

NON-ANOPHELINE MOSQUITOES OF TAIWAN: ANNOTATED CATALOG AND BIBLIOGRAPHY¹

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INTRODUCTION

The studies of the mosquitoes of Taiwan were initiated as early as 1901 or even earlier by several pioneer workers, i. e. K. Kinoshita, J. Hatori, F. V. Theobald, J. Tsuzuki and so on, and have subsequently been carried out by them and many other workers. Most of the workers laid much more emphasis on anopheline than on non-anopheline mosquitoes, because the former had direct bearing on the transmission of the most dreaded disease, malaria, in Taiwan. Owing to their efforts, the taxonomic problems of the *Anopheles* mosquitoes of Taiwan are now well settled, and their local distribution and some aspects of their habits well understood. However, there still remains much work to be done on the non-anopheline mosquitoes of Taiwan. Nowadays, malaria is being so successfully brought down to near-eradication in Taiwan that public health workers as well as the general public are starting to give their attention to the control of other mosquito-borne diseases such as filariasis and Japanese B encephalitis, and the elimination of mosquito nuisance. Accordingly extensive studies of the non-anopheline mosquitoes of Taiwan now become very necessary and important.

Morishita and Okada (1955) published a reference catalogue of the local non-anopheline mosquitoes. However the catalog compiled by them in 1955 was based on information obtained before 1945. They listed 34 species, but now it becomes clear that 4 of them are respectively synonyms of 4 species among the remaining 30. Since 1945 much more information has been added by Tsai & Lien (1950), Chow (1950) and Chen & Lien (1956). Up to the present all together more than 100 different combinations of generic and specific mosquito names have been used for the non-anopheline mosquitoes recorded from Taiwan. Owing to the frequent changes of mosquito names in mosquito taxonomy and inaccurate identification of mosquitoes in the past, it is obvious that the number of mosquito names used far exceeds the number of species actually recorded to exist in Taiwan. According to current mosquito taxonomy and the evidence I obtained, these numerous

1. During the period between 1901 and June 1961. The word "Taiwan" here means the main island of Taiwan and subordinate islands.
2. TAMRI for short; address: Chaochow, Pingtung, Taiwan, China. This study was conducted with aid from the U. S. Naval Medical Research Unit No. 2 including funds made available through Public Law 480, Section 104 (c). The opinions and assertions contained herein are those of the author and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

mosquito names are apparently applicable to 61 species and subspecies or varieties. In my recent investigation, it has become clear that more than 90 species of non-anopheline mosquitoes actually exist in the main island of Taiwan and the subordinate islands. These of course contain many species new to Taiwan and new to science. The full account of such species will be given together with keys to the larvae and the adults of all known species in a separate paper.

The purpose of this paper is to present a comprehensive account of all the previous records of the non-anopheline mosquitoes from Taiwan, together with a brief account of my findings as supporting information. In order to effect this purpose as completely as possible, I have examined a large number of papers with utmost care. A total of 107 reports were found to be relative to the present theme. However only about 50% of the reports are original. The remaining reports are direct or indirect quotations from the original reports. The reports which deal with ecological, toxicological and other studies are also included as a part of taxonomic and distributional studies. However such particular studies are not reviewed except for some more important information.

The records of the local species of mosquito so far as I could find from the scientific papers and books published between 1901 and June 1961 are all included in the text. However it should be understood that for accuracy only the species records clearly indicating either Formosa or Taiwan are included and that those indicating Oriental, Cosmopolitan etc. are all excluded from the text. The list of Toxorhynchitini and Culicini of Taiwan appearing in the paper "Provisional list of medically important fauna of Taiwan (Formosa)" by Shimada, Trager and Adams (April, 1961) is so misleading that it is entirely disregarded. The errata sheet issued some months after the publication of the paper is likewise so misleading that it is also disregarded.

The mosquito names hitherto used for the local mosquitoes are all listed according to their proper designation, and followed by code numbers and page numbers. The code numbers represent the respective paper listed in the bibliography. The page numbers indicate the origin of the records in the respective paper. The papers listed in the bibliography are arranged according to the order of publication, but the order might not be correct in cases where more than two papers are published in different journals in the same year. The previous collection data when known are fully given, and followed by the code number of the respective paper. The code numbers shown in italics after the mosquito names indicate that the corresponding papers are original records.

During the island-wide malaria control and eradication operations launched since 1952 and 1958 respectively, a large number of non-anopheline mosquitoes as well as anophelines have been collected from every corner of the main island of Taiwan and the subordinate islands by the entomological members of TAMRI, and have since been well preserved. The mosquito specimens in TAMRI collection are largely the fruits of the strenuous exertions of Dr. H. H. Chen, now WHO Malaria Advisor to Saigon, Vietnam, to whom I am very much obliged. He worked in TAMRI as chief of the Entomology Section for several years, then as vicedirector of the Institute for some time. Thanks to his strenuous exertions, the preparation of the present paper was greatly facilitated.

ANNOTATED CATALOG

1. *Toxorhynchites (Toxorhynchites) aurifluus* (Edwards)

Megarhinus aurifluus, Edwards, 1921, Ann. Mag. Nat. Hist. ser. 9, 8: 631.—25: 631.—28: 459.—33: 364.—40: 61.—43: 25.—49: 92.—50: 241.—60: 599.—61: C2.—69: 4.—79: 178.

Megarhinus sp., 45: 11; fig. 6.

Megarhinus aurifluus var. *formosensis*, 50: 241.—79: 178.

Megarhinus aurifluus formosensis, 61: C2.

Toxorhynchites aurifluus, 77: 310.—97: 62.

Previous Records: 1 ♀, Toa Tsui Kutsu, V. 1914; 2 ♂♂, Kankau, 1912 and 1 ♂, Toyenmongai; also 1 ♂ without definite data (25); 1 ♂, Suiriko, V. 1939 (45); 1 ♂, Taito, 25. II. 1919 (50); *M. aurifluus* var. *formosensis*, 2 ♂♂, Ikenohata (Shinchiku), 26. V. 1938 (50).

Widely distributed in central and southern parts of Taiwan Proper, but not common. Larva breeds usually in tree-holes and bamboo-stumps, rarely in artificial containers in forested mountainous area below 1200 m, and preys on larvae of Culicidae, Chironomidae and others occurring in the same habitat. Each larval habitat usually contains only 1 larva, but sometimes more than 2, the maximum number noted being 6. Adults are very seldom encountered even in the area where larvae are found in numbers. Eggs are very round and milky white in color.

Ogasawara (1939) described *T. aurifluus* var. *formosensis* from the northern part of Taiwan Proper, however his description is very brief and lacks reliable discriminating characters from type *T. aurifluus*. As I suspected that it might be the synonym of *T. aurifluus* Edwards, I sent my assistants, C. L. Chung and L. C. Lu to the type locality of said variety in September 1961 to confirm this. There they successfully obtained a pupa and four larvae of *Toxorhynchites* from tree-holes. Except one, all emerged into adults. The resulting adults contain a male and a female each of typical *T. aurifluus* and *T. manicatus*. From this finding, I am encouraged to treat Ogasawara's *T. aurifluus* var. *formosensis* as the synonym of *T. aurifluus* Edwards.

2. *Toxorhynchites (Toxorhynchites) manicatus* (Edwards)

Megarhinus manicatus Edwards, 1921, Ann. Mag. Nat. Hist. ser. 9, 8: 630.—25: 630.—28: 459.—33: 364.—40: 61.—43: 16.—50: 242.—60: 599.—61: C2.—79: 178.

Toxorhynchites manicatus, 77: 310.—81: 32.—97: 64.

Previous Records: 1 ♀, Toa Tsui Kutsu, V. 1914 (25).

Widely distributed throughout Taiwan Proper, but not common in area below 1000 m. Larva breeds in the same types of habitat as those of *T. aurifluus* in more or less the same order of frequency in forested mountainous area between 200–2400 m, and preys on larvae of Culicidae, Chironomidae and others. Each larval habitat usually contains only 1 larva, but sometimes more than 2, the maximum number noted being 12. Like *T. aurifluus*, adults are also very seldom encountered in the field. Eggs are very round and milky white in color.

3. *Tripteroides (Tripteroides) aranoides* (Theobald)

Wyeomyia aranoides Theobald, 1901, Mon. Cul. 2: 274.

Tripteroides aranoides, 72: 281.—97: 66.

Tripteroides aranoides aranoides, 107: 30.

Previous Records: Numerous larvae collected from bamboo-stumps in Taichung Hsien (72).

Widely distributed throughout Taiwan Proper, also present on Liuchiu I., fairly common but not common in area above 500 m. Larva breeds exclusively in bamboo-stumps. Adults are sometimes seen around breeding sites, but I have never been attacked by them even in the area where larvae breed in abundance.

4. *Tripteroides (Tripteroides) bambusa* (Yamada)

Rachionotomyia bambusa Yamada, 1917, Zool. Mag., Tokyo 29: 61.—28: 461.—33: 364.—41: 229.—59: 10.

Phoniomyia bimaculipes, 14: 1026.

Rachionotomyia sp. (? *bambusa*), 25: 630.

Tripteroides bambusa 60: 609.—61: C2.—67: 15.—72: 281.—75: 1552.—79: 178.—97: 66.

Tripteroides bimaculipes 79: 178.

Previous Records: 5 adults, Daichikuko, F4 (14); Polisha (25); Breeding in bamboo stumps in Taichung Hsien and in artificial water containers in Hwalien Hsien (72).

Very widely distributed throughout Taiwan Proper, more common than *T. aranoides*. Larva breeds in numbers in bamboo-stumps and tree-holes in forested area below 2000 m. Adults are very often seen in forested areas, but I have never been attacked although adult ♀♀ are sometimes seen alighting on my naked hands or legs as if probing. I have seen once in the tidal forest near the southernmost tip of Taiwan Proper an adult ♀ alighting on the nose of a tortoise as if probing, but despite careful watching for some time, I failed to confirm its biting.

5. *Malaya genurostris* Leicester

Malaya genurostris Leicester, 1908, Cul. Malaya: 258.—97: 94.—107: 50.

Harpagomyia genurostris, 28: 461.—33: 364.—40: 93.—61: C2.—72: 281.—79: 178.

Previous Records: No specific data mentioned; material probably collected by H. Sauter (28); breeding in leaf bases of *Colocasia* in Taichung, Taitung and Hwalien (72).

Very widely distributed throughout Taiwan Proper and also present on Lanyu I., fairly common in area below 500 m. Larva breeds in abundance in the leaf-axils of *Colocasia*, *Alocasia* and *Musa*. I have captured an adult ♀ flying in a house in mountainous area in the central part of Taiwan Proper. Adults are known to take food from the mouth of ants, but I have not seen such activity in the field.

6. *Malaya jacobsoni* (Edwards)

Harpagomyia jacobsoni Edwards, 1930, Bull. Ent. Res. 21: 543.—72: 281.

Malaya jacobsoni, 97: 94.

Previous Records: Many were found in leaf bases of *Colocasia* in Taichung (72).

Collected so far only in the central part of Taiwan Proper. Larvae were found breeding in leaf-axils of *Colocasia*, at Puwei, Q13, 5.V.1954 (J. C. Lien); and also in leaf-axils of *Colocasia*, at Toupiengkeng, K20, 6.X.1955 (C. L. Chung, H. M. Lin & S. C. Lien). Adults have not been encountered in the field.

7. *Ficalbia* (*Mimomyia*) *chamberlaini metallica* (Leicester)

Conopomyia metallica Leicester, 1908, Cul. Malaya: 113.

Ficalbia metallica, 82: 201 & 202.—87: 16.

Ficalbia chamberlaini var. *metallica*, 86: 35 & 36.

Ficalbia chamberlaini issp. *metallica*, 97: 98.

Previous Records: Many pupae & larvae, impounded river with *Eichhornia*, S. of Chaochow, W16, V–VII. 1954 & 14. II. 1955; 1 ♀, house, Hsinsheng, W16, 27. IV. 1955; 2 pupae & 70 larvae, *Eichhornia* pond, Chutien, W11, 5. II. 1955; 5 pupae & 20 larvae, *Eichhornia* pond, Hsialutou, Q12, VI–VII. 1954 (82); specimens in USNM were apparently obtained from TAMRI (86).

Found so far only in Chiaï and Chaochow areas as reported by Chen & Lien (1957). Larva breeds in *Eichhornia* ponds and impounded rivers, and when alive is very distinctive because of dark head and siphon, and yellowish thorax and abdomen. Pupa is also distinctive because of long trumpets and darkened paddle. Habits of adults are unknown.

8. *Ficalbia* (*Etorleptomyia*) *luzonensis* (Ludlow)

O'Reillia luzonensis Ludlow, 1905, Canad. Ent. 37: 101.

Ficalbia luzonensis, 82: 199, 205 & 206.—86: 46.—87: 15.—97: 99.

Previous Records: 1 pupa & 11 larvae, pond with *Eichhornia*, Yuanshan, C4, 28. IX. 1944 & 25. X. 1944; 1 larva, water-oats field, Chuchih, E30, 10. IX. 1949; 40 larvae & 3 pupae, weedy ground pool, Hsinjeng, H10, 26. XI. 1954; 7 larvae, ground pool, Kangchien, H7, 24. XI. 1955; many larvae & pupae, pond with *Eichhornia*, Hsialutou, Q12, 11–24. V. 1954; 5 larvae, bamboo-stump near pond with *Eichhornia*, Hsialutou, Q12, 10. VI. 1954; 1 larva, weedy swamp, Chungshan Park of Chiaï, Q12, 6. VI. 1954; 1 larva, hoof-mark, Shenshui, T20, 7. I. 1956; 1 pupa, ground pool with grass margin, Chipu, T23, 4. VIII. 1954; 1 ♀, light trap in cowshed, Sankung, W16, 15. II. 1954; many larvae and pupae, impounded river with *Eichhornia* and *Pistia*, S. of Chaochow, W16, 19. V., 5, 11, 26, 29. VI., 2. VII. 1954 & 14. II. 1955; 3 larvae, ground pool with grass margin, Kuanghua W16; 1 ♂, rock cave along stream bank, Sanhsien, U2, 15. VII. 1954; 1 ♀, pit, Changpin, U1, 12. V. 1954 (82); specimens in the USNM were apparently obtained from TAMRI (86).

Very widely distributed throughout Taiwan Proper, but not common. Larva breeds around decaying *Eichhornia* in ponds, shaded small ground pools with decaying plants such as fallen leaves etc., and small rock pools with decaying plants, but only once found in bamboo-stump in plain area. Habits of adults are unknown.

9. *Ficalbia* (*Ravenalites*) *fusca* (Leicester)

Dasymyia fusca Leicester, 1908, Cul. Malaya: 102.

Ficalbia fusca, 82: 203.—97: 100.

Previous Records: 1 ♂ & 2 ♀ ♀, under rock, Tili, N13, 29. I. 1954; 2 pupae, tree-hole, Chukou, Q13 (82).

Has been found only in central and north-eastern parts of Taiwan Proper, and is very rare. Larva breeds in rot tree-holes with little water, in forested mountainous area between 200–1200 m. Since the report of occurrence of this species on Taiwan Proper by Chen & Lien (1957), further positive collections were made from the following localities:

47 larvae & 1 pupa, rot tree-hole, Shihtzutou, N3, 13 & 26. IX. 1960 (J. C. Lien & C. L. Chung); 2 larvae, rot tree-hole, Wuling, U7, 5. XI. 1960 (J. C. Lien); 27 larvae & 1 pupa, tree-holes, Shihtzutou, N3, 13. VIII. 1961 (P. S. Chen & K. S. Cheng); 10 larvae, tree-holes, Chihtuan, G11, 9–10. IX. 1961 (C. L. Chung & L. C. Lu). Larva when alive is pale pink in color. Pupa is distinctive because of long trumpets and very narrow paddles. Habits of adults are unknown.

10. *Mansonia* (*Coquillettidia*) *crassipes* (Van der Wulp)

Culex crassipes Van der Wulp, 1881, Bijd. Fauna Midden-Sumatra, Dipt.: 9.

Taeniorhynchus brevicellulus, 59: 10.

Taeniorhynchus crassipes, 61: C2.

Previous Records: No specific data mentioned (59).

I have not encountered this species, and it seems to me that it does not occur in Taiwan. However further confirmation is necessary before deleting it from the catalog.

11. *Mansonia* (*Coquillettidia*) *giblini* (Taylor)

Pseudotaeniorhynchus conopas var. *giblini* Taylor, 1914, R. Ent. Soc. Lond., Trans. 1914: 198.

Taeniorhynchus conopas, 2: 204.—3: 360.

Chrysoconops conopas, 4: 443.

Taeniorhynchus nigrosignatus, 16: 224.

Mansonia giblini, 97: 102.

Previous Records: Tamsui ?, Formosa, 8. I. 1900 (2).

I have not encountered this species in Taiwan. Theobald (1901) mentions "Some specimens, much eaten by mites, received from Formosa evidently belong to this species (indicating *Taeniorhynchus conopas* of Theobald)." Since the identification was done with such badly damaged specimens, it is not necessarily reliable. Therefore further confirmation is necessary.

12. *Mansonia* (*Mansonioides*) *uniformis* (Theobald)

Panoplites uniformis Theobald, 1901, Mon. Cul. 2: 180.

Mansonia uniformis, 20: 452.—22: 68.—60: 620.—61: C2.—75: 1546.—79: 178.—82: 201.—83: 484–93.—99: 3.—103: 223.

Taeniorhynchus uniformis, 25: 629.—41: 218.

Previous Records: Taihoku (20); Taihoku, I. 1915–IV. 1919 (22); Taihoku, Hokuto & Takao (25); Larvae, pond with *Eichhornia*, Hsialutou, Q12, 11–24. V. 1954; larvae, impounded river with *Eichhornia*, S. of Chaochow, W16, 19. V., 5, 11, 26, 29. VI., 2. VII. 1954 & 14. II. 1955; larvae, *Eichhornia* pond, Hsialutou, Q12, VI–VII. 1954 (82); Taipei (99).

Very widely distributed in plain area throughout Taiwan Proper, but not very common. Larva breeds in *Eichhornia* ponds with decaying plants, and attaches its siphon to roots of *Eichhornia*. Adult ♀ bites men at night and sometimes during daytime, and is attracted to water-buffaloes at night.

13. *Uranotaenia annandalei* Barraud

Uranotaenia annandalei Barraud, 1926, Indian Jour. Med. Res. 14: 343.—72: 281.—97: 109.

Previous Records: Only 1 larva from ground pool in Taichung (72).

Very widely distributed throughout Taiwan Proper and also present on Liuchiu I., and very common in area below 500 m. Larva breeds in shaded stream pools with or without fallen leaves and also in pools in dark tunnels, and rests on surface of water nearly as horizontally as anopheline larva. Easily mistaken for larva of *Anopheles* by less experienced collectors. Breeding water varies considerably from clear to turbid. Adults are often seen resting on rocks and grasses around breeding site and also in rock crevices. Habits of adults are unknown.

14. *Uranotaenia bimaculata* Leicester

Uranotaenia bimaculata Leicester, 1908, Cul. Malaya: 226.—72: 281.—82: 203.—87: 13.—97: 110.

Previous Records: Breeding in bamboo-stumps and papaya tree-holes in Taichung (72); larvae, tree-hole, Chukou, Q13, 5. V. 1954 (82).

Very widely distributed throughout Taiwan Proper, and common in area below 2000 m. Larva breeds usually in bamboo-stumps and tree-holes, and sometimes in artificial water containers in forested areas. Larva when alive hangs down vertically from the surface of water and is pale in color. Habits of adults are unknown.

15. *Uranotaenia macfarlanei* Edwards

Uranotaenia macfarlanei Edwards, 1914, Bull. Ent. Res. 5: 127.—72: 281.—82: 201.—87: 13.—97: 115.

Previous Records: Larvae breeding in ground pools and adults resting under rock overhanging hole in Taichung (72); larvae, ground pool, Kanchien, H7, 24. XI. 1954 (82).

Widely distributed throughout Taiwan Proper, but not very common. Larva breeds in turbid water of bad smelling in shaded pools at edge of streams and hoof-marks on swampy ground. Larva when alive, hangs down almost vertically from surface of water, and is very distinctive, because of dark head and pale orange-colored thorax and abdomen. Adults are sometimes seen around breeding site, but I have never been bitten by them.

16. *Uranotaenia maculipleura* Leicester

Uranotaenia maculipleura Leicester, 1908, Cul. Malaya: 223.—72: 282.—87: 13.—97: 115.
Uranotaenia sp., 82: 202 & 203.

Previous Records: Only 1 ♀ caught under rock overhanging hole in Taichung (72); adults, pit, Changpin, U1, 12. V. 1954; adults, under rock, Tili, N13, 29. IX. 1954 (82).

Widely distributed throughout Taiwan Proper, but not very common. Larva breeds in very shaded small pools at edge of streams and in pools in tunnels in area below 500 m, and is very seldom encountered in field collection. Larva when alive is slightly yellowish. Adults are often encountered and collected in numbers in shaded rock crevices. Morphologically, larva agrees fairly well with that of *U. stonei* except for anal segment which is completely ringed and also for some minor details. Habits of adults are unknown.

17. *Orthopodomyia anopheloides* (Giles)

Mansonia anopheloides Giles, 1903, IN Wyville Thomson, Jour. Trop. Med. 6: 315.
Orthopodomyia anopheloides, 72: 282.—82: 203.—87: 14.—97: 122.—107: 57.

Previous Records: 1 ♀ hatched from larva collected in bamboo-stump at Chushan, N11 (72); larvae, tree-hole, Chukou, Q13, 5. V. 1954 (82).

Very widely distributed throughout Taiwan Proper, and fairly common in mountainous area below 2000 m. Larva breeds in tree-holes and bamboo-stumps. Habits of adults are unknown.

18. *Heizmannia lii* Wu

Heizmannia lii Wu, 1936, Bur. Ent. Chekiang, Yearb. (1935) 5: 46.

Heizmannia sp., 82: 203.

Previous Records: Larvae, tree-hole, Chukou, Q13, 5. V. 1954 (82).

New to Taiwan, widely distributed in region south of 24°40' N in Taiwan Proper, but very rarely encountered. Larva breeds in bamboo-stumps and tree-holes in mountainous area between 100–800 m. Adult ♀ bites men during daytime in forested areas. On my request, Mr. P. F. Mattingly of the BMNH kindly checked some characters and compared my drawings of ♂ terminalia of local specimens against the specimens of *H. lii* in BMNH. According to him the local specimens are apparently indistinguishable from the specimens of *H. lii* which are presumably the paratypes of *H. lii* from China. Descriptions of larva, pupa and adults will be given in a separate paper.

19. *Aedes (Ochlerotatus) vigilax* (Skuse)

Culex vigilax Skuse, 1889, Linn. Soc. N. S. W., Proc. 3: 1731.

Aedes vigilax, 26: 100.—40: 138.—60: 640.—61: C2.—62: 53.—64: 56.—77: 456.—87: 17.—97: 157.—105: 44.

Previous Records: Anping (26).

I have not encountered this species in Taiwan. Edwards' record was from Anping, a coastal town in Tainan City in the southern part of Taiwan Proper.

20. *Aedes (Finlaya) albolateralis* (Theobald)

Stegomyia albolateralis Theobald, 1908, Rec. Indian Mus. 2: 289.

Aedes niveus, 23: 318.—60: 671.—75: 1548.

Aedes albolateralis, 41: 222.—59: 7.—61: C2.—67: 20.—79: 179.—82: 204.

Previous Records: 1 ♂, 1 ♀, no specific locality mentioned (23); larvae, tree-hole, Chukou, Q13, 29. V. 1954 (82).

Widely distributed in central and southern parts of Taiwan Proper, rather common. Larva breeds in tree-holes and bamboo-stumps in mountainous area below 500 m. Adult ♀ bites men, cows and buffaloes at night, most actively at dusk. Adults are characterized by having *ppn* unscaled, mesosome of ♂ with fine teeth on apical border, and inner surface of coxite with tuft of scales of several lengths basally on dorsal margin.

21. *Aedes (Finlaya) formosensis* Yamada

Aedes formosensis Yamada 1921, Annot. Zool. Japon. 10: 67.—24: 67.—28: 466.—33: 365.—34: 29.—40: 151.—41: 225.—43: 189 & 190.—60: 658 & 669.—61: C2.—68: 639.—72: 282.—74: 554.—77: 459.—79: 179.—87: 18.—97: 162.

Aedes formosaensis, 69: 6.

Previous Records: 2 ♀♀, Kakubanzan, 10. V. 1921 (24); breeding in bamboo-stumps in Hwalien Hsien (72).

Widely distributed throughout Taiwan Proper, but not very common. Larva breeds almost exclusively in leaf-axils of *Musa* and rarely in leaf-axils of *Colocasia* in mountainous area below 1000 m. Larva when alive is very distinctive because of dark brown head and siphon, and yellowish thorax and abdomen. Adult ♀ bites men and buffaloes at night and sometimes during daytime in shaded forested areas. Chow (1950) recorded *Aedes formosensis* from bamboo-stumps; however, I have not been able to collect this species from bamboo-stumps. All local adult specimens belonging to *Aedes chrysolineatus* group resulted from the larvae collected from bamboo-stumps are all keyed down to another species in that group. It will be discussed in a separate paper.

22. *Aedes* (Finlaya) *hatorii* Yamada

Aedes hatorii Yamada, 1921, Annot. Zool. Japon. 10: 70.—24: 70.—33: 365.—40: 152.—41: 223.—60: 659 & 669.—61: C2.—65: 8.—67: 19.—74: 557.—75: 1548.—77: 459.—79: 179.—97: 163.

Hulecoeteomyia pseudotaeniata, 15: 70.

Aedes pseudotaeniatus, 79: 179.

Previous Records: Adults, Sekimon Police Station; larvae, rock pool on river bank at Sekimon; adults, drawing room of Kunfukan, Kakubanzan; adults, Babutoku Police Station, F4; adult ♀♀ biting man at dusk in bush at Kakubanzan in December (15); 1 ♂, Taihoku, II. 1917 (24).

Has been found to occur only in northern part of Taiwan Proper, and is not very common. Larva has been found breeding in rock holes on stream beds at Neishuangchi, A2; in rock holes near the water-fall at Wulai, E32; and in rock holes on stream bed at Nuannuan, B7. All these areas are below 500 m. Larva when alive has dark brown head and siphon, and grayish yellow thorax and abdomen. According to Hatori (1917) adult ♀♀ bite men at dusk in bush at Kakubanzan in December.

23. *Aedes* (Finlaya) *japonicus shintienensis* Tsai and Lien

Aedes shintienensis Tsai & Lien, 1950, Med. Assn. Formosa, Jour. 49: 177.—71: 177.—97: 170.

Aedes japonicus, 65: 8.—67: 18.—72: 282.—97: 164.

Previous Records: No specific locality mentioned (65); 10 ♂♂, 17 ♀♀ bred from larvae collected from small rock pool, Chuchih, E30 (71); breeding in rocky pools in Taichung, Nantou and Hwalien Hsiens (72).

Very widely distributed throughout Taiwan Proper and very common. Larva breeds in rock holes on stream beds, depressions on fallen trees and artificial containers in mountainous area below 2400 m. Larva when alive has dark brown head and reddish brown thorax and abdomen. Habits of adults are unknown.

On comparing local specimens with *Aedes japonicus* of Kyoto, Japan (kindly supplied by Dr. G. Nakata of Kyoto Sanitary Laboratory), I found the following differences: Both sexes (5 ♂♂ & 3 ♀♀) of *Aedes japonicus* of Kyoto, Japan, have *ppn* with numerous broad

pale scales on a large area and some narrow yellowish scales on extreme dorsal border, and the upright forked scales on median area of vertex as dark as those on lateral areas. Local ♀ specimens have *ppn* with numerous narrow curved golden scales on a large area on upper and central parts, and few to several broad pale scales on extreme lower aspect, and upright forked scales on median area of vertex much paler than those on lateral areas. Male specimens have *ppn* with narrow curved golden scales more numerous and broad pale scales more reduced than in ♀♀, and upright forked scales on median area of vertex as in ♀♀.

24. *Aedes* (*Finlaya*) *sinensis* Chow

Aedes sinensis Chow, 1950, Taiwan Mus., Quart. Jour. 3: 283.—72: 283.—90: 469.—97: 171.

Previous Records: 1 ♂, holotype, 3 ♂♂, 3 ♀♀, paratypes, papaya tree-hole at Ta-keng, J2, IV. 1949; 1 ♂, 2 ♀♀ and 1 larva, paratypes, bamboo-stumps at Shongtung, N1, V. 1949 and IX. 1950 (72).

Known to occur only from type-localities. I have not encountered this species. According to Chow (1950), this species is characterized by having *ppn* with a patch of broad white scales, basally dorsal inner surface and lateral margin of basistyle bare, and larval mouth brush hairs simple.

25. *Aedes* (*Finlaya*) *togoi* (Theobald)

Culicella togoi Theobald, 1907, Mon. Cul. 4: 379.

Aedes togoi, 32: 565.—? 35: 355.—41: 224.—59: 7.—60: 670.—61: C2.—72: 282.—79: 179.—97: 172.—101: 791.—102: 267–82.

Previous Records: No specific data mentioned (32); larvae secured abundantly from sewage or pond, ?Taihoku (35); breeding in brackish water (originally as blackish water) kept in rocky pools at coasts of Taitung and Pingtung Hsiens (72); larvae, brackish rock pools near coast, Chinshan, E4 (102).

Widely distributed along northern and eastern coast of Taiwan Proper, present also in Lanyu I., not very common in Taiwan Proper, but very common in Lanyu I. Larva breeds in numbers in coral rock holes and boats or canoos containing saline water along seashore. According to Lien (1960) experimentally the larva can be tolerant of saline water of up to 5%, and adult ♀♀ are partially autogenous, and feed readily on human hands, guinea pigs and rather reluctantly on laboratory mice. In nature, the habits of adults are not well known. In Lanyu where the larva breeds in numbers along coral seashore, it does not constitute a nuisance to man, though a small number of engorged ♀♀ can be found in houses. Adult ♀♀ of this species have been experimentally demonstrated to be readily infected with *Wuchereria bancrofti*, *Setaria digitata*, Japanese B encephalitis virus and Semliki Forest virus.

26. *Aedes* (*Skusea*) *amesii* (Ludlow)

Stegomyia amesii Ludlow, 1903, N. Y. Ent. Soc., Jour. 11: 139.

Aedes amesi, 25: 629.—79: 180.

Previous Record: 1 ♀, Takao (25).

Collected by H. Sauter at Takao, seaport city in southern part of Taiwan, and identified by F. W. Edwards. I have not encountered this species.

27. *Aedes (Stegomyia) aegypti* (Linnaeus)

Culex aegypti Linn., 1762, Hasselquist's Reise nach Palästina: 470.

Stegomyia fasciata, 1: 79.—7: 190.—11: 197.—13: 945.—18: 390.—19: 210 & 211.—21: 143.—22: 63.

Aedes argenteus, 25: 629.—32: 563.—33: 365.—37: 509.

Aedes aegypti, 38: 11.—41: 221.—54: 3.—59: 8.—60: 678.—61: C2.—63: 39.—75: 1547.—76: 547—50.—78: 3.—79: 180.—83: 484—93.—91: 639—41.—101: 791 & 821.—102: 278—81.—103: 214.

Previous Records: No specific data mentioned (1); 1 ♂, room, Tapani, S18; 1 ♀, room & toilet, Hozangai, T25; 5 ♀♀, Kokuseiko, R1; 5 ♀♀, Kyuko, F5; 4 ♀♀, room, Doko, M10; 3 ♀♀, room, Nanshiko, V1; 43 ♂♂ & 46 ♀♀, room, Hachitoshima, X5; 1 ♂, Sekkan, T18; 14 ♂♂ & 4 ♀♀, Tosekiko, Q1; 2 ♂♂, room, Ariko, W1; 2 ♀♀, room, Kigo, V9; 2 ♂♂ & 4 ♀♀, Kanteibyō; all between 10. VIII—10. XII. 1908 (7); Hokoto (11); 70 larvae & 11 pupae, jar, Kenko, T25, 15. II. 1917; 4 ♀♀ & 1 ♂, rain water container, Kaboko, T25, 6. I. 1917 (19); Tapani, Ariko, Hokko, Bokushikyaku and Kagi (21); Anping and Takao (25); 5 ♀♀, house, Makung; 1 ♂, water container, Hsiyu; 26—28. I. 1954 (76); 14 ♀♀, Penghu (78); Kaohsiung City (91); larvae, artificial containers around houses, Chihou, V9 and Makung, X3 (102).

Has been proved to occur only in the region south of 24°50' N in Taiwan Proper and the Penghu Is., very common along coastal regions but also present in some foothill regions. Larva breeds in artificial water containers in and around houses. Adult ♀ bites men during daytime but sometimes even at night under lighted conditions, and rests in houses. *Aedes aegypti* has been demonstrated to be entirely absent in Taipei City (25° N) by previous workers. However Miu & Lang (1958) reported the presence of adults of *Aedes aegypti* in Taipei City from March to November. Owing to the fact that *Aedes albopictus* is very common in Taipei City, I am inclined to believe that the mosquitoes of *Aedes albopictus* were misidentified for *Aedes aegypti*. Therefore their record of *Aedes aegypti* is placed under the synonymy of *Aedes albopictus*.

28. *Aedes (Stegomyia) albolineatus* (Theobald)

Scutomyia albolineatus Theobald, 1904, Entomologist 37: 77.

Aedes albolineatus, 72: 282.—87: 20.—97: 180.

Previous Records: Breeding in bamboo-stumps at Takang, Taichung Hsien (72).

Widely distributed in central and southern parts of Taiwan Proper, but not common. Larva breeds in bamboo-stumps and tree-holes in forested mountainous area below 1000 m. Adult ♀ occasionally bites men during daytime in forested areas, but it is not a fierce biter.

29. *Aedes (Stegomyia) albopictus* (Skuse)

Culex albopictus Skuse, 1894, Ind. Mus. Notes 3: 20.

Stegomyia scutellaris, 1: 113 & 299.—4: 155.—7: 190.—9: 31.—11: 198.—12: 806.—13: 945.—17: 133.—20: 452.—21: 143.—22: 63 & 68.—29: 625.

Aedes albopictus, 25: 629.—32: 564.—37: 509.—38: 8 & 12.—41: 220.—42: pl. 58.—54: 4.—56: 196, 197 & 199.—59: 8.—60: 683.—61: C2.—63: 42.—70: 123—31.—72: 282.—73: 149—67.—77: 40.—79: 180.—82: 201.—83: 484—93.—101: 791 & 821.

Aedes aegypti, 99: 2—39.

Previous Records: Tamsui, 2. VIII. 1899 (1); Urai (9); Hokoto (11); 4 ♂♂ & 6 ♀♀, Nanryo, U15 (12); larvae, cement lined ditch, Ryukokosyo, Taihoku (17); Taihoku? (20); Hokko, Bokushikyaku and Kagi (21); Taihoku, I. 1915-IV. 1919 (22); Maruyama, Hokuto and Taihoku (25); Taihoku (29); Taihoku (54); Taihoku and its vicinity, V-XI. 1942 (56); Taipei? (70); breeding in bamboo-stumps at Takang, J2, (72); bamboo-stump, Hsialutou, Q12, 10. VI. 1954 (82); adults, houses, Taipei, 10. III-14. XI. 1959 (99).

Very widely distributed throughout Taiwan Proper, also present in Penghu Is., Lutaio I. and Liuchiu I., and common especially in forested area below 1000 m. In urban and suburban areas, larva breeds mainly in artificial water containers, such as vases, water for ant-proofing, jars, empty tins, bottles, barrel, unused wheel tires, flooded concrete floor in air shelters or similar constructions. Adult ♀ bites men, cows, buffaloes and goats during daytime, and may bite at dusk and dawn.

30. *Aedes* (*Stegomyia*) *annandalei horishensis* Yamada

Aedes horishensis Yamada, 1921, Annot. Zool. Japon. 10: 58.—24: 58.—28: 464.—31: 475.—33: 364.—40: 164.—43: 227.—60: 674 & 682.—61: C2.—69: 7.—77: 474.—97: 184.
Aedes annandalei horishensis, 41: 220.—59: 8.—79: 180.
Aedes annandalei, 72: 282.—97: 181.

Previous Records: 1 ♀, Horisha, 12. IV. 1921 (24); commonly breeding in bamboo-stumps in Taichung and Nantou Hsiens (72).

Widely distributed in central and southern parts of Taiwan Proper, also present in Liuchiu I., but not very common. Larva breeds exclusively in bamboo-stumps in forested area below 1000 m. Adult ♀ bites men in forested area during daytime. Abdominal pale bands of the single adult ♀ of *Aedes horishensis* are described by Yamada (1921) as sub-basal, however pale bands are not so clearly defined as subbasal in most of the local adult specimens. Pale bands are apparently basal medially and only slightly subbasal toward sides. Male terminalia of local specimens are apparently indistinguishable from those of *Aedes annandalei* of India. As it is closely related to *Aedes annandalei*, it is here treated as a subspecies.

31. *Aedes* (*Stegomyia*) *desmotes* Giles

Stegomyia desmotes Giles, 1904, Jour. Trop. Med. 7: 367.
Stegomyia montana, 21: 140, 141 & 143.—22: 64.
Aedes montana, 79: 180.

Previous Records: 1 ♀, Chikutoki, Q17, VII. 1917; several adult ♀♀ attacking man, not captured, Kanshirei, S5, VII. 1917 (21); 1 ♀, Chikutoki, Q17, VII. 1917; several adult ♀♀ attacking man, not captured, Kanshirei, S5, VII. 1917 (22).

Found only in some localities in central and southern parts of Taiwan Proper, and is very rare. Adults are found mostly in forested mountainous area around 400-500 m, and only occasionally below that height. Larval breeding places are unknown. Extensive collections made from bamboo-stumps, tree-holes and others revealed no positive collection of this species even in areas where a good number of adults were encountered. The laterally compressed thorax of adults suggests their possible occurrence in the internodes of living bamboos with small holes. Adult ♀ bites man very fiercely during daytime in forested areas. Adults of this species have been so far collected from the following localities:

1 ♀, biting man, Chunghan Park of Chia, Q12, 31.V.1953 (J. C. Lien); 26 ♀♀, biting men around bamboo bush, Kuantzuling, S5, 21.VI.1953 (J. C. Lien), progeny raised from this batch consists of 11 ♂♂, 5 ♀♀ and also many larvae and pupal skins; 1 ♀, Chinghuang, U11, 17.XI.1953 (J. J. Ho); several adult ♀♀, biting men, Wanchiu and Michi, S11, 5.X.1956 (S. Y. Liu, C. C. Hsu & J. J. Ho); 1 ♀, biting man in forest, Kangkou, W 32, 18.X.1960 (J. C. Lien); 7 ♀♀, biting man, Tahu, Q13, 13.V.1961 (J. C. Lien), progeny raised from this batch consists of 4 ♂♂ and 4 ♀♀ with their larval and pupal skins; 1 ♀, biting man, Shihchiautung, Q13, 15.V.1961 (J. C. Lien). The ♂ terminalia of local specimens are apparently indistinguishable from those of *Aedes desmotes* of the Philippines and India.

32. *Aedes* (*Stegomyia*) *mediopunctatus* var. *perplexus* (Leicester)

Stegomyia perplexa Leicester, 1908, Cul. Malaya: 83.

Aedes mediopunctatus var. *perplexus*, 97: 185.

Previous Records: No specific data mentioned (97); specimens in USNM apparently obtained from TAMRI.

Widely distributed in central and southern parts of Taiwan Proper, but not very common. Larva breeds exclusively in bamboo-stumps in forested area below 1500 m. Adult ♀ bites men viciously in forested area. Local specimens have distinct white basal bands on segments I and II of fore and mid tarsi, while specimens from Ulu Gombak of Malaya (kindly supplied by Mr. W. W. Macdonald of Liverpool School of Tropical Medicine) have white basal bands on I of fore and mid tarsi only. However, according to Leicester's original description (1908) of *Stegomyia perplexa*, the type specimen has white basal bands on I of fore tarsus and on I and II of mid tarsus.

33. *Aedes* (*Stegomyia*) *w-albus* (Theobald)

Stegomyia w-alba, Theobald, 1905, Ann. Hist.-Nat. Mus. Hung. 3: 74.

Aedes w-alba, 39: 108.—69: 7.

Aedes w-albus, 43: 233.—77: 475.—87: 20.—97: 189.—106: 223.

Previous Records: There are no real records of *Aedes w-albus* from Taiwan or Formosa. All previous records quoted directly or indirectly from a wrong review.

Seeing the report "The *Stegomyia* survey in Hong Kong" by Macfarlane (1915), Hatori (quoted by some workers as Secrete) in his paper "Notes on Mosquitoes.—6" (1916, p. 945) mentions the occurrence of *Stegomyia w-alba* in Hong Kong and its absence in Formosa (Taiwan); however this was wrongly reviewed as its being reported from Formosa in the abstracts appearing in China Med. Jour. Shanghai 31: 348, 1917 and in Rev. appl. Ent. (B) 6: 50, 1918, and since then this wrong review has been quoted by Bonne-Wepster and Brug (1932) and subsequent workers. Therefore this species should be deleted from the list of non-anopheline mosquitoes of Taiwan.

34. *Aedes* (*Aedimorphus*) *vexans nocturnus* (Theobald)

Culex nocturnus Theobald, 1903, Mon. Cul. 3: 159.

?*Culex sollicitans*, 1: 113, 369 & 370.—3: 398.

?*Grahamia sollicitans*, 4: 278.

Aedes vexans, 25: 629.—101: 791.

Aedes vexans nipponii, 79: 181.

?*Aedes sollicitans*, 79: 179.

Previous Records: Tamsui, 8. I. 1900 (1); 1♂, Takao (25).

Widely distributed throughout Taiwan Proper, but not common. Larva breeds in newly flooded rice-fields and ground pools around foothill area during winter, and is rarely found in other seasons. Adult ♀ bites men, cows and buffaloes at night. Despite my extensive searches in houses during daytime in January, 1957, at Hsinhua, S26, where numerous larvae were found breeding in rice-fields at that time, only 1 engorged ♀ was found resting in a house. Trying to colonize the mosquito I caged the pupae of this mosquito collected from Hsinhua, however all the resulting adults were so wild and excited that they hit themselves continuously against the screen walls of the cage and killed themselves in a few days.

On comparing local adult specimens with the adult specimens of *Aedes vexans nipponii* from Kyoto, Japan (kindly supplied by Dr. G. Nakata of Kyoto Sanitary Laboratory, Japan) and *Aedes vexans nocturnus* from the Philippines (kindly supplied by Dr. F. E. Baisas of the Division of Malaria, Department of Health, the Philippines), I found that the local specimens show closer resemblance to the latter than the former. I further examined 50 local larval specimens. These 50 specimens have head hair 6 (hair B) with 1-3 branches and hair 5 (hair C) single in all but 4 specimens in which this hair is 2-branched on one side only. As both the adult and the larva of this mosquito show very close resemblance to *Aedes vexans nocturnus*, this mosquito is treated here as that subspecies.

35. *Armigeres (Armigeres) subalbatus* (Coquillett)

Culex subalbatus Coquillett, 1898, U. S. Nat. Mus., Proc. 21: 302.

Armigeres ventralis, 1: 113.

Armigeres obturbans, 1: 325.—25: 629.—32: 563.—38: 12 & 13.—41: 219.—42: pl. 58.—59: 9.—60: 614.—61: C2.—75: 1546.—77: 40.—79: 181.—106: 224.

Desvoidya obturbans, 4: 141.—8: 322.—11: 198.—14: 1027.—15: 70.—20: 452.—22: 68.—29: 625.

Armigeres subalbatus, 72: 282.—76: 547-50.—83: 484-93.—92: 240.—93: 912.—97: 213.—98: 269.—103: 214.—107: 91.

Armigeres, 78: 3.

Previous Records: Tinghai, 8. I. 1900 (1); Hokoto (11); 3♀♀, Boryo, W25 (14); Kakubanzan (15); Taihoku? (20); Taihoku, I. 1915-IV. 1919 (22); Taihoku, Chosokei, Maruyama and Tainan (25); Taihoku (29); larvae breed in bamboo-stumps, artificial water containers and fecal tanks, very common on Taiwan (72); 1♂, house, Hushi, 1♀, house, Hsiyu; 10♀♀ & 3♂♂, stable, Hsiyu; 2♀♀, water container, Hsiyu; 26-28. I. 1954 (76); 75♀♀, Penghu (78); Chungho, E21, Sinshe, K11 and Chaochow, W16 (93).

Very widely distributed throughout Taiwan Proper, also present on the Penghu Is. and Liuchiu I., and very common. Larva breeds in numbers in fecal tanks around houses, papaya tree-holes, bamboo-stumps, and other tree-holes, and very rarely in leaf-axile of *Colocasia*. Larva when alive is reddish to bluish in color. Adult ♀ bites men, cows and buffaloes both day and night, but mainly at dawn and dusk.

36. *Armigeres (Leicesteria) annulitarsis* (Leicester)

Leicesteria annulitarsis Leicester, 1908, Cul. Malaya: 99 (♀ only).

Armigeres annulitarsis, 25: 629.—28: 463.—31: 475.—33: 364.—61: C2.—69: 8.—79: 181.—87: 26.—97: 214.—100: 121.—107: 96.

Previous Records: Maruyama & Kankau (25).

I have not encountered this species. Further investigation is necessary.

37. *Armigeres (Leicesteria) digitatus* (Edwards)

Leicesteria digitatus Edwards, 1914, Bull. Ent. Res. 4: 262.

Armigeres digitatus, 107: 99.

Previous Records: No specific data mentioned. Specimen in USNM were obtained from TAMRI, and probably of the same batch as a ♂ and ♀ in TAMRI collection, which are determined by Dr. Alan Stone. These specimens bear the label with the following data: Tanan, Meishan, Chia Hsien, bamboo-stump, 11. III. 1954, H. H. Chen, T. S. Lo, J. K. Ni.

Rather rare and has so far been found from the following localities in central part of Taiwan Proper: Adults raised from young stages are indicated in parentheses. 1 larva & 4 pupae (1♂, 1♀), bamboo-stump, Tanan Q6, 11. III. 1954, H. H. Chen, T. S. Lo, J. K. Ni; 2 larvae & 4 pupae (2♂♂, 3♀♀), bamboo-stump, Tanan, Q6, 11. III. 1954, H. H. Chen, T. S. Lo, J. K. Ni; 13 larvae, bamboo-stump, Chuchi, Q8, 12. III. 1954, J. C. Lien; 8 larvae (2♂♂, 5♀♀), bamboo-stump, Niuputzu, Q13, 20. IV. 1954, J. C. Lien; 1 larva (1♀), bamboo-stump, Chichi, N8, 3. V. 1954, J. K. Ni, S. Y. Li; 2 larvae (1♂, 1♀), bamboo-stump, Chichi, N8, 3. V. 1954, J. K. Ni, S. Y. Li; 1 larva & 1 pupa (1♂), bamboo-stump, Hsiao-lung, S19, 7. VIII. 1954, H. H. Chen, C. L. Chung; 13 larvae & 7 pupae (3♂♂, 8♀♀), bamboo-stumps, Chukou, Q13, 8. VIII. 1954, H. H. Chen, C. L. Chung; 2 larvae (1♂, 1♀), bamboo-stump, Tinglin, N11, 14. XII. 1954, P. T. Tseng, J. K. Ni, J. J. Ho; 2 larvae, bamboo-stump, Wenfeng, Q8, 12. IV. 1958, J. C. Lien; 31 larvae (12♂♂, 16♀♀), bamboo-stump, Chuchi, Q8, 22. XII. 1960, P. S. Chen. The larvae breed exclusively in bamboo-stumps. Habits of adults are unknown.

38. *Armigeres (Leicesteria) magnus* (Theobald)

Brevirhynchus magnus Theobald, 1908, Rec. Ind. Mus. 2: 293.

Armigeres magnus, 72: 282.—87: 27.—97: 214.—100: 119.—107: 102.

Previous Records: Breeding in bamboo-stumps at Hanchi, Taichung Hsien (72); 5♂♂ and 5♀♀, bamboo-stump, Chushan, N11, II. 1955 (100).

Widely distributed in central and southern parts of Taiwan Proper, also present on Liuchiu I., and rather common. Larva breeds in new bamboo-stumps with milky water of unpleasant odor in mountainous area below 500 m. Larva when alive is pale in color. Adult ♀ bites men during daytime in shaded forested areas.

39. *Armigeres (Leicesteria) omissus* (Edwards)

Leicesteria omissa Edwards, 1914, Bull. Ent. Res. 5: 76.

Leicesteria longipalpis, 14: 1026.—15: 70.

Armigeres omissus, 72: 282.—87: 27.—97: 215.—100: 126.—107: 103.

Armigeres longipalpis, 79: 181.

Previous Records: Sogo and Sokei, E31; Takinoshita, Dangai-Raho, Kyopan, Gohun-hei and Sikkei, D13; Rokuchikuzan and Chikuto, F4, (14); Kakubanzan (15); 1 ♂ hatched from larva collected in leaf bases of *Colocasia* at Shuangtung (72); 5 ♂♂ & 5 ♀♀, *Colocasia* axils, Wulai, E32 (100).

Very widely distributed throughout Taiwan Proper, and rather common. Larva breeds exclusively in leaf-axils of *Colocasia* in mountainous area below 500 m. In Malaya the larva breeds mainly in internodes of living bamboos with small holes bored by insects (Macdonald, 1960). The larva when alive is pale in color. Adult ♀ bites men during daytime in shaded forested areas.

40. *Armigeres (Leicesteriomyia) flavus* (Leicester)

Chaetomyia flavus Leicester, 1908, Cul. Malaya: 101.

Armigeres flavus, 72: 282.—87: 27.—97: 215.—100: 117.—107: 106.

Previous Records: Breeding in bamboo stumps at Chushan, N11 (72); 5 ♂♂ and 5 ♀♀, bamboo-stump, Shuili, N9, 4. VIII. 1954 (100).

Widely distributed in central and southern parts of Taiwan Proper, but not very common. Larva breeds in new bamboo-stumps with milky water of unpleasant odor in mountainous area below 500 mm. Larva when alive is pale in color. Adult ♀ bites men during daytime in shaded forested areas.

41. *Culex (Lutzia) fuscans* Wiedemann

Culex fuscans Wiedemann, 1820, Dipt. Exot. 1: 9.—56: 197-99.—72: 282.—82: 201, 202, 205 & 206.—83: 484-93.—97: 223.

Culex concolor, 11: 198.—22: 68.—29: 625.

Lutzia concolor, 25: 629.

Previous Records: Adults resulted from larvae collected at Teiwan in Hokoto (11); Taihoku, I. 1915-V. 1919 (22); Maruyama (25); Taihoku (29); Taihoku and its vicinity, V-XI. 1942 (56); breeding in artificial water containers in Taichung Hsien (72); larvae, pond with *Eichhornia*, Hsialutou, Q12, 11-24. V. 1954; larvae, ground pool with grass margin, Chipu, T23, 4. VIII. 1954; larvae, impounded river with *Eichhornia* and *Pistia*, 9. V., 5, 11, 26, 29. VI., 2. VII. 1954 & 14. II. 1955; larvae, *Eichhornia* pond, Hsialutou Q12, VI-VII. 1954 (82).

Very widely distributed throughout Taiwan Proper, present also in the Penghu Is., Liuchiu I., Lutao I. and Lanyu I., and very common in urban and suburban areas below 1800 m. Larva breeds in ditches, ponds, pools and artificial water containers with water full of organic matter, usually in company with *Culex pipiens quinquefasciatus* in Taiwan Proper, the Penghu Is. and Liuchiu I. Larva preys on mosquito larvae of other species occurring in the same habitat. Adult ♀♀ do not bite men.

42. *Culex (Lutzia) vorax* (Edwards)

Lutzia vorax Edwards, 1921, Bull. Ent. Res. 12: 327.

Culex tigripes, 6: 123.

Culex fuscana vorax, 41: 217.

Culex vorax, 60: 705.—61: C2.—67: 24.—72: 282.—79: 181.—97: 224.

?*Armigeres subalbatus*, 99: 3.

Previous Records: Between Keiko and Furin, P7, on way to Urai, VIII. 1912 (6); breeding in mountainous pools in Nantou Hsien (72); Taipei, larvae often encountered together with *Anopheles sinensis*, *Culex tritaeniorhynchus*, *Culex vishnui* and *Mansonia uniformis* (99).

Very widely distributed throughout Taiwan Proper, present also in Liuchiu I., common in rural and foothill areas below 1800 m. Larva breeds in road side pools, stream pools, rock pools, bamboo-stumps and artificial containers in company with various species of mosquitoes. Like *Culex fuscianus*, larva preys on mosquito larvae of other species occurring in the same habitat. Adult ♀♀ do not bite men.

43. *Culex* (*Neoculex*) *brevipalpis* (Giles)

Stegomyia brevipalpis Giles, 1902, Handbook, 2nd ed.: 384.

Culex brevipalpis, 72: 282.—97: 226.

Previous Records: Breeding in bamboo-stumps and papaya tree-holes in Taichung Hsien (72).

Widely distributed in central and southern parts of Taiwan Proper, rather rare in the central part of Taiwan, and more common toward the southern-most part of Taiwan. Larva breeds in tree-holes and bamboo-stumps in forested area below 1000 m. Habits of adults are unknown.

44. *Culex* (*Neoculex*) *hayashii* Yamada

Culex hayashii Yamada, 1917, Zool. Mag., Tokyo 29: 67.—97: 227.

Culex hayashi, 72: 282.

Previous Record: Only 1 larva collected from mountainous stream at Toubienkeng, Taichung Hsien (72).

Collected from following localities: 4 larvae, stream pool, Yuchouhu, A2, 19.VIII. 1949 (J. C. Lien); 2 larvae & 1 pupa, ground pool, Chingtan, E30, 5.III. 1950 (J. C. Lien); 20 larvae & 14 pupae, stream pool, Aoshenshui, T20, 8.I. 1956 (S. Y. Liu and J. K. Ni). It is rather rare. Larva breeds in shaded stream pools, and rests on surface of water nearly as horizontally as anopheline larva. Habits of adults are unknown.

45. *Culex* (*Mochthogenes*) *malayi* (Leicester)

Aedes malayi Leicester, 1908, Cul. Malaya: 184.

Culex malayi, 72: 282.—87: 28.—97: 231.

Previous Records: Breeding in ground pools in Taichung Hsien (72).

Collected from following localities: 1 larva, ditch with clear water and aquatic plants, Chungshan Park of Chiai, Q12, 6.VI. 1954 (J. C. Lien); many larvae and pupae, pools on stream bed, Tafu and Penfu, W33, 26 & 28.IV. 1961 (J. C. Lien, P. S. Chen, C. C. Lin & C. M. Liu). Rather rare in Taiwan Proper, but fairly common in Liuchiu I. Larva breeds in stream pools and rests on the surface of water nearly as horizontally as anopheline larva. Habits of adults are unknown. Adults are very small and easily distinguished from other *Culex* species in having vertex mostly covered with pale broad appressed scales. Male terminalia are very distinctive because of forked dististyle.

46. *Culex (Lophoceraomyia) rubithoracis* (Leicester)

Lophoceratomyia rubithoracis Leicester, 1908, *Cul. Malaya*: 119.

Culex rubithoracis, 25: 630.—41: 217.—60: 710.—61: C2.—67: 25.—75: 1545.—79: 182.—82: 202 & 205.—87: 29.—97: 235.

Previous Records: Taihoku (25); larvae, impounded river with *Eichhornia*, S of Chao-chow, W16, V-VIII. 1954 & 14. II. 1955 (82).

Widely distributed throughout Taiwan Proper, rather common in northern part of Taiwan Proper and rare in southern part. Larva breeds in grassy ground pools, rice-fields and ponds with *Eichhornia crassipes* and *Pistia striotes* in plain areas. Habits of adults are unknown.

47. *Culex (Lophoceraomyia)* sp. near *uniformis* (Theobald)

Culex sp., 82: 203.

Culex sp. near *uniformis*, 82: 204.

Previous Records: Larvae, tree-hole, Chukou, Q13, 5. V. 1954 (82).

Widely distributed in central part of Taiwan Proper, but very very rare. Larva breeds in tree-holes and bamboo-stumps in mountainous area below 1800 m. Larva is very distinctive because of minute spicules all over body. Habits of adults are unknown. Adults, pupa and larva will be described in a separate paper.

48. *Culex (Culiciomyia) nigropunctatus* Edwards

Culex nigropunctatus Edwards, 1926, *Bull. Ent. Res.* 17: 121 (*nom. nov.* for *annulata* Theobald, *non* Schrank, 1776).—82: 202.

Previous Records: Larvae, hoof-mark, Shenshui, T20, 7. I. 1956; larvae, ground pool with grass margin, Kuanghua, W16, 7. II. 1955; adults rock cave along stream bank, Sanhsien, U2, 15. VII. 1954; pit, Changpin, U1, 12. V. 1954 (82).

Widely distributed in central and southern parts of Taiwan Proper, but not very common. Larva breeds in hoof-marks, small ground pools and seepage pools with turbid water and grassy margin. Larva is distinctive because of long siphon and false joint due to weak sclerotization on siphon. Habits of adults are unknown.

49. *Culex (Culiciomyia) pallidothorax* Theobald

Culex pallidothorax Theobald, 1905, *Jour. Econ. Biol.* 1: 32.—41: 216.—59: 9.—60: 712.—61: C2.—67: 26.—72: 282.—79: 182.—82: 201.—87: 30.—97: 239.

Previous Records: No specific data mentioned (41); only 1 larva collected from artificial water container at Taian, P8 (72); weedy ground pool, Hsinjeng, H10, 26. XI. 1954 (82).

Very widely distributed throughout Taiwan Proper, also present on Liuchiu I., and very common. Larva breeds in stream pools, rock pools, bamboo-stumps and artificial containers in area below 500 m. Habits of adults are unknown.

50. *Culex (Culex) annulus* Theobald

Culex annulus Theobald, 1901, *Mon. Cul.* 1: 358.

Culex sp., 11: 198.

Culex tritaeniorhynchus, 78: 3.

Culex vishnui, 82: 201, 202, 205 & 206.—83: 484–93, partim.—98: 269.—103: 210 & 214.

Previous Records: Kokutsutan, X3 (11); 1♀, house, Penghu (78); larvae, pond with *Eichhornia*, Hsialutou, Q12, 11–24. V. 1954, larvae, impounded river with *Eichhornia*, S. of Chaochow, W16, V–VIII. 1954, 14. II. 1955 (82); 31 adult ♀♀, houses, Tsukuan, T18 (98).

Widely distributed throughout Taiwan Proper, present also in Penghu Is. and Liuchiu I., and very common. Larva breeds in rice-fields, ponds, ground pools in plain and foot-hill areas. Adult ♀ bites men, cows and buffaloes at night, especially actively at dusk, and enters and rests in houses. Morphologically the larva and adults agree very well with the description of *Culex annulus* by Colless (1956).

Wu & Chen (1960) reported that among 31 adult females of *Culex vishnui* collected in the filaria patients' houses at Tsukuan in the southern part of Taiwan, one adult female was found harboring 3 1st stage filaria larvae of *Wuchereria* sp. Owing to the fact that *Culex vishnui* is very rare in the plain area in southern part of Taiwan Proper, it seems to me that the mosquitoes they called *Culex vishnui* were very possibly *Culex annulus*. To make this supposition clear, I sent my assistants to the same area for mosquito fauna survey. The *Culex* mosquitoes with banded proboscis were not encountered in houses during daytime, however the larval collection and night catch using water buffalo as bait revealed the presence of two species of mosquitoes in *Culex vishnui* group, i. e. *Culex tritaeniorhynchus summorosus* and *Culex annulus*. Therefore the mosquitoes they called *Culex vishnui* might contain either of the two species or both. Since the probability of being *Culex annulus* is higher, they are here tentatively treated as *Culex annulus*.

51. *Culex* (*Culex*) *bitaeniorhynchus* Giles

Culex bitaeniorhynchus Giles, 1901, Bomb. Nat. Hist. Soc., Jour. 13: 607.—22: 68.—25: 629.—29: 625.—56: 197–99.—61: C2.—72: 282.—75: 1542.—76: 548–50.—79: 182.—82: 201 & 206.—83: 484–93.—99: 3.

Culex bitaeniorhynchus karatsuensis, 41: 211.—60: 722.

Previous Records: Taihoku, I. 1915–IV. 1919 (22); Maruyama, Daitotei, Chosokei & Sanshikyaku (25); Taihoku (29); Taihoku, V–XI. 1942 (56); breeding in water pools in Yunling Hsien and in streams in Hwalien Hsien (72); a small number of larvae, Penghu, 26–28. I. 1954 (76); larvae, pond with *Eichhornia*, Hsialutou, Q12, 11–24. V. 1954; pit, Changpin, U1, 12. V. 1954 (82); Taipei (99).

Very widely distributed throughout Taiwan Proper, also present in the Penghu Is., Liuchiu I. and Lanyu I., and very common. Larva breeds in rice-fields, streams, irrigation ditches and ponds with green algae in area below 1000 m. Larva when living is very greenish in color. Adult ♀ bites cows, buffaloes and sometimes men.

52. *Culex* (*Culex*) *fuscocephalus* Theobald

Culex fuscocephalus Theobald, 1907, Mon. Cul. 4: 420.—25: 630.—72: 282.—79: 182.—82: 201, 202, 205 & 206.—83: 484–93.—93: 912.—97: 247.—101: 791 & 812.

Previous Records: Hokuto & Sanshikyaku (25); breeding in rice-fields and pools in Taichung (72); larvae, pond, Hsialutou, Q12, 11–24. V. 1954; larvae, weedy swamp, Chungshan Park of Chia, Q12, 6. VI. 1954; larvae, hoof-mark, Shenshui, T20, 7. I. 1956; larvae, ground pool with grass margin, Chipu, T23, 4. VIII. 1954; larvae, impounded river with

Eichhornia and *Pistia*, S. of Chaochow, W16, 15. II. 1954 (82); Chunggho, E21, Shinshe, K11, and Chaochow, W16 (93).

Widely distributed throughout Taiwan Proper, also present on Liuchiu I. and Lutaio I., and very common in plain area especially in southern part of Taiwan Proper. Larva breeds in ground pools used by buffalo for bathing, small ground pools, hoof-marks and rice-fields. Adult ♀ bites buffaloes at night and very actively at dusk, and occasionally bites men. Hu (1958) reported that a positive isolation of Japanese B encephalitis virus was obtained in a batch of this mosquito collected in Chaochow in the southern part of Taiwan Proper.

53. *Culex (Culex) gelidus* Theobald

Culex gelidus Theobald 1901, Mon. Cul. 2: 20.—43: 407.—61: C2.—69: 9.—79: 182.—97: 248.

Previous Records: No specific data mentioned in any of these papers.

I have not encountered this species. It is very likely that this species does not occur in Taiwan.

54. *Culex (Culex) mimeticus* Noé

Culex mimeticus Noé, 1899, Soc. Ent. Ital., Boll. 31: 240.—6: 123.—12: 803.—22: 68.—23: 338.—27: 284.—28: 471.—29: 625.—31: 477.—33: 367.—36: 373.—40: 205.—43: 412.—44: 451.—60: 714.—61: C2.—66: 81.—67: 27.—69: 9.—72: 282.—79: 183.—83: 483—93.—87: 31.—106: 225.

Culex mimeticus var., 25: 629.

Previous Records: Between Keiko and Furin, P7, VII. 1912; on way to Urai, E32, VIII. 1912 (6); between Seifukusyo and Dairyochi, E31, II. 1916 (12); Taihoku, I. 1915—IV. 1919 (22); no specific data mentioned (23); Maruyama, Formosa (25); Taihoku (29); breeding in streams in Hwalien Hsien and in pools in Yungling Hsien (72).

Very widely distributed throughout Taiwan Proper, fairly common in area below 2200 m. Larva breeds in ground pools, rice-fields and ditches. Habits of adults are unknown.

55. *Culex (Culex) orientalis* Edwards

Culex orientalis Edwards, 1921, Bull. Ent. Res. 12: 338.—72: 282.—97: 252.

Previous Records: Breeding in streams in Hwalien Hsien (72).

None of the forms in *mimeticus* series of Edwards (1932) I encountered in Taiwan Proper is keyed down to *orientalis*. It is very likely that this species does not occur in Taiwan. However, further investigation is necessary.

56. *Culex (Culex) pipiens quinquefasciatus* Say

Culex quinquefasciatus Say, 1823, Acad. Nat. Sci. Philad. Jour. 3: 10.—17: 133.—22: 68.—29: 625.—30: 765—89.—38: 12.—41: 215.—46: 2884.—47: 511.—48: 1486.—57: 95—144.—58.—59: 9.—61: C2.—78: 3.—79: 183.—82: 201, 202 & 206.—93: 912 & 913.

Culex pipiens, 5: 37.—77: 40.

Culex fatigans, 9: 31.—10: 312.—11: 198.—14: 1027.—17: 133.—25: 630.—51: 1468.—52: 1651—57.—53: 908.—55: 1466—70.—56: 197 & 198.—60: 721.—70: 123—31.—72: 282.—73: 149—67.—76: 547—50.—80: 7—11.—83: 484—93.—85: 82—83.—89.—91: 636—39.—95: 88.—96: 229 & 235.—98: 262, 268, 269 & 270.—101: 791 & 821.

Culex sp., 20: 452.

Culex pipiens var. *pallens*, 60: 808.

Culex pipiens fatigans, 84: 956-66.—94: 176-85.—99: 2-39.—103: 209-88.

Previous Records: No specific locality mentioned (5); Urai (9); common in Hokoto (11); Boryo, W25 (14); larvae, cement lined ditch, Ryukokosho (17); Taihoku (20); Taihoku, I. 1915-IV. 1919 (22); a large number (25); Taihoku (29); Taihoku (30); Taihoku (46); Taihoku (47); Taihoku (48); 29 ♀♀, Makogai, X3 (51); Taihoku (52); Taihoku (53); Taihoku and its vicinity (56); Taihoku and its vicinity (57); Taihoku (58); Taipei (70); breeding in many types of water, such as ditches, pools, ponds, artificial water containers, etc., very common throughout whole island (72); Taipei (73); 29 ♀♀ & 5 ♂♂, house, Makung, 11 ♀♀ & 5 ♂♂, house, Hushi, 3 ♀♀, house, Hsiyu; 26 ♀♀ & 11 ♂♂, hotel room and toilet, Hsiyu; 4 ♀♀ & 2 ♂♂, stable, Hsiyu; 8 ♀♀ & 8 ♂♂, water container, Hsiyu; 26-28. I. 1954 (76); 607 ♀♀, Penghu Hsien (78); Taipei (80); larvae, pond with *Eichhornia*, Hsialutou, Q12, 11-24. V. 1954; larvae, ground pool with grass margin, Kuanghua, W16, 7. II. 1955; adults, pit, Changpin, U1, 12. V. 1954; larvae, *Eichhornia* pond, Hsialutou, Q12, VI-VII. 1954 (82); Taihoku and Taichu (84); Taipei (85); Hsinhua, S26, 1956 (89); Taihsi, M7, III. 1955 and Chaochow, W16, III. 1955 & IX-XI. 1955 (91); Chungho, E21, Shinshe, K11, Chaochow, W16 (93); Taihoku (94); Hsiyu I., X1 (95); 91 ♀♀, Tsukuan, T18 (98); adults, house, Taipei, 10. II-14. XI. 1958 (99).

Very widely distributed throughout Taiwan Proper, also present in Penghu Is., Liuchiu I., Lutaao I. and Lanyu I. and very very common. Adults have been encountered twice at Alishan, Q19, 2200 m. Larva breeds in stagnant filthy cement-lined ditches, filthy pools, pig's fecal tanks and artificial water containers. In urban areas the majority of the population of this mosquito occur in stagnant filthy cement-lined ditches, and in rural areas where cement-lined ditches are not available they occur mostly in artificial water containers and pig's fecal tanks. Adult ♀♀ are very anthropophilic and endophilic, and bite men very actively at night, especially at mid-night when rooms are not illuminated. Both ♂♂ and ♀♀ rest on the dark aspects in houses, such as bedrooms, store rooms etc. during daytime and also at night. This has been demonstrated to be the vector of filariasis in Taiwan Proper and Penghu Is. by previous workers.

57. *Culex* (*Culex*) *sinensis* Theobald

Culex gelidus var. *sinensis* Theobald, 1903, Mon. Cul. 3: 180.

Culex sinensis, 43: 395.—59: 9.—61: C2.—69: 9.—72: 282.—79: 183.

Previous Records: No specific data mentioned (43); breeding in rice-fields in Taichung (72).

Widely distributed throughout Taiwan Proper, but very rare. Larva breeds in rice-fields, streams, irrigation ditches and ponds with green algae in area below 500 m. Larva when living is very greenish in color. Adult ♀ rest in houses, enters human baited double net traps and light traps. Biting habits of adult ♀♀ are unknown.

58. *Culex* (*Culex*) *sitiens* Wiedemann

Culex sitiens Wiedemann, 1828, Aussereur. zweifel. Insec. 1: 542.—11: 198.—?12: 803.—25: 630.—41: 213.—59: 9.—60: 727.—61: C2.—79: 183.

Previous Records: Hokoto (11); between Seifukusyo and Dairyochi, E31, II. 1916,

?(12); Takao (25).

Widely distributed throughout Taiwan Proper and also present in Penghu Is. and Liuchiu I., but restricted to coastal region. Larva breeds in brackish fish ponds with aquatic plants, pools just above high tide and boats on seashore. Adult ♀ enters houses at night. It is very likely that this mosquito bites men. The larval record by Hatori (1916) from Sankakuyu is rather questionable, because Sankakuyu is situated in the mountainous area far away from the sea coast.

59. *Culex (Culex) tritaeniorhynchus summorosus* Dyar

Culex summorosus Dyar, 1920, Insec. Inscit. menst. 8: 180.

Culex tritaeniorhynchus, 25: 630.—41: 213.—59: 9.—60: 725.—61: C2.—79: 183.—82: 201, 202, 205 & 206.—83: 484-93.—93: 911-13.—97: 263.—99: 3.—101: 791 & 821.

Previous Records: Maruyama, Daitotei, Sanshikyaku and Takao (25); larvae, pond with *Eichhornia*, Hsialutou, Q12, 11, 24. V. 1954; larvae, ground pool with grass margin, Chipu, T23, 4. VIII. 1954; larvae, impounded river with *Eichhornia* and *Pistia*, S. of Chaochow, W16, 19. V., 5, 11, 26, 29. VI, 2. VII. 1954 and 14. II. 1955; larvae, impounded river with *Eichhornia*, S. of Chaochow, W16, V-VIII. 1954, 14. II. 1955 (82); Chungo, E21, Shinshe, K11, and Chaochow, W16 (93); Taipei (99).

Widely distributed in plain foothill areas throughout Taiwan Proper and also present on Lutao I. and Lanyu I. and more common in northern part of Taiwan Proper than in southern part. Larva breeds in rice-fields and ground pools. Adult ♀ bites buffaloes and men. Hu (1958) reported that positive isolations of Japanese B encephalitis virus were obtained in many batches of this mosquitoes collected in Taipei area.

60. *Culex (Culex) vishnui* Theobald

Culex vishnui Theobald, 1901, Mon. Cul. 1: 355 (♀ only).—25: 630.—60: 726.—61: C2.—72: 282.—79: 184.—83: 484-93, partim.

Culex impellens, 22: 68.—29: 625.

Culex annulus, 41: 214.—42: pl. 58.—59: 9.

Previous Records: Taihoku (22); Taihoku & Daitotei (25); Taihoku (29); breeding in pools and rice-fields, common on Taiwan (72).

Widely distributed throughout Taiwan Proper, but not common. Larva breeds in rice-fields, ground pools and ditches in plain and foothill areas. Habits of adults are unknown. The local *Culex* larvae in *Culex vishnui* group which have only about 7 or 8 large comb teeth are here tentatively treated as *Culex vishnui*. I have compared the adult and larval specimens of Taiwan with those of *Culex pseudovishnui* from Singapore (kindly supplied by Dr. Colless). Both the adult and larval specimens of the local material agree fairly well with *C. pseudovishnui* of Singapore except as follows: In adults, median upright forked scales on vertex are much paler and distinct than those of *C. pseudovishnui*, and in the larva the comb teeth are wider basally, the basal attachment is much shorter, and prothoracic hair 4 is only 2-branched and stouter, and their tips reach beyond preclypeus. The prothoracic hair 4 of the larva of *C. pseudovishnui* is 4-5-branched, the branches are much shorter and more slender, and their tips do not reach preclypeus.

61. *Culex (Culex) whitmorei* (Giles)

Taeniorhynchus whitmorei Giles, 1904, Jour. Trop. Med. 7: 367.

Culex whitmorei, 25 : 629.—41 : 212.—59 : 9.—60 : 723.—61 : C2.—72 : 282.—75 : 1542.

Previous Records : Toyen distr. & Sanshikyaku (25); breeding in rice-fields in Tai-chung (72).

Widely distributed throughout Taiwan Proper, but very very rare. The larvae have not been collected by me and other TAMRI members. Adult ♀♀ have been collected in plain and mountainous areas below 500 m. They enter houses, human baited double net traps and light traps.

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SUMMARY

During the past 60 years 61 species of non-anopheline mosquitoes were recorded from Taiwan under more than 100 combinations of generic and specific mosquito names. These records are scattered over 107 reports. About 50 % of the reports are original and the remaining reports are direct or indirect quotations from the original reports. These records are brought together with a bibliography to show their origin and are fully annotated.

I did not encounter 9 out of these 61 species, and discovered the fact that all the previous records of *Aedes w-albus* for Taiwan were quoted directly or indirectly from a wrong review of a paper. Because of this finding it is thought reasonable to delete *Aedes w-albus* from the list of the non-anopheline mosquitoes of Taiwan.

Based on the results of my investigation and observation for many years, a brief account is given of vertical and horizontal distribution, density in general, larval ecology, habits of adults and some taxonomic notes. Local distribution, larval habitat, occurrence in elevation and biting habits of adult females in nature are summarized in the following table.

Abbreviations : (Local distribution) NT : Northern Taiwan, CT : Central Taiwan, ST : Southern Taiwan, Lu : Luta Island, Lan : Lanyu Island, Liu : Liuchiu Island, Pen : Penghu Islands, E : Eastern side only. (Habitat) AC : Artificial container, BCP : Brackish coral rock pool, BFP : Brackish fish pond, BP : Brackish pool, BS : Bamboo-stump, CD : Cement-lined ditch, EP : *Eichhornia* pond, FT : Fecal tank, GP : Ground pool, HM : Hoof-mark, ID : Irrigation ditch, LAC : Leaf axils of *Colocasia*, LAM : Leaf axils of *Musa*, PD : Pond, PTH : Papaya tree-hole, RF : Rice-field, RP : Rock pool, SP : Stream pool, TH : Tree-hole. (Biting in nature) B : Buffalo, C : Cow, M : Man.

Species	Local distribution							Larval habitat	Occurrence in elevation(m)	Biting
	NT	CT	ST	Lu	Lan	Liu	Pen			
1. <i>Tox. aurifluus</i>	+	+	+	-	-	-	-	TH, BS, AC	up to 1,200	
2. <i>Tox. manicatus</i>	+	+	+	-	-	-	-	TH, BS, AC	200-2,400	
3. <i>Tr. aranoides</i>	+	+	+	-	-	+	-	BS	up to 500	
4. <i>Tr. bambusa</i>	+	+	+	-	-	-	-	BS, TH, AC	up to 2,000	
5. <i>Ma. genurostris</i>	+	+	+	-	+	-	-	LAC, LAM	up to 500	
6. <i>Ma. jacobsoni</i>	-	+	-	-	-	-	-	LAC	200-1,000	
7. <i>F. c. metallica</i>	-	+	+	-	-	-	-	EP	up to 50	
8. <i>F. luzonensis</i>	+	+	+	-	-	-	-	EP, GP, BS, RP	up to 200	
9. <i>F. fusca</i>	+	+	-	-	-	-	-	TH	200-1,200	
10. <i>Man. crassipes</i>	not encountered									
11. <i>Man. giblini</i>	not encountered									
12. <i>Man. uniformis</i>	+	+	+	-	-	-	-	EP	up to 500	B & M
13. <i>U. annandalei</i>	+	+	+	-	-	+	-	SP, GP	up to 500	B & M
14. <i>U. bimaculata</i>	+	+	+	-	-	-	-	BS, TH, AC	up to 2,000	
15. <i>U. macferlanei</i>	+	+	+	-	-	-	-	SP, HM	up to 500	
16. <i>U. maculipleura</i>	+	+	+	-	-	-	-	shaded SP	up to 500	
17. <i>O. anopheloides</i>	+	+	+	-	-	-	-	TH, BS	up to 2,000	
18. <i>H. lii</i>	+	+	+	-	-	-	-	BS, TH	100-800	M
19. <i>Ae. vigilax</i>	not encountered									
20. <i>Ae. albolateralis</i>	-	+	+	-	-	-	-	TH, BS	up to 500	B & M
21. <i>Ae. formosensis</i>	+	+	+	-	-	-	-	LAM, LAC	up to 1,000	B & M
22. <i>Ae. hatorii</i>	+	-	-	-	-	-	-	RP	up to 500	M
23. <i>Ae. j. shintienensis</i>	+	+	+	-	-	-	-	RP, TH, AC	up to 2,400	
24. <i>Ae. sinensis</i>	not encountered							PTH, BS	up to 500	
25. <i>Ae. togoi</i>	+	+E	+E	-	+	-	-	BCP, AC	coast only	M (?)
26. <i>Ae. amesii</i>	not encountered									
27. <i>Ae. aegypti</i>	+	+	+	-	-	-	+	AC	up to 300	M
28. <i>Ae. albolineatus</i>	-	+	+	-	-	-	-	BS, TH	up to 1,000	M
29. <i>Ae. albopictus</i>	+	+	+	+	-	+	+	AC, BS, TH	up to 1,000	M
30. <i>Ae. a. horishensis</i>	-	+	+	-	-	-	-	BS	up to 1,000	M
31. <i>Ae. desmotes</i>	-	+	+	-	-	-	-	?	up to 500	M
32. <i>Ae. m. perplexus</i>	-	+	+	-	-	-	-	BS	up to 1,500	M
33. <i>Ae. w-albus</i>	not encountered									
34. <i>Ae. v. nocturnus</i>	+	+	+	-	-	-	+	RF, GP	up to 500	M, B & C
35. <i>Ar. subalbatus</i>	+	+	+	-	-	+	+	FT, AC, PTH, BS, LAC	up to 2,000	M, B & C
36. <i>Ar. annularis</i>	not encountered									
37. <i>Ar. digitatus</i>	-	+	-	-	-	-	-	BS	around 100	
38. <i>Ar. magnus</i>	-	+	+	-	-	+	-	BS	up to 500	M
39. <i>Ar. omissus</i>	+	+	+	-	-	-	-	LAC	up to 500	M
40. <i>Ar. flavus</i>	-	+	+	-	-	-	-	BS	up to 500	M

Species	Local distribution							Larval habitat	Occurrence in elevation (m)	Biting
	NT	CT	ST	Lu	Lan	Liu	Pen			
41. <i>C. fuscans</i>	+	+	+	+	+	+	+	CD, EP, GP, AC	up to 1,800	
42. <i>C. vorax</i>	+	+	+	-	-	+	-	GP, SP, RP, BS	up to 1,800	
43. <i>C. brevipalpis</i>	-	+	+	-	-	-	-	TH, BS	up to 1,000	
44. <i>C. hayashii</i>	+	+	+	-	-	-	-	SP, GP	up to 200	
45. <i>C. malayi</i>	-	+	-	-	-	+	-	GP	up to 100	
46. <i>C. rubithoracis</i>	+	+	+	-	-	-	-	EP, RF, GP	up to 50	
47. <i>C. nr. uniformis</i>	-	+	-	-	-	-	-	TH, BS	up to 1,800	
48. <i>C. nigropunctatus</i>	+	+	+	-	-	-	-	HM, GP, SP	up to 200	
49. <i>C. pallidothorax</i>	+	+	+	-	-	+	-	SP, RP, BS, AC	up to 500	
50. <i>C. annulus</i>	+	+	+	-	-	+	+	RF, GP, PD	up to 200	M, B & C
51. <i>C. bitaeniorhynchus</i>	+	+	+	-	+	+	+	RF, SP, ID, PD	up to 1,000	M, B & C
52. <i>C. fuscocephalus</i>	+	+	+	+	-	+	-	GP, HM, RF	up to 500	B
53. <i>C. gelidus</i>	not encountered									
54. <i>C. mimeticus</i>	+	+	+	-	-	-	-	GP, RF, ID	up to 2,200	
55. <i>C. orientalis</i>	not encountered									
56. <i>C. p. quinquefasciatus</i>	+	+	+	+	+	+	+	AC, GP, PD, CD	up to 2,200	M
57. <i>C. sinensis</i>	+	+	+	-	-	-	-	ID, PD	up to 500	M (?)
58. <i>C. sitiens</i>	+	+	+	-	-	+	+	BFP, GP, AC	coast only	M (?), B
59. <i>C. t. summorosus</i>	+	+	+	+	+	-	-	RF, GP	up to 500	M, B
60. <i>C. vishnui</i>	+	+	+	-	-	-	-	RF, GP, ID	up to 500	
61. <i>C. whitmorei</i>	+	+	+	-	-	-	-	?	up to 500	B

GAZETEER

Abbreviations: J—Japanese, M—Mandarin, T—Taiwanese, p.—prefecture, sp.—subprefecture, v.—village; for code numbers see "Key to the map."

- Anping (T & M)—Anping, R3.
 Ariko (Ako p.) (J)—Likang, W1.
 Aoshenshui (M)—Aoshenshui, T20.
 Babutoku (Kansaiho sp., Toyen p.) (J)—Chinshan, F4.
 Bokushikyaku (J)—Putzu, Q10.
 Boryo (Ako p.) (J)—Fangliao, W25.
 Changpin (M)—Changpin v., U1.
 Chaochow (M)—Chaochow, W16.
 Chiai (M)—Chiai, Q12.
 Chingtan (M)—Chingtan, E30.
 Chihou (M)—Chihou, V9.
 Chihtuan (M)—Chihtuan, Leshui v., G11.
 Chikuto (Kansaiho sp., Toyen p.) (J)—Chutou, F4.
 Chikutoki (Kagi p.) (J)—Chutouchi, Q17.
 Chinhuang (M)—Chinhuang v., U11.
 Chinshan (Taipei h.) (M)—Chinshan, E4.
 Chipu (M)—Chipu, T23.
 Chosokei (J)—Shuangchi v., E16.
 Chuchih (M)—Chuchih v., E30.
 Chukou (M)—Chukou v., Q13.
 Chunggho (M)—Chunggho, E21.
 Chushan (M)—Chushan, N11.
 Chutien (M)—Chutien, W11.
 Daichikuko (Kansaiho sp., Toyen p.) (J)—Tachukeng, F4.
 Dairyochi (Sankakuyu sp., Toyen p.) (J)—Taliaoti, Chulun v., E31.
 Daitotei (J)—Yenping t. (C2).
 Dangai-Raho (Daika sp., Toyen p.) (J)—Tuanai, Isheng v., D13.
 Doko (Kagi p.) (J)—Tuku, M10.
 Furin (J)—Fenglin, P7.
 Gohunhei (Daika sp., Toyen p.) (J)—Howenping, Tsojeng v., D13.
 Hachitoshima (Hoko p.) (J)—Patsotao, X5.
 Hanchi (M)—Hanchi, J8.
 Hokko (J)—Peikang, M20.
 Hokoto (J)—Penghutao or Penghu Island, X.
 Hokuto (J)—Peitou, A1.
 Horisha (J)—Puli, N3.

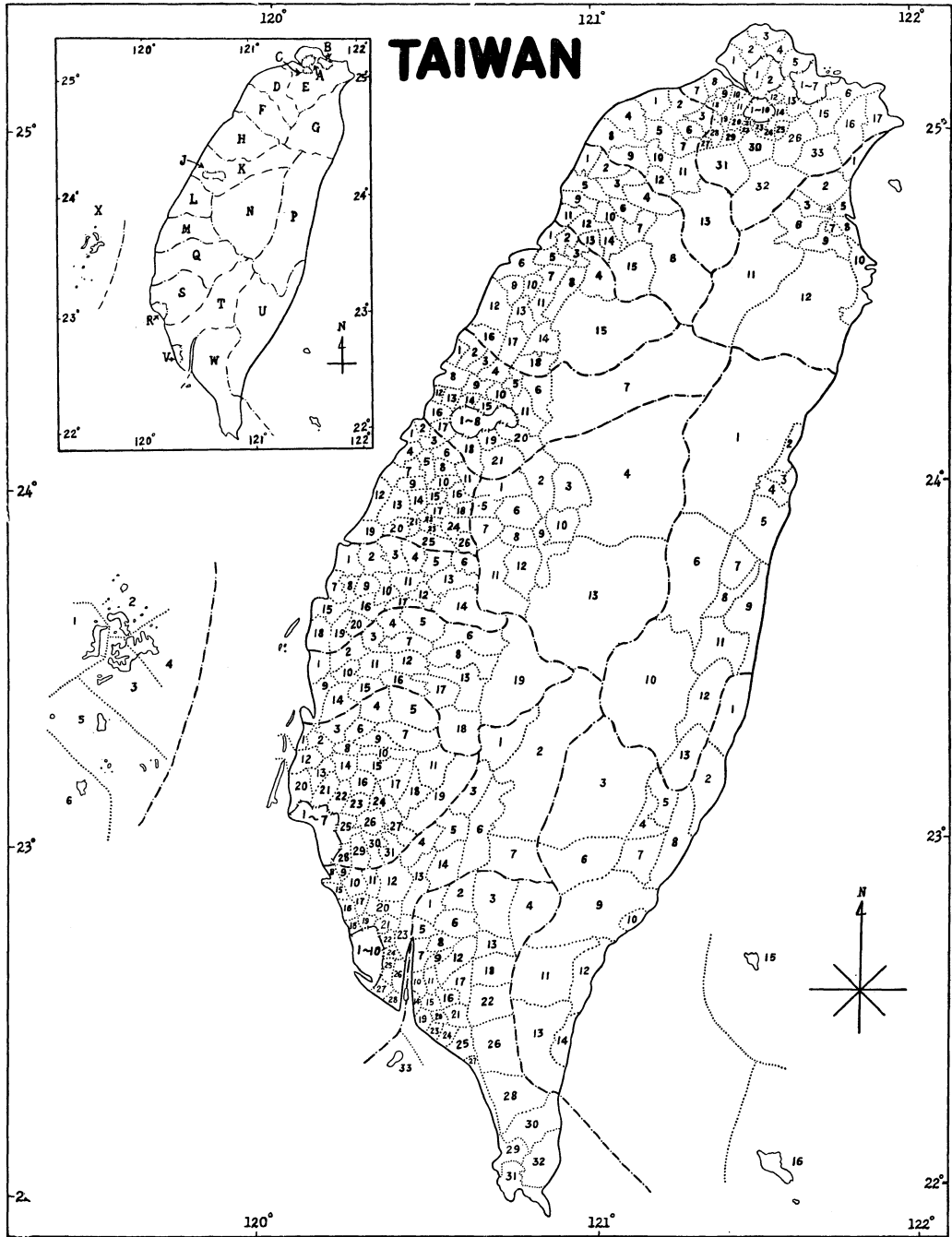
- Hozangai (Tainan p.) (J)—Fengshan, T25.
Hsialutou (M)—Hsialutou, Q12.
Hsinhua (Tainan h.) (M)—Hsinhua, S26.
Hsinjeng (M)—Hsinjeng v., H10.
Hsinsheng (M)—Hsinsheng v., W16.
Hsiyu (M)—Hsiyu Island, X1.
Huhsi (M)—Huhsi, X4.
Hwalien (M)—Hualien, P3.
Hwalien Hsien (M)—Hualien h. (P).
Ikenohata (Shinchiku) (J)—Chihtuan, Leshui v., G11.
Kaboko (Hozangai, Daichikuri, Tainan p.) (J)—Fengshan, T25.
Kakubanzan (J)—Chiaopanshan or Fuhsing, D13.
Kangchien (M)—Kangchien v., H7.
Kangkou (M)—Kangkou or Kangkou v., W32.
Kankau (T)—*See* Kangkou (M).
Kanshirei (Kagi p.) (J)—Kuantzuling, S5.
Kanteibyō (Tainan p.) (J)—A part of Tainan c. (R).
Kaohsiung City (M)—Kaohsiung c. (V).
Karenko (J)—Hualienkang or Hualien, P3.
Keiko (J)—Chikou v., P5.
Kenko (Hozangai, Daichikuri, Tainan p.) (J)—Fengshan, T25.
Kigo (Takao, Tainan p.) (J)—Chihou, V9.
Kokuseiko (Kagi p.) (J)—Kuohsingkang or Luerhmen, R1.
Kokutsutan (J)—Houkutan, Chungkuang v., X3.
Kuanghua (M)—Kuanghua, W16.
Kunfukan (Kakubanzan) (J)—The name of the mansion-house for distinguished guests, at Chiaopanshan or Fuhsing, D13.
Kyopan (Daika sp., Toyen p.) (J)—Isheng v., D13.
Kyuko (Shinchiku p.) (J)—Chiukang, F5.
Lanyu Island (M)—Lanyu Island (U16); also known as Orchid Island, and formerly as Botel Tobago or Kotosho (J).
Liuchiu Island (M)—Hsiaoliuchiu or Liuchiu Island, W33; formerly known as L'êlé Lambay and Shoryukyu (J).
Lutao Island (M)—Lutao Island, U15; also known as Green Island, and formerly as Kashoto (J).
Maruyama (J)—Misspelled as Macuyama, north side of Taipei; Yuanshan, C4.
Makogai (J)—Makung, X3.
Makung (M)—Makung, X3.
Michi (M)—Michi v., S11.
Nanryo (Kashoto) (J)—Nanliao, U15.
Nanshiko (Tainan p.)—Nantzu, V1.
Nantou Hsien (M)—Nantou h. (N).
Neishuangchi (M)—Neishuangchi, Chishan v., A2.
Penfu (M)—Penfu v., W33.
Penghu (M)—Penghu h. or the Pescadores (X).
Penghu Islands (M)—Penghu Islands or the Pescadores (X).
Pingtung Hsien (M)—Pingtung h. (W).
Polisha (T)—Puli, N3.
Puwei (M)—Puwei, Chungho v., Q13.
Rokuchikuzan (Kansaiho sp., Toyen p.) (J)—Luchushan, F4.
Ryukokosyo (Taihoku) (J)—A part of Taipei c. (C).
Sanhsien (M)—Sanhsien v., U2.
Sankakuyu (J)—Sanhsia, E31.
Sankung (M)—Sankung v., W16.
Sanshikyaku (J)—Santzuchia, E28.
Seifukusyo (Sankakuyu sp., Toyen p.) (J)—Chengfu v., E31.
Sekimon (J)—Shihmen, D12.
Sekkan (Tainan p.) (J)—Chihkan, T18.
Shenshui (M)—Shenshui, T20.
Shihchiaotung (M)—Shihchiaotung, Tahu v., Q13.
Shihtzutou (M)—Shihtzutou, N3.
Shinshe (M)—Hsinshhe, K11.
Shongtung (M)—Shuangtung v., N1.
Shuangtung (Taichung h.) (M)—Shuangtung v., N1.
Shuili (M)—Shuili, N9.
Sikkei (Daika sp., Toyen p.) (J)—Tsojeng v., D13.
Sogo (Sankakuyu sp., Toyen p.) (J)—Tsouho, Chuntou v., E31.
Sokei (Sankakuyu sp., Toyen p.) (J)—Shuangchi, Chuntou v., E31.
Suiriko (J)—Shuilikeng or Shuili, N9.
Suo (Giran p.) (J)—Suao, G10.
Tafu (M)—Tafu v., W33.
Tahu (M)—Tahu v., Q13.
Taian (M)—Taian, P8.
Taichu (J)—Taichung or Taichung c. (J).
Taichung (M)—Taichung c. (J) or Taichung h. (K).
Taihoku (J)—Taipei or Taipeh (C).
Taihsi (M)—Taihsi, M7.
Tainan (J & M)—Tainan or Tainan c. (R).
Taipei (M)—Taipei or Taipeh (C).
Taito (J)—Taitung, U10.

- Taitung (M)—Taitung, U10.
 Takang (M)—Takeng, J2.
 Takao (J)—Kaohsiung or Kaohsiung c. (V).
 Takeng (M)—Takeng, J2.
 Takinoshita (Daika, sp., Toyen p.) (J)—Lung-hsia, Isheng v., D13.
 Tamsui (T)—Tanshui, E1.
 Tapani (Tainan p.) (T & J)—Yuching, S18.
 Tili (M)—Tili v., N13.
 Tinghai (T)—Ting v., E8.
 Toa Tsui Kutsu (T & J combined)—Tashuiku, Yunglung v., N12.
 Tosekiko (Kagi p.) (J)—Tungshihkan or Tungshih, Q1.
 Toubiekang (M)—Toupienkeng or Toupien v., K20.
 Toupienkeng (M)—Toupienkeng or Toupien v., K20.
 Toyenmongai (J)—A part of Tainan c. (R); very probably Tungmen, R6.
 Tsukuan (M)—Tzukuan, T18.
 Urai (J)—Wulai, E32.
 Wanchiu (M)—Wanchiu v., S11.
 Wulai (M)—Wulai, E32.
 Wuling (M)—Wuling, U7.
 Yuanshan (M)—Yuanshan, C4.
 Yuchouhu (M)—Yuchouhu, A2.
 Yunling Hsien (M)—Yunling h. (M).

KEY TO THE MAP

Abbreviations: c.—city, d.—district, h.—hsien (something like county). Place names following numerals are township names.

- | | | | | | | | | |
|---|-----------------|------------|----------|------------|----------|------------|-----------|-------------|
| A | Yangmingshan d. | 9 | Yangmei | 26 | Shihting | 7 | Lotung | |
| | 1 | Peitou | 10 | Pingchen | 27 | Yingko | 8 | Wuchieh |
| | 2 | Shihlin | 11 | Tachi | 28 | Shulin | 9 | Tungshan |
| B | Chilung c. | 12 | Lungtan | 29 | Tucheng | 10 | Suao | |
| | 1 | Anle | 13 | Fuhsing | 30 | Hsintien | 11 | Tatung |
| | 2 | Chungshan | E | Taipei h. | 31 | Sanhsia | 12 | Nanao |
| | 3 | Chungcheng | 1 | Tanshui | 32 | Wulai | H | Miaoli h. |
| | 4 | Chitu | 2 | Sanchih | 33 | Pinglin | 1 | Chunan |
| | 5 | Jenai | 3 | Shihmen | F | Hsinchu h. | 2 | Toufen |
| | 6 | Hsini | 4 | Chinshan | 1 | Hsinfeng | 3 | Sanwan |
| | 7 | Nuannuan | 5 | Wanli | 2 | Hukou | 4 | Nanchuang |
| C | Taipei c. | 6 | Juifang | 3 | Hsinpu | 3 | Tsaochiao | |
| | 1 | Tatung | 7 | Linkou | 4 | Kuanhsi | 6 | Houlung |
| | 2 | Yenping | 8 | Pali | 5 | Chupei | 7 | Touwu |
| | 3 | Chiencheng | 9 | Wuku | 6 | Hsiunglin | 8 | Shihtan |
| | 4 | Chungshan | 10 | Luchou | 7 | Hengshan | 9 | Hsihu |
| | 5 | Sungshan | 11 | Sanchung | 8 | Chienshih | 10 | Miaoli |
| | 6 | Lungshan | 12 | Neihu | 9 | Hsinchu | 11 | Kungkuan |
| | 7 | Chengchung | 13 | Hsichih | 10 | Chutung | 12 | Tunghsiao |
| | 8 | Taan | 14 | Nankang | 11 | Hsiangshan | 13 | Tunglo |
| | 9 | Shuangyuan | 15 | Pingchi | 12 | Paoshan | 14 | Tahu |
| | 10 | Kuting | 16 | Shuangchi | 13 | Emei | 15 | Taian |
| D | Taoyuan h. | 17 | Kungliao | 14 | Peipu | 14 | Yuanli | |
| | 1 | Tayuan | 18 | Taishan | 15 | Wufeng | 17 | Sani |
| | 2 | Luchu | 19 | Hsinchuang | G | Ilan h. | 18 | Cholan |
| | 3 | Kweishan | 20 | Panchiao | 1 | Toucheng | J | Taichung c. |
| | 4 | Kuanyin | 21 | Chungho | 2 | Chiaochi | 1 | Hsitun |
| | 5 | Chungli | 22 | Yungho | 3 | Yuanshan | 2 | Peitun |
| | 6 | Taoyuan | 23 | Chingmei | 4 | Ilan | 3 | Nantun |
| | 7 | Pate | 24 | Mucha | 5 | Chuangwei | 4 | Hsichu |
| | 8 | Hsinwu | 25 | Shenkeng | 6 | Sanhsing | 5 | Peichu |



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|----|-------------|----|------------|----|------------|----|--------------|
| 6 | Chungchu | 25 | Chichou | 13 | Fuli | 21 | Hsikang |
| 7 | Nanchu | 26 | Erhshui | Q | Chiai h. | 22 | Anting |
| 8 | Tungchu | M | Yunlin h. | 1 | Tungshih | 23 | Hsinshih |
| K | Taichung h. | 1 | Mailiao | 2 | Liuchia | 24 | Shanshang |
| 1 | Taan | 2 | Lunpei | 3 | Hsinkang | 25 | Yungkang |
| 2 | Tachia | 3 | Erhlun | 4 | Chikou | 26 | Hsinhua |
| 3 | Waipu | 4 | Hsilo | 5 | Talin | 27 | Tsochen |
| 4 | Houli | 5 | Latung | 6 | Meishan | 28 | Jente |
| 5 | Shihkang | 6 | Linnei | 7 | Minhsiung | 29 | Kueijen |
| 6 | Tungshih | 7 | Taihsi | 8 | Chuchi | 30 | Kuanmiao |
| 7 | Hoping | 8 | Tungshih | 9 | Putai | 31 | Lungchi |
| 8 | Chingshui | 9 | Paochung | 10 | Putzu | T | Kaohsiung h. |
| 9 | Shenkang | 10 | Tuku | 11 | Taipao | 1 | Sanmin |
| 10 | Fengyuan | 11 | Huwei | 12 | Chiai | 2 | Taoyuan |
| 11 | Hsinshe | 12 | Tounan | 13 | Fanlu | 3 | Chiahshien |
| 12 | Wuhsi | 13 | Touliu | 14 | Ichu | 4 | Neimen |
| 13 | Shalu | 14 | Kukeng | 15 | Lutsao | 5 | Shanlin |
| 14 | Taya | 15 | Ssuhu | 16 | Shuishang | 6 | Liukwei |
| 15 | Tantz | 16 | Yuanchang | 17 | Chungpu | 7 | Maolin |
| 16 | Lungching | 17 | Tapi | 18 | Tapu | 8 | Chiehting |
| 17 | Tatu | 18 | Kouhu | 19 | Wufeng | 9 | Hunei |
| 18 | Wujih | 19 | Shuilin | R | Tainan c. | 10 | Luchu |
| 19 | Tali | 20 | Peikang | 1 | Annan | 11 | Alien |
| 20 | Taiping | N | Nantou h. | 2 | Peichu | 12 | Tienliao |
| 21 | Wufeng | 1 | Tsaotun | 3 | Anping | 13 | Chishan |
| L | Changhua h. | 2 | Kuohsing | 4 | Hsichu | 14 | Meinung |
| 1 | Hsienhsi | 3 | Puli | 5 | Chungchu | 15 | Yungan |
| 2 | Shenkang | 4 | Jenai | 6 | Tungchu | 16 | Mito |
| 3 | Homei | 5 | Nantou | 7 | Nanchu | 17 | Kangshan |
| 4 | Lukang | 6 | Chungliao | S | Tainan h. | 18 | Tzukuan |
| 5 | Hsiushui | 7 | Mingchien | 1 | Peimen | 19 | Chiaotou |
| 6 | Changhua | 8 | Chichi | 2 | Hsuehchia | 20 | Yenchao |
| 7 | Fuhsing | 9 | Shuili | 3 | Yenshui | 21 | Tashe |
| 8 | Huatan | 10 | Yuchih | 4 | Houpi | 22 | Jenwu |
| 9 | Puyen | 11 | Chushan | 5 | Paiho | 23 | Tashu |
| 10 | Tatsun | 12 | Luku | 6 | Hsinying | 24 | Niaosung |
| 11 | Fenyuan | 13 | Hsini | 7 | Tungshan | 25 | Fengshan |
| 12 | Fengyuan | P | Hualien h. | 8 | Hsiaying | 26 | Taliao |
| 13 | Erhlin | 1 | Hsiulin | 9 | Liuying | 27 | Hsiaokang |
| 14 | Chihu | 2 | Hsincheng | 10 | Liuchia | 28 | Linyuan |
| 15 | Puhsin | 3 | Hualien | 11 | Nanhsi | U | Taitung h. |
| 16 | Yuanlin | 4 | Chian | 12 | Chiangchun | 1 | Changpin |
| 17 | Yungching | 5 | Shoufeng | 13 | Chiali | 2 | Chengkung |
| 18 | Shetou | 6 | Wanjung | 14 | Matou | 3 | Haituan |
| 19 | Tacheng | 7 | Fenglin | 15 | Kuantien | 4 | Kuanshan |
| 20 | Chutang | 8 | Kuangfu | 16 | Shanhua | 5 | Chihshang |
| 21 | Peitou | 9 | Fengpin | 17 | Tanei | 6 | Yenping |
| 22 | Tienwei | 10 | Chochi | 18 | Yuching | 7 | Luyeh |
| 23 | Pitou | 11 | Juisui | 19 | Nanhua | 8 | Tungho |
| 24 | Tienchung | 12 | Yuli | 20 | Chiku | 9 | Peinan |

10 Taitung	8 Lingya	12 Neipu	27 Fangshan
11 Chinfeng	9 Chichin	13 Machia	28 Shihtzu
12 Taimali	10 Chienchen	14 Hsinyuan	29 Checheng
13 Tajen	W Pingtung h.	15 Kanting	30 Mutan
14 Tawu	1 Likang	16 Chaochou	31 Hengchun
15 Lutao	2 Kaoshu	17 Wanluan	32 Manchou
16 Lanyu	3 Santi	18 Taiwu	33 Liuchiu
V Kaohsiung c.	4 Wutai	19 Tungkang	X Penghu h.
1 Nantzu	5 Chiuju	20 Nanchou	1 Hsiyu
2 Tsoying	6 Yenpu	21 Hsinpi	2 Paisha
3 Kushan	7 Pingtung	22 Laii	3 Makung
4 Sanmin	8 Changchih	23 Linpien	4 Huhsi
5 Yencheng	9 Linlo	24 Chiatung	5 Wanan
6 Chienchin	10 Wantan	25 Fangliao	6 Chimei
7 Hsinhsing	11 Chutien	26 Chunjih	

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HEMIPTERA-HOMOPTERA

(Continued from page 614)

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