Duda and *Nesiodrosophila* Wheeler & Takada.

HAINAN, A PROVINCE in the southeastern part of the People's Republic of China, is a large (34,000 km²) continental island lying west of the South China Sea and east of Beibu Gulf (Gulf of Tonkin) at ca. 20° N latitude (Figure 1). Wholly tropical in nature, the northern and western portions of the island have a broad coastal plain, to the south and west of which are substantial mountains, rising to over 2000 m altitude and harboring large forested areas. The climate is mild and breezy and most of the rainfall comes from seasonal monsoons. There are occasional destructive typhoons.

Very little is known about the Drosophilidae of China as a whole and of Hainan in particular. This lack is regrettable in view of the increasing genetic and geographical information on speciation and evolution in this family, including both continental and insular faunas (e.g., Ashburner et al. 1981). Preliminary studies of some areas of southwestern China in particular suggest that the endemic fauna there is extraordinarily interesting and diverse (e.g., Toda and Peng 1989, Watabe et al. 1990). This is the first paper to report

specifically on drosophilid collections from Hainan Island.

MATERIALS AND METHODS

Collections were made during a very dry period from 16 November through 23 November 1991 at six sites (Figure 1; Table 1). Banana bait, fermented with yeast, was placed in plantations or naturally forested areas, and the specimens were collected in the usual manner by net sweeping over the bait. In addition, extensive net sweeping over natural substrates was carried out without the use of baits. All of the specimens listed below were collected by HuKai and H. L. Carson and are deposited at Kunming Institute of Zoology, Academia Sinica, Kunming, Yunnan, People's Republic of China.

OBSERVATIONS ON SPECIES

The following catalog records identifications of species and gives notes on their distributions. Descriptions of the collection sites are given in Table 1. As shown in Table 1, the institute grounds and arboretum at the Research Institute of Tropical Forests near the town of Jian Feng, Ledong County, yielded the richest collections. Especially valuable was an area of natural forest within the arboretum that had been preserved along a small stream.

Eight species represent first records from China. It is noteworthy that three very widely distributed species over the world, *D. melano-*

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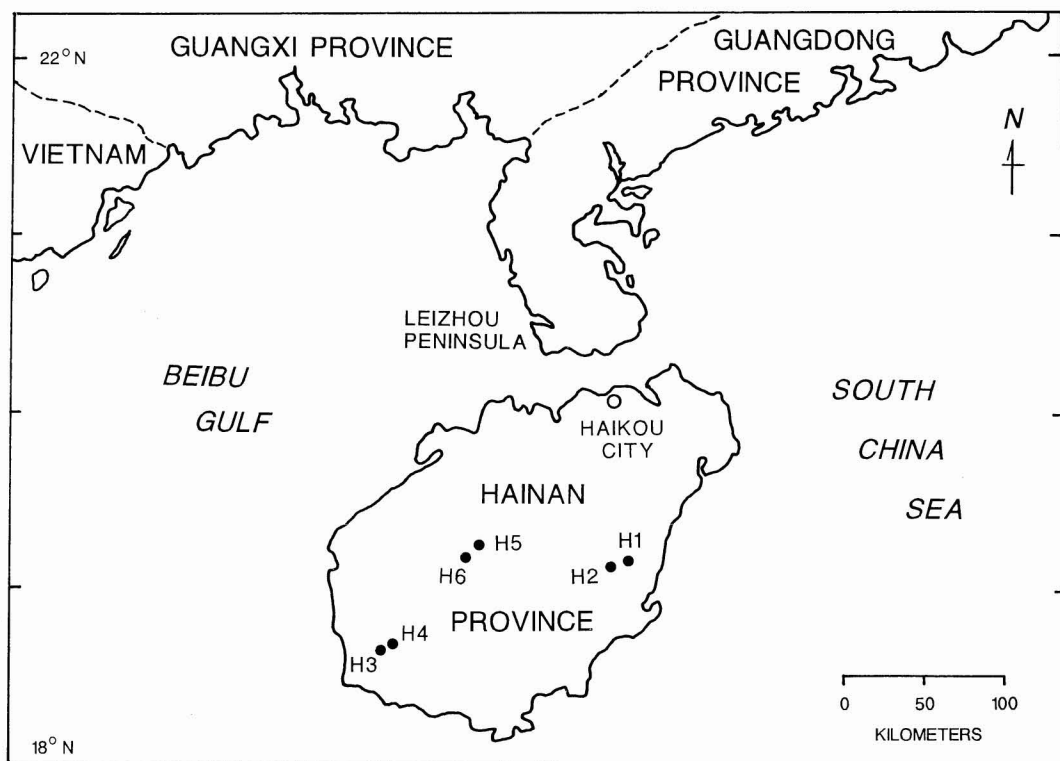


FIGURE 1. Map showing Hainan Island in southern China and the positions of *Drosophila* collecting sites H1 through H6 (see Table 1).

TABLE 1
COLLECTION SITES FOR DROSOPHILIDAE IN HAINAN PROVINCE, CHINA

SITE NO. (SEE FIG. 1)	LOCALITY	DATE (1991)	REMARKS
H1	Dongxin Farm, Wanning County, altitude 200 m	16, 17 Nov.	Baits of banana set ca. 200 m south of guest house in area of rubber and coffee trees; 11 species collected
H2	Small rural village, 13 km south of Jing Lin, Wanning County	17 Nov.	Swept flies near houses in village and in gardens; 3 species collected
H3	Research Institute of Tropical Forests, near Jian Feng town, Ledong County, altitude 200 m	19–21 Nov.	Baits placed in extensive hillside arboretum with many exotic trees and in natural forest area along stream; sweeping with nets; 19 species collected
H4	Nature Reserve at Jian Feng Ling, Ledong County, altitude 1,000 m	20 Nov.	Net sweeping in high-altitude intact native forest; no bait used; 10 species collected
H5	Bawang Lin, nature reserve for gibbons (Hu Toa Ling), Changjian County, altitude 1,000 m	23 Nov.	Net sweeping along trail ascending narrow ridge in virgin forest; no bait used; 8 species collected
H6	Bawang Town, Changjiang County, altitude 200 m	23 Nov.	Baits in courtyard and hillside near guest house; 8 species collected

nogaster Meigen, *D. simulans* Sturtevant, and *D. immigrans* Sturtevant, were not present in any of these collections.

Subfamily STEGANINAE

Tribe STEGANINI Okada, 1989

Subtribe LEUCOPHENGINA Grimaldi, 1990

Genus *Leucophenga* Mik, 1886

1. *Leucophenga subpollinosa* (Meijere)
Leucophenga subpollinosa Meijere, 1914,
Tijdschr. Entomol. 57: 263.

SPECIMEN EXAMINED: 1 ♀, H1.

DISTRIBUTION: Ryukyu Is., China (Taiwan, Guangdong, Hainan), Philippines, Vietnam, Thailand, Malaya, Sumatra, Borneo, Java, Nepal, India.

2. *Leucophenga bellula* (Bergroth)
Leucophenga bellula Bergroth, 1894, Entomol.
Z. Stettin 55: 75.

SPECIMEN EXAMINED: 1 ♀, H1.

DISTRIBUTION: Japan, Ryukyu Is., China (Beijing, Guangdong, Yunnan, Hainan, Hong Kong), Java, Nepal, India, Micronesia, Australia, Africa.

Subfamily DROSOPHILINAE

Tribe DROSOPHILINI Okada, 1989

Subtribe DROSOPHILINA Grimaldi, 1990

Infratribe DROSOPHILITI Grimaldi, 1990

Genus *Scaptodrosophila* Duda, 1923

3. *Scaptodrosophila oweni* (Bock & Parsons)
Drosophila (Scaptodrosophila) oweni Bock &
Parsons, 1978, Aust. J. Zool. 26: 346;
Okada, 1988, Entomol. Scand. Suppl. 30:
133.

SPECIMEN EXAMINED: 1 ♂, H3.

DISTRIBUTION: Sri Lanka, China (Hainan), Australia.

4. *Scaptodrosophila minima* (Okada)
Drosophila (Scaptodrosophila) minima Okada,
1966, Bull. Br. Mus. (Nat. Hist.) Entomol.
Suppl. 6: 69.

REMARKS: Lateral lobe of gonopod fused to aedeagus. Body ca. 1.5 mm in length.

SPECIMEN EXAMINED: 1 ♂, H5.

DISTRIBUTION: Ryukyu Is., China (Taiwan, Yunnan, Guangdong, Hainan), Nepal, India.

5. *Scaptodrosophila* sp.

REMARKS: Body yellow, arista branches 2/1, bifurcation large. Posterior dorsocentral setae located at same level with prescutellar setae. Thorax with extra setae between posterior dorsocentral setae and prescutellar setae, another one outside posterior dorsocentral setae.

SPECIMEN EXAMINED: 1 ♀, H1.

Chymomyza genus group, Grimaldi, 1990

Genus *Chymomyza* Czerny, 1903

6. *Chymomyza pararufithorax* Vaidya & Godbole

Chymomyza pararufithorax Vaidya & Godbole, 1973, Dros. Inf. Serv. 50: 71.

Chymomyza vaidyai Okada, 1976, Kontyu 44: 500.

REMARKS: Parameres short, hypandrial apodeme concave at lower margin.

SPECIMEN EXAMINED: 1 ♂, H3.

DISTRIBUTION: India, Malaysia, China (Guangdong, Hainan).

Hirtodrosophila genus complex, Grimaldi, 1990

Zygothrica genus group, Grimaldi, 1990

Genus *Paramycodrosophila* Duda, 1923

7. *Paramycodrosophila okadai* Wynn & Toda
Paramycodrosophila okadai Wynn & Toda,
1990, Jpn. J. Entomol. 58: 308.

SPECIMEN EXAMINED: 1 ♂, H3.

DISTRIBUTION: China (Hainan), Myanmar.

Drosophila genus complex, Grimaldi, 1990

Genus *Drosophila* Fallen, 1823

Subgenus *Sophophora* Sturtevant, 1939

melanogaster species group, Hsu, 1949

takahashii subgroup, Hsu, 1949

8. *Drosophila (Sophophora) takahashii* Sturtevant

Drosophila (Sophophora) takahashii Sturtevant, 1927, Philipp. J. Sci. 32: 371.

SPECIMENS EXAMINED: 4 ♂♂, H3; 2 ♂♂, H6.

DISTRIBUTION: China (Beijing, Xinjiang, Shanxi, Shandong, Jiangsu, Anhui, Shanghai, Zhejiang, Jiangxi, Hunan, Fujian, Taiwan, Guangdong, Hainan, Guangxi, Guizhou, Yunnan), Japan, Korea, Micronesia, Ryukyu

Is., Philippines, Thailand, Malaya, Borneo, Java, Nepal, India, Myanmar, Sri Lanka.

suzukii subgroup, Hsu, 1949

9. *Drosophila (Sophophora) suzukii* (Matsumura)

Leucophenga suzukii Matsumura, 1931, Six thousand insects of Japan Empire, 367.

SPECIMENS EXAMINED: 1 ♂, H3; 1 ♂, H4.

DISTRIBUTION: China (Heilongjiang, Jilin, Liaoning, Beijing, Shanxi, Shandong, Jiangsu, Anhui, Shanghai, Zhejiang, Jiangxi, Hunan, Fujian, Guangdong, Hainan, Guangxi, Sichuan, Guangzhou, Yunnan), Japan, Korea, Quelpart Is., Ryukyu Is., Bonin Is., Hawaii, Thailand, northern India, Myanmar.

eugracilis subgroup, Bock & Wheeler, 1972

10. *Drosophila (Sophophora) eugracilis* Bock & Wheeler

Drosophila (Sophophora) eugracilis Bock & Wheeler, 1972, Univ. Tex. Publ. 7213:31.

SPECIMENS EXAMINED: 3 ♂♂, H6.

DISTRIBUTION: Philippines, Cambodia, Thailand, Malaya, Singapore, Sumatra, Borneo, Java, Celebes, Andaman Is., northern to southern India, Sri Lanka, New Guinea, Australia, Myanmar, China (Yunnan, Hainan, Taiwan).

ananassae subgroup, Hsu, 1949

11. *Drosophila (Sophophora) ananassae* Dole-schall

Drosophila (Sophophora) ananassae Dole-schall, 1858, Natuurk. Tijdschr. Ned. Indie (1858-1859) 17:128.

SPECIMENS EXAMINED: 13 ♂♂, 1 ♀, H2.

DISTRIBUTION: Cosmopolitan; Europe, southern United States, Japan, Korea, Bonin Is., Ryukyu Is., Vietnam, Thailand, Singapore, Sumatra, Borneo, Java, Celebes, Andaman Is., Myanmar, India, Sri Lanka, China (Shanghai, Taiwan, Hainan, Yunnan), New Guinea, Moluccas, Australia, New Caledonia, Norfolk Is., Fiji Is., Samoa, Hawaii, South America, Mauritius, Africa.

12. *Drosophila (Sophophora) malerkotliana malerkotliana* Parshad & Paika

Drosophila (Sophophora) malerkotliana Parshad & Paika, 1964, Res. Bull. Panjab Univ. 15:235.

SPECIMENS EXAMINED: 16 ♂♂, H6; 27 ♂♂, H3.

DISTRIBUTION: Philippines, Thailand, Malaya, Singapore, Sumatra, Borneo, Java, Celebes, China (Yunnan, Hainan, Guangzhou, Guangdong).

13. *Drosophila (Sophophora) bipectinata* Duda
Drosophila (Sophophora) bipectinata Duda, 1923, Ann. Hist. Nat. Mus. Natl. Hung. 20:52.

SPECIMENS EXAMINED: 1 ♂, H1; 8 ♂♂, H3; 3 ♂♂, H6.

DISTRIBUTION: India, Nepal, Borneo, Philippines, New Guinea, Samoa, Ryukyu Is., Cambodia, Thailand, Malaya, Singapore, Sumatra, China (Hainan, Yunnan, Taiwan, Zhejiang, Guangdong).

14. *Drosophila (Sophophora) parabiptinata* Bock

Drosophila (Sophophora) parabiptinata Bock, 1971, Univ. Tex. Publ. 7103:277.

SPECIMENS EXAMINED: 6 ♂♂, H1; 2 ♂♂, H3; 4 ♂♂, H6.

DISTRIBUTION: Borneo, Philippines, Cambodia, Thailand, Celebes, India, China (Hunan, Hainan, Yunnan).

montium subgroup, Hsu, 1949

15. *Drosophila (Sophophora) kikkawai* Burla
Drosophila kikkawai Burla, 1954, Rev. Bras. Biol. 14:47.

SPECIMENS EXAMINED: 5 ♂♂, H1; 1 ♂, 3 ♀♀, H2; 1 ♂, H3; 8 ♂♂, H6.

DISTRIBUTION: Samoa, Fiji, Hawaii, Micronesia, New Guinea, Borneo, Philippines, Sumatra, Vietnam, Malaya, Thailand, India, Nepal, Korea, Japan, South Africa, China (Hainan, Yunnan, Jilin, Beijing, Shandong, Shanxi, Jiangsu, Anhui, Sichuan, Shanghai, Zhejiang, Fujian, Jiangxi, Hunan, Taiwan, Guangzhou, Guangdong, Guangxi, Hong Kong).

16. *Drosophila (Sophophora) trapezifrons* Okada
Drosophila (Sophophora) trapezifrons Okada,

1966, Bull. Br. Mus. (Nat. Hist.) Entomol. Suppl. 6:93.

SPECIMENS EXAMINED: 4 ♂♂, 3 ♀♀, H5.

DISTRIBUTION: Nepal, India, China (Hainan, Yunnan, Taiwan, Beijing, Sichuan, Zhejiang, Fujian, Jiangxi, Guangzhou, Guangdong, Guangxi).

17. *Drosophila (Sophophora) jambulina* Parshad & Paika

Drosophila (Sophophora) jambulina Parshad & Paika, 1964, Res. Bull. Panjab Univ. (n.s.) 15:240.

REMARKS: Tip of aedeagus slightly hairy, medially with sparse hairs. Secondary surstylus with 2 large and 1 very small teeth.

SPECIMENS EXAMINED: 1 ♂, H3; 12 ♂♂, H6.

DISTRIBUTION: Cambodia, Java, India, Sri Lanka, Australia, China (Hainan, Taiwan, Hong Kong).

18. *Drosophila (Sophophora) punjabiensis* Parshad & Paika

Drosophila (Sophophora) punjabiensis Parshad & Paika, 1964, Res. Bull. Panjab Univ. (n.s.) 15:241.

REMARKS: Tip of aedeagus hairy, antero-medially with hairs. Paramedian spines of hypandrium missing. Aedeagus longer than in preceding species.

SPECIMEN EXAMINED: 1 ♂, H3.

DISTRIBUTION: India, Malaya, Thailand, Singapore, China (Hainan, Yunnan).

19. *Drosophila (Sophophora) agumbensis* Prakash & Reddy

Drosophila (Sophophora) agumbensis Prakash & Reddy, 1978, Orient. Insects 12:259.

SPECIMEN EXAMINED: 1 ♂, H3.

DISTRIBUTION: India, China (Hainan).

20. *Drosophila (Sophophora) baimaii* Bock & Wheeler

Drosophila (Sophophora) baimaii Bock & Wheeler, 1972, Univ. Tex. Publ. 7213:70.

REMARKS: Aedeagus hirsute apically and subapically. Paramere similar to that of *baimaii* but secondary surstylus with 1 large black tooth, thicker and shorter than tooth on cercus, as in *D. pseudobaimaii* Takada, Momma & Shima. C ca. 2.0, 4V ca. 2.7.

SPECIMEN EXAMINED: 1 ♂, H3.

DISTRIBUTION: China (Hainan), Thailand.

Subgenus *Drosophila* Fallen, 1823
immigrans species group, Sturtevant, 1942
nasuta subgroup, Wilson et al., 1969

21. *Drosophila (Drosophila) albomicans* Duda
Drosophila (Spinulophila) albomicans Duda, 1923, Ann. Hist. Nat. Mus. Natl. Hung. 20:48.

SPECIMENS EXAMINED: 1 ♂, 6 ♀♀, H1; 1 ♂, H3; 2 ♂♂, 2 ♀♀, H6.

DISTRIBUTION: Ryukyu Is., Thailand, Malaya, India, Myanmar, China (Taiwan, Hong Kong, Yunnan, Guangdong, Guangxi, Hainan, Shandong, Sichuan, Shanghai, Zhejiang, Fujian, Hunan, Guangzhou).

22. *Drosophila (Drosophila) sulfurigaster albostrigata* Wheeler

Drosophila (Drosophila) sulfurigaster albostrigata Wheeler, in Wilson et al., 1969, Univ. Tex. Publ. 6918:217.

SPECIMENS EXAMINED: 1 ♂, 1 ♀, H3.

DISTRIBUTION: Philippines, Cambodia, Thailand, Sri Lanka, Malaya, Borneo, Singapore, Myanmar, China (Hainan, Yunnan).

hypocausta subgroup, Wilson et al., 1969

23. *Drosophila (Drosophila) siamana* Hihara & Lin

Drosophila (Drosophila) siamana Hihara & Lin, 1984, Bull. Inst. Zool. Acad. Sin. (Taipei) 23:207.

SPECIMENS EXAMINED: 1 ♂, H1; 1 ♂, H2; 1 ♂, H3; 1 ♂, H4.

DISTRIBUTION: Thailand, Malaya, Borneo, Myanmar, China (Hainan, Yunnan).

histrion species group, Okada, 1989

24. *Drosophila (Drosophila) trisetosa* Okada
Drosophila (Drosophila) trisetosa Okada, 1966, Bull. Br. Mus. (Nat. Hist.) Entomol. Suppl. 6:99.

SPECIMENS EXAMINED: 2 ♂♂, H1.

DISTRIBUTION: Nepal, India, Myanmar, China (Hainan, Guangdong, Yunnan).

Subgenus *Psilodorha* Okada, 1968

25. *Drosophila (Psilodorha) ancora* Okada
Drosophila (Psilodorha) ancora Okada, 1968,
Kontyu 36: 334.

SPECIMEN EXAMINED: 1 ♂, H4.

DISTRIBUTION: Ryukyu Is., China (Hainan).

Styloptera genus group, Grimaldi, 1990

Genus *Liodrosophila* Duda, 1922

26. *Liodrosophila globosa* Okada
Liodrosophila globosa Okada, 1965, Kontyu
33: 334; 1974, Mushi 48: 50.

SPECIMENS EXAMINED: 2 ♂♂, H3; 1 ♂, 4 ♀♀,
H4.

DISTRIBUTION: Ryukyu Is., Java, Sumatra,
Sabah, Brunei, Sri Lanka, China (Hainan,
Yunnan).

27. *Liodrosophila quadrimaculata* Okada
Liodrosophila quadrimaculata Okada, 1974,
Mushi 48: 34.

REMARKS: Fore and mid coxae not black.

SPECIMEN EXAMINED: 1 ♂, H5.

DISTRIBUTION: China (Hainan, Taiwan).

28. *Liodrosophila aerea* Okada
Liodrosophila aerea Okada, 1956, Syst. Study
Dros. Japan, 57; 1974, Mushi 48: 30.

SPECIMENS EXAMINED: 6 ♂♂, 3 ♀♀, H4; 7 ♂♂,
9 ♀♀, H5.

DISTRIBUTION: Japan, Korea, Ryukyu Is.,
Singapore, Java, China (Hainan, Taiwan,
Hong Kong, Yunnan).

29. *Liodrosophila nitida* Duda
Liodrosophila nitida Duda, 1922, Arch.
Naturg. 88(A4): 157.

SPECIMENS EXAMINED: 1 ♂, 1 ♀, H4.

DISTRIBUTION: Japan, Ryukyu Is., Vietnam,
Nepal, Thailand, Malaya, Java, Singapore,
Sumatra, Sabah, China (Hainan, Taiwan,
Hong Kong).

Genus *Hypselothrea* Meijere, 1906

30. *Hypselothrea guttata* Duda
Hypselothrea guttata Duda, 1926, Suppl.
Entomol. (Berl.) 14: 56.

SPECIMENS EXAMINED: 3 ♀♀, H4; 2 ♂♂, 1 ♀,
H5.

DISTRIBUTION: Nepal, India, Sumatra,
China (Taiwan, Hainan, Guangdong, Anhui,
Fujian).

Genus *Mulgravea* Bock, 1982

31. *Mulgravea indersinghi* (Takada &
Momma)

Lissocephala indersinghi Takada & Momma,
1975, J. Fac. Sci. Hokkaido Univ. Ser. VI
(Zool.) 20: 24.

SPECIMENS EXAMINED: 1 ♂, H3; 2 ♂♂, H4.

DISTRIBUTION: Malaya, China (Hainan).

REMARKS: Tergites similar to *M. parasiatica*
Takada & Momma, black from 2T to 4T, but
5T yellow laterally, 6T with triangular patch
in middle, 7T yellow laterally. Frontal vittae
entirely black. For a list of *Mulgravea* species,
see Okada (1987).

Dicladochaeta genus group, Grimaldi, 1990

Genus *Microdrosophila* Malloch, 1921

32. *Microdrosophila (Microdrosophila) bipar-*
tita Zhang

Microdrosophila (Microdrosophila) bipartita
Zhang, 1989, Proc. Jpn. Soc. Syst. Zool.
40: 72.

SPECIMEN EXAMINED: 1 ♀, H1.

DISTRIBUTION: China (Yunnan, Hainan).

33. *Microdrosophila (Microdrosophila) tabu-*
laris Zhang

Microdrosophila (Microdrosophila) tabularis
Zhang, 1989, Proc. Jpn. Soc. Syst. Zool.
40: 77.

REMARKS: Body yellow, but mesopleuron
without stripe. Wing wide.

SPECIMEN EXAMINED: 1 ♀, H1.

DISTRIBUTION: China (Hainan, Yunnan).

Scaptomyza genus group, Grimaldi, 1990

Genus *Nesiodrosophila* Wheeler & Takada,
1964

34. *Nesiodrosophila delicata* Nishiharu
Nesiodrosophila delicata Nishiharu, 1981,
Kontyu 49: 21.

SPECIMENS EXAMINED: 4 ♂♂, 2 ♀♀, H3; 9 ♂♂,
7 ♀♀, H4; 1 ♂, 3 ♀♀, H5.

DISTRIBUTION: Japan, Myanmar, China
(Hainan).

35. *Nesiodrosophila magnidentata* (Lee)

Drosophila magnidentata Lee, 1964, Korean J. Zool. 7: 107 (37 in reprint edition). *Nesiodrosophila magnidentata*, Okada, 1984, Kontyu 52: 33.

REMARKS: C index high, ca. 2.5–3.0; in *N. magnidentata* it is only 2.0. Anterior scutellars nearly equal to posteriors (less than 1/2 length of posterior one).

SPECIMENS EXAMINED: 2 ♀♀, H5.

DISTRIBUTION: Korea, China (Hainan).

36. *Nesiodrosophila* sp. G2

REMARKS: Epandrium black, narrow on lower part. Cercus pale, with 1 long seta subapically. Surstylus pale, primary prenisetae ca. 4–5. Aedeagus dorsally with curved process. Body black dorsally, pale white ventrally. This is a new species from Guangdong that is being described by M. J. Toda (pers. comm.).

SPECIMENS EXAMINED: 3 ♂♂, 5 ♀♀, H5.

DISTRIBUTION: China (Hainan, Guangdong).

Scaptomyza genus subgroup, Grimaldi, 1990
Genus *Lordiphosa* Basden, 1961

37. *Lordiphosa acutissima* (Okada)

Drosophila acutissima Okada, 1956, Syst. Study. Dros. Japan, 139.

Lordiphosa acutissima, Wheeler, in Ashburner et al., 1986, Genet. Biol. *Drosophila*, vol. 3e: 402.

REMARKS: The pattern of the primary prenisetae of the surstylus is different from that in the original description. The prenisetae are more irregular; the upper half of the epandrium has ca. 2 setae.

SPECIMEN EXAMINED: 1 ♂, H4.

DISTRIBUTION: Japan, China (Jilin, Liaoning, Taiwan, Hainan, Yunnan).

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