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MOSQUITO STUDIES (Diptera, Culicidae)

- III. Two new *Aedes* from Tonga and Samoa. By Shivaji Ramalingam and John N. Belkin.
- IV. The mosquitoes of the Robinson-Peabody Museum of Salem expedition to the southwest Pacific, 1956. By John N. Belkin.

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MOSQUITO STUDIES (Diptera, Culicidae)

IV. THE MOSQUITOES OF THE ROBINSON-PEABODY MUSEUM

OF SALEM EXPEDITION TO THE SOUTHWEST PACIFIC, 1956¹

By John N. Belkin²

INTRODUCTION

A very interesting and valuable collection of mosquitoes, primarily from Polynesian outliers, was obtained by David D. Bonnet on the Robinson-Peabody Museum of Salem Expedition to the Southwest Pacific, 1956 (Robinson 1965, in press). The opportunity to examine the collection was particularly welcome owing to the fact that this material filled some of the most glaring lacunae in our knowledge of the mosquitoes of the South Pacific at the time that I was engaged in studying the fauna of this area. I had the opportunity to participate in the planning for the entomological phases of the expedition and suggested localities and mosquito groups that needed particular attention. I wish to thank William A. Robinson, the leader of the expedition, for making the material available to me and for visiting some isolated islands that were not originally on the itinerary thus making it possible to collect material that has been of inestimable value to me in the preparation of a survey and analysis of the mosquitoes of the South Pacific.

Although the mosquito material collected on the expedition is not very extensive (about 50 species; 2789 specimens including 232♂, 362♀, 1704 larvae and 491 pupae), it is of great interest and significance. Much of it consists of rearings and includes many individual rearings from larvae or pupae, thus establishing for the first time a correlation of sexes and stages for several species. It includes 3 new species not known by any other material (Aedes (S.) robinsoni, Aedes (S.) futunae and Tripteroides (T.) bonneti), 2 new but unnamed forms not represented by any other material (Culex (Lophoceraomyia) sp. 13, Aoba form and Aedes (S.) sp. near gurneyi), critical material of 4 additional new species represented by specimens from other collections (Aedes (F.) oceanicus, Aedes (S.) aobae, Aedes (S.) rotumae and Aedes (S.) varuae),

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additional material and stages of 2 species previously known only by the type collections (Aedes (S.) tulagiensis and Tripteroides (T.) distigma), additional larval material of 2 unnamed new forms (Culex (Lophoceraomyia) sp. 15, Santa Cruz forms and Culex (L.) sp. 18, Solomons rock pool forms), and finally numerous new records of species from islands never previously collected or very poorly sampled, notably from Alofi in the Hoorn group, Rotuma Island, Aoba and Vao in the New Hebrides, the Santa Cruz and Reef islands, Sikiana, Nuguria, Tabar, Wuvulu and Tobi.

The present report covers only the collections made in the Australasian part of the area covered by the expedition, i. e. from Samoa westward to Tobi Island. Unless indicated to the contrary I have personally identified all this material. I am grateful to Elizabeth N. Marks of the University of Queensland for checking the identification of most of the material from Nuguria westward to Wuvulu and to Richard M. Bohart of the University of California, Davis for the identification of species from Tobi Island. The material from the Sulu Archipelago and North Borneo awaits detailed study by Peter F. Mattingly of the British Museum (Nat. Hist.) and his collaborators engaged in a study of the mosquitoes of the Indomalayan area.

The taxonomic treatment follows that of my "Mosquitoes of the South Pacific" (Berkeley, Univ. of California Press, 1962) where the new species were described. An asterisk (*) preceding a locality or species indicates a new record. The localities are given in an east to west and south to north sequence throughout. The numbers in parentheses following localities or species refer to the Bonnet collection numbers, the data on which are given in the section on Collection Data and Identifications. All the material has been deposited either in the U. S. National Museum (USNM) or the University of California, Los Angeles (UCLA).

COLLECTION DATA AND IDENTIFICATIONS

The collection data have been transcribed directly from the field notes of David D. Bonnet. All the collections were made in 1956 on the dates specified for each.

1. Fagaitua, Tutuila, American Samoa. July 21. Leaf axil of taro (talo manua), in partial shade. Aedes (F.) oceanicus, 1L.
2. Utumea, Tutuila, American Samoa. July 21. Leaf axil of pandanus, in shade. Aedes (F.) oceanicus, 1♂, 1♀, 2P, 7L.
3. Auasi, Tutuila, American Samoa. July 21. Leaf axil of taro (ta'amu), in partial shade. Aedes (F.) oceanicus, 3P, 4L.
4. Amouli, Tutuila, American Samoa. July 23. Leaf axil of taro (ta'amu), Aedes (F.) oceanicus, 4L.
5. Amouli, Tutuila, American Samoa. July 23. Leaf axil of pandanus (laufala). Aedes (F.) oceanicus, 7L.
6. Amouli, Tutuila, American Samoa. July 24. Tin can in bush area behind village, shaded. Aedes (S.) polynesiensis, 2L.
7. Amouli, Tutuila, American Samoa. July 24. Leaf axil of pandanus (laufala). Aedes (F.) oceanicus, 2P, 25L.
8. Mu'a, Alofi, Hoorn Islands. July 29. Biting man in bush in daytime. Aedes (S.) futunae, 3♀.
9. Mu'a, Alofi, Hoorn Islands. July 29. Biting man in bush in daytime. Aedes (S.) futunae, 4♀; A. (S.) polynesiensis, 1♀.

10. Mu'a, Alofi, Hoorn Islands. July 29. Treehole at base of large tree (Inocarpus?), in deep shade in dense forest. Aedes (S.) futunae, 5♂, 5♀, 9P, 35L; A. (S.) polynesiensis, 3♂; A. (Finlaya) oceanicus, 1L.
- 10R. Oinafa Village, Rotuma. Aug. 3-5. No other data, presumably biting. Aedes (Aedim.) nocturnus, 2♀; Culex (C.) annulirostris, 11♀.
11. Mu'a, Alofi, Hoorn Islands. July 29. Coconut half in bush area along trail. Aedes (S.) polynesiensis, 1♂, 2♀, 1L, 2P.
12. Oinafa, Rotuma. Aug. 4. Hole in large "hefau" tree, in partial shade. Aedes (S.) rotumae, 1♂, 8L, 1P.
13. Oinafa, Rotuma. Aug. 4. Step cut in coconut palm, in shade. Aedes (S.) rotumae, 2L.
14. Oinafa, Rotuma. Aug. 3-4. Biting man at night in Chief Tokaninua's house. Aedes (S.) rotumae, 1♀; Culex (C.) annulirostris, 20♀.
15. Oinafa, Rotuma. Aug. 4. Partially burned coconut half, in shaded brush area close to village. Aedes (S.) rotumae, 2♂, 4♀, 43L, 20P.
16. Oinafa, Rotuma. Aug. 4. Well, 8 ft. deep, 6 ft. diameter. No mosquitoes. Water beetles.
17. Oinafa, Rotuma. Aug. 4. Hole in "shebe" tree, 3 ft. from ground; opposite graveyard. Aedes (S.) rotumae, 4♂, 2♀, 20L, 5P.
18. Oinafa, Rotuma. Aug. 4. Tin can in deep shade in bush area, edge of village. Aedes (S.) rotumae, 15L; Tripteroides (R.) rotumanus, 5L.
19. Oinafa, Rotuma. Aug. 4. Swamp 300 yards inland from village toward gardens; water very warm to touch; full sun. Aedes (Aedim.) nocturnus, 20L.
20. Oinafa, Rotuma. Aug. 4. Net sweepings in bush area back of village, opposite chief's house; 1750 hrs. Aedes (S.) rotumae, 1♂, 3♀; Aedes (Aedim.) nocturnus, 1♀.
21. Oinafa, Rotuma. Aug. 5. Mixed collection from treehole, coconut halves and tin cans in bush area behind village. Aedes (S.) rotumae, 2♂, 4♀, 29L, 6P.
22. Matauta, Tikopia. Aug. 8. Biting man in daytime, in partial shade along trail to Lake Terota; adjacent to collection 31. Aedes (S.) hebrideus, 3♀.
23. Matauta, Tikopia. Aug. 8. Treehole, in shade along trail toward Lake Terota. Tripteroides (R.) melanesiensis, 1♀.
24. Matauta, Tikopia. Aug. 8. Treehole, in partial shade along trail toward Ravanga village and Lake Terota. No mosquitoes.
25. Teifi, Tikopia. Aug. 8. Coconut shell, in shaded bush near trail to Lake Terota. Aedes (S.) hebrideus, 4♂, 1♀, 18L, 4P.
26. Teifi, Tikopia. Aug. 8. Treehole in papaya tree, in full sun along trail to Ravanga village, near gardens. Aedes (S.) hebrideus, 3♂, 1♀, 4L, 2P.
27. Terota, Tikopia. Aug. 8. Edge of Lake Terota, in bull rushes and water lilies. Anopheles (C.) farauti, 1♀, 4L; Culex (C.) annulirostris, 1♂, 3♀, 10L, 2P; Tripteroides (R.) melanesiensis, 1P (probably erroneous record).
28. Terota, Tikopia. Aug. 8. Small ground pools and footprints in taro patch near Lake Terota; very soft mud. No mosquitoes.
29. Kafika, Tikopia. Aug. 8. Outrigger canoe on beach of village, in partial shade. Aedes (S.) hebrideus, 25L.
30. Teifi, Tikopia. Aug. 8. Biting man in daytime, in partial shade on trail to Matauta. Aedes (S.) hebrideus, 2♀.
31. Teifi, Tikopia. Aug. 8. Treehole, in shade along trail toward Matauta. Aedes (S.) hebrideus, 2♂, 3♀, 8L, 5P; Tripteroides melanesiensis, 4♂, 5♀, 41L, 4P.

- 31A. Tikopia? No locality, date or habitat given. Aedes (S.) hebrideus, 1♂, 5♀, 4P.
32. Peuo, Vanikoro, Santa Cruz. Aug. 11. Water in iron frame of old steam boiler, partial shade. Culex (Lopho.) sp. 15, Santa Cruz forms, 15L.
33. Peuo, Vanikoro, Santa Cruz. Aug. 11. Iron drum, 55 gal. rain barrel in open sun. Aedes (S.) varuae, 15L; Tripteroides (R.) melanesiensis, 1L.
34. Peuo, Vanikoro, Santa Cruz. Aug. 11. Iron drum, 55 gal. rain barrel, open sun. Culex (C.) quinquefasciatus, 3♂, 4♀, 8L, 7P.
35. Peuo, Vanikoro, Santa Cruz. Aug. 11. Kerosene tin, 5 gal., filled with rain water from corrugated iron roof. Culex (C.) quinquefasciatus, 1♂, 7♀, 10L, 11P.
36. Peuo, Vanikoro, Santa Cruz. Aug. 11. Rain barrel, 55 gal. drum, shaded. Aedes (V.) lineatus, 1♂, 4♀, 11L, 4P.
37. Peuo, Vanikoro, Santa Cruz. Aug. 11. Taken while biting man in daytime in partial shade on pathway to Government House. Aedes (V.) lineatus, 1♀.
38. Peuo, Vanikoro, Santa Cruz. Aug. 11. Tree fern stump with water in center on pathway toward Government House, full sun. Aedes (S.) robinsoni, 1♂, 1P; Aedes (S.) varuae, 1L; Tripteroides (R.) melanesiensis, 3♂, 1♀, 50L, 2P.
39. Peuo, Vanikoro, Santa Cruz. Aug. 11. Tree fern stump with water in center on hillside above Government House, partial shade. No mosquitoes.
40. Peuo, Vanikoro, Santa Cruz. Aug. 11. Large treehole in Flame tree (Poinciana) near Government House on hillside, partial shade. Aedes (S.) robinsoni, 3♂, 9L, 7P; Tripteroides (R.) melanesiensis, 8♂, 4♀, 39L, 12P.
41. Peuo, Vanikoro, Santa Cruz. Aug. 11. Tractor ruts in swampy area of timber trail below Government House toward river, full sunlight, water very warm to touch. Anopheles farauti, 12L, 1P; Culex (C.) annulirostris, 1♂, 2♀, 6L, 3P.
42. Vao, New Hebrides. Aug. 17. Old whale boat on beach near anchorage, shade. Anopheles farauti, 1L; Aedes (S.) hebrideus, 3L; Culex (C.) quinquefasciatus, 1♀, 2L.
43. Vao, New Hebrides. Aug. 17. Treehole in deep shade near ceremonial dance area, ground level. Culex (C.) pacificus, 5L; Tripteroides (R.) melanesiensis, 2♀, 150 L, 6P.
- 43A. Vao, New Hebrides. Aug. 17. Mosquitoes swarming and biting at site 43. Aedes (S.) hebrideus, 2♀.
44. Vao, New Hebrides. Aug. 17. Canoe on beach, shaded. No mosquitoes.
45. Vao, New Hebrides. Aug. 17. Treehole in village near anchorage, partial shade. Tripteroides (R.) melanesiensis, 4L.
46. Vao, New Hebrides. Aug. 17. Treehole in village, partial shade. Tripteroides (R.) melanesiensis, 1L.
47. Vao, New Hebrides. Aug. 17. Treehole in village (Breadfruit tree), shaded. Tripteroides (R.) melanesiensis, 6L.
48. Vao, New Hebrides. Aug. 17. Brought in a bottle by a small boy, probably from a rain barrel. Aedes (S.) hebrideus, 1L; Culex (Mochtho.) femineus, 1♂; Tripteroides (R.) melanesiensis, 25L.
49. Vao, New Hebrides. Aug. 17. Brought in a bottle by a small boy, probably from a rain barrel. Aedes (S.) hebrideus, 1L; Culex (C.) quinquefasciatus, 1♀, 2L; Tripteroides (R.) melanesiensis, 1♀, 1L, 2P.

50. Vao, New Hebrides. Aug. 18. Treehole (guava) near village, partial shade. Culex (C.) pacificus, 7♂, 6♀, 82L, 12P.

51. Vao, New Hebrides. Aug. 18. Aluminum wing tank from airplane made into open canoe, on beach in shade. Aedes (S.) hebrideus, 1♂; Tripteroidea (R.) melanesiensis, 1♂.

52. Vao, New Hebrides. Aug. 18. Ground well, rock lined, on opposite side of island from anchorage. Aedes (S.) hebrideus, 1♂; Culex (Mochtho.) femineus, 1♂.

53. Amok, Malekula, New Hebrides. Aug. 20. Ceremonial drum area, near village, inside base of carved out hollow log drum, 1,500 ft. elevation, in partial shade. Aedes (S.) hebrideus, 1♂, 1♀, 1P; Tripteroidea (R.) melanesiensis, 17♂, 24♀, 30L, 42P.

54. Amok, Malekula, New Hebrides. Aug. 20. Leaf axil of taro plant (Colocasia), one of nine plants examined, near ceremonial drum area. No mosquitoes.

55. Amok, Malekula, New Hebrides. Aug. 20. Treehole near village, 1,500 ft. elevation, shaded. Tripteroidea (R.) melanesiensis, 1♀.

56. Amok, Malekula, New Hebrides. Aug. 21. On trail down mountain from village of Amok. Small shaded forest ground pool, 1,000 ft. elevation approximately. Culex (Mochtho.) femineus, 1♀, 12L, 1P.

57. Amok, Malekula, New Hebrides. Aug. 20. Pig wallow in reed area near village. Adult mosquitoes captured while skimming on water surface. Culex (Mochtho.) femineus, 4♂; Tripteroidea (R.) melanesiensis, 1♂.

58. Amok, Malekula, New Hebrides. Aug. 20. Pig wallow (#57), larvae from extremely muddy water. Culex (Lopho.) buxtoni, 2L; Culex (Mochtho.) femineus, 1♂, 13L, 1P; Tripteroidea (R.) melanesiensis, 1♀.

59. Aoba, New Hebrides. Aug. 24. Treehole in deep shaded forest near gardens of Episcopal Girls' School. Tripteroidea (R.) melanesiensis, 3L.

60. Aoba, New Hebrides. Aug. 24. Taken while biting man in daytime at site 59. Aedes (S.) aobae, 2♀; Aedes (V.) lineatus, 1♀.

61. Aoba, New Hebrides. Aug. 24. Treehole near Crater Lake in deep shade, about 1.5 gal. Aedes (S.) aobae, 7♂, 8♀, 6L, 5P; Culex (C.) pacificus, 2♂, 2L, 2P; Culex (Lopho.) sp. 13, Aoba form 1L, 1P; Tripteroidea (R.) melanesiensis, 1♀, 1L, 1P.

62. Aoba, New Hebrides. Aug. 24. Taken while biting man in shade near Crater Lake; vicious biters; native ducks present in lake. Aedes (S.) aobae, 1♀; Aedes (V.) lineatus, 5♂, 5♀.

63. Aoba, New Hebrides. Aug. 24. Fish from Crater Lake. No mosquitoes.

64. Aoba, New Hebrides. Aug. 24. Moist dirt from treehole near Lake. Placed in water. No mosquitoes.

65. Malo, Temotu, Santa Cruz. Aug. 29. Water in Tridacna shell in full sunlight near village. Aedes (S.) varuae, 5♂, 1♀; Anopheles farauti, 1♀, 1P.

66. Espiritu Santo, New Hebrides. Aug. 16. Female Culex with blood recovered on "Varua" soon after departure from port. Eggs laid 3 days later. Culex (C.) quinquefasciatus, 5♀, 18L, 4P.

67. Malo, Temotu, Santa Cruz. Aug. 29. Taken while biting man in partial shade at 1715. Armigeres (A.) breinli, 2♀.

68. Malo, Temotu, Santa Cruz. Aug. 29. Treehole 10 ft. above ground, breadfruit. No mosquitoes.

69. Malo, Temotu, Santa Cruz. Aug. 29. U.S. airplane wing tank used to catch rain water, shade. Tripteroides (T.) bonneti, 1♂, 1P.
70. Malo, Temotu, Santa Cruz. Aug. 29. Shallow ground well, full sun, no vegetation. Anopheles farauti, 2♂, 1♀, 4L, 2P.
71. Lawai, Graciosa Bay, Santa Cruz. Aug. 30. Half coconut, partial shade, near hospital. Aedes (S.) varuae, 2♂, 1P.
72. Malo, Temotu, Santa Cruz. Aug. 29. Treehole near village. Aedes (S.) hebrideus, 2L.
73. Malo, Temotu, Santa Cruz. Aug. 29. Rain barrel in village, full sunlight. Aedes (S.) hebrideus, 1♀, 1L, 1P.
74. Lawai, Graciosa Bay, Santa Cruz. Aug. 30. Ground well. Anopheles farauti, 1♀, 5L, 2P; Culex (Lopho.) sp. 15, Santa Cruz forms, 15♂, 2L.
75. Malo, Temotu, Santa Cruz. Aug. 29. Treehole at base of tree, shaded. No mosquitoes.
76. Lawai, Graciosa Bay, Santa Cruz. Aug. 30. Rain barrel near hospital. Aedes (S.) hebrideus, 2♂, 1♀, 10L; Aedes (S.) varuae, 11L, 5P; Culex (Lopho.) sp. 15, Santa Cruz forms, 11L.
77. Lawai, Graciosa Bay, Santa Cruz. Aug. 30. Leaf axil of "Spiny Palm," shaded area near gardens behind hospital. Aedes (S.) tulagiensis, 13L.
78. Naelo, Reef Islands. Aug. 31. Rain water collected in groove in trunk of fallen tree, full sun. Aedes (S.) hebrideus, 3L; Aedes (S.) varuae, 3L; Culex (Lopho.) sp. 15, Santa Cruz forms, 8L.
79. Naelo, Reef Islands. Aug. 31. Treehole in shade near hospital. Aedes (S.) tulagiensis, 7L.
80. Naelo, Reef Islands. Aug. 31. Female mosquito captured while egg laying at site 78. Aedes (S.) varuae, 1♀.
81. Naelo, Reef Islands. Aug. 31. Treehole in shade. Tripteroides (R.) melanesiensis, 20L.
82. Naelo, Reef Islands. Aug. 31. Leaf axil of "Spiny Palm," shaded area. No mosquitoes.
83. Naelo, Reef Islands. Aug. 31. Treehole near hospital, shade. Tripteroides (R.) melanesiensis, 6L.
84. Naelo, Reef Islands. Aug. 31. Rain barrel near hospital, partial shade. No mosquitoes.
85. Naelo, Reef Islands. Sept. 1. Leaf axil of "Spiny Palm," shaded, Aedes (S.) tulagiensis, 25L.
86. Naelo, Reef Islands. Sept. 1. Hole in side of coconut tree cut to collect rain water, on trail to hospital. Tripteroides (R.) melanesiensis, 4L.
87. Fenualoa, Reef Islands. Sept. 3. Treehole near dispensary, shaded. No mosquitoes.
88. Fenualoa, Reef Islands. Sept. 3. Treehole. No mosquitoes.
89. Fenualoa, Reef Islands. Sept. 3. Treehole. No mosquitoes.
90. Fenualoa, Reef Islands. Sept. 3. Leaf axil of "Spiny Palm" near dispensary, shaded. No mosquitoes.
91. Fenualoa, Reef Islands. Sept. 3. Treehole in shade. Tripteroides (R.) melanesiensis, 1♀, 1P.
92. Nupani, Reef Islands. Sept. 5. Treehole in shade near village. Aedes (S.) tulagiensis, 1♂, 1♀, 75L, 12P; Tripteroides (R.) melanesiensis, 1♀, 1P.
93. Nupani, Reef Islands. Sept. 5. Treehole in shade. No mosquitoes.

94. Nupani, Reef Islands. Sept. 5. Rain barrel in village, semi-shade under coconut trees. No mosquitoes.
95. Nupani, Reef Islands. Sept. 5. Taken while biting man in daylight, semi-shade. Armigeres (A.) breinli, 5♀; Aedes (S.) hebrideus, 2♀.
96. Nupani, Reef Islands. Sept. 5. Treehole in shade in forest area. Aedes (S.) hebrideus, 1♀.
97. Nupani, Reef Islands. Sept. 5. Taken while biting man, deep shade in bush. Armigeres (A.) breinli, 2♀; Aedes (S.) hebrideus, 1♀.
98. Sikiana. Sept. 6. Water contained in half Tridacna shell in garden, open sunlight. Aedes (S.) varuae, 4♂, 2♀, 1L, 7P.
99. Sikiana. Sept. 6. Ground well near garden, open sun. Culex (C.) annulirostris, 1♂, 2♀, 1P.
100. Sikiana. Sept. 6. Leaf of pandanus lying on ground in semi-shade, near gardens behind village. Aedes (S.) varuae, 1♂, 3♀, 6L, 6P.
101. Sikiana. Sept. 6. Leaf axil of pandanus, near gardens in semi-shade. Aedes (F.) hollingsheadi, 2♂, 4P.
102. Sikiana. Sept. 6. Coconut shell, rat eaten, in bush near village. No mosquitoes.
103. Sikiana. Sept. 6. Canal along edge of taro patch at gardens behind village. Aedes (V.) lineatus, 5♀, 1L, 14P; Culex (C.) annulirostris, 1♂, 4L.
104. Sikiana. Sept. 6. Taken while biting man in daylight. Aedes (V.) lineatus, 3♀.
105. Mboli (Purvis Bay), Florida, Solomon Islands. Sept. 14. Treehole in old log in shade near watering point. Aedes (S.) albolineatus, 1♂, 2♀, 40L; Tripteroides (T.) distigma, 1♂, 7P.
106. Mboli (Purvis Bay), Florida, Solomon Islands. Sept. 14. Shaded treehole in base of tree at pipeline inlet high on side of cliff. Aedes (S.) quasiscutellaris, 4♂, 13L, 14P.
107. Mboli (Purvis Bay), Florida, Solomon Islands. Sept. 14. Rockholes in vesicular lava rock, very numerous and large, shaded and leaves in holes. Aedes (S.) quasiscutellaris, 2♂, 1♀, 12L, 2P; Culex (Lopho.) sp. 18, Solomons rock pool forms, 17L.
108. Mboli (Purvis Bay), Florida, Solomon Islands. Sept. 14. Treehole in fallen rotten log, shaded. Culex (Lopho.) walukasi, 15L.
- 109A. Mboli (Purvis Bay), Florida, Solomon Islands. No date. Egg raft floating in water at 107. Probably Culex (Lopho.) sp. 18, Solomon rock pool forms.
- 109B. Ontong Java. Sept. 19. Rat eaten coconut near village in bush area, shaded. No mosquitoes.
110. Ontong Java. Sept. 19. Ground well in village, open sun. No mosquitoes.
- 110A. Ontong Java. Sept. 19. Treehole (breadfruit) near village, shaded. Aedes (S.) hebrideus, 30L.
111. Ontong Java. Sept. 19. Rain barrel in village, semi-shade. Aedes (S.) hebrideus, 17L.
112. Ontong Java. Sept. 19. Female caught in barrel (site 111) while egg-laying. Aedes (S.) hebrideus, 1♀.
113. Ontong Java. Sept. 19. Canoe along beach near village, semi-shade. Aedes (S.) hebrideus, 2♂, 30L, 3P.
114. Nuguria, Fead. Sept. 24. Ground well behind residence, semi-shade. Aedes (S.) hebrideus, 3L; Anopheles farauti, 4L.

115. Nuguria, Fead. Sept. 24. Taken while biting man in daytime near house. Aedes (S.) hebrideus, 1♀; Aedes (V.) lineatus, 1♀.
116. Nuguria, Fead. Sept. 24. Swamp area behind residence, beneath coconut trees in semi-shade. Culex (C.) annulirostris, 2♂, 4♀, 12L, 7P.
117. Tatau, Sos, Tabar. Sept. 29. Treehole near hospital, semi-shade. Aedes (F.) quasirubithorax subgroup, 17L, 2P; Aedes (S.) albolineatus, 2L; Aedes (S.) scutellaris group, 11L; Tripteroides (F.) bimaculipes group, 12L.
118. Tatau, Sos, Tabar. Sept. 29. Treehole near hospital, semi-shade. Aedes (F.) notoscriptus, 1♂, 1L, 4P; Aedes (F.) papuensis subgroup, 2L; Aedes (F.) quasirubithorax subgroup, 2L; Aedes (S.) albolineatus, 1♂, 2♀, 7L, 1P.
119. Ontong Java. Sept. 20. Old kettle with rain water in village, semi-shade. Aedes (S.) hebrideus, 1♂, 3♀, 14L, 5P; Aedes (V.) lineatus, 4♀.
120. Tatau, Sos, Tabar. Sept. 30. Taken while biting man in daytime on hill behind Tom Spencer's house. No mosquitoes.
121. Nuguria, Fead. Sept. 24. Rain water in bottom of sail boat next to house. Aedes (S.) hebrideus, 8♂, 12♀, 25L, 15P.
122. Tatau, Sos, Tabar. Sept. 29. Ground well near school, open sun. Anopheles farauti, 2♀, 3L, 2P; Culex (C.) annulirostris, 5L.
123. Lorangau, Manus, Admiralty. Oct. 4. Swamp at naval base near native hospital. Culex sp., 1P.
124. Lorangau, Manus, Admiralty. Oct. 4. Taro plant leaf axil in semi-shade. Near water supply pumping station. No mosquitoes.
125. Lorangau, Manus, Admiralty. Oct. 4. Rain barrel near pig pen at naval base, open sun. Aedes (F.) notoscriptus, 1L; Culex (Culicio.) fragilis, 10L, 5P.
126. Lorangau, Manus, Admiralty. Oct. 4. Tridacna shell on ground, semi-shade. No mosquitoes.
127. Wewak, Boroam, New Guinea. Oct. 10. Ground pool, grassy, in full sun. Anopheles farauti, 1♂, 1♀, 2L, 2P; Culex (C.) annulirostris, 2♂, 1♀, 3P.
128. Wewak, Boroam, New Guinea. Oct. 10. Outrigger canoe in shade along beach. Aedes (S.) scutellaris, 8♀, 8P.
129. Wewak, Boroam, New Guinea. Oct. 11. Outrigger canoe in shade along beach, same as 128. Aedes (F.) notoscriptus, 2L; Aedes (S.) sp. near gurneyi, 1♂; Aedes (S.) scutellaris and scutellaris group, 9♂, 12♀, 4L, 13P; Culex (C.) near whittingtoni, 9L, 2P.
130. Auna, Wuvulu. Oct. 14. Treehole near village. Aedes (F.) notoscriptus, 1♂; Aedes (S.) hebrideus, 5L; Culex (C.) quinquefasciatus, 1♀.
131. Auna, Wuvulu. Oct. 14. Rain barrel, semi-shade in village. Aedes (S.) hebrideus, 2♂, 2♀, 40L, 8P.
132. Auna, Wuvulu. Oct. 14. Rain barrel, full sun in village. Aedes (S.) hebrideus, 11L, 3P.
133. Auna, Wuvulu. Oct. 14. Rain barrel, partial shade in village. No mosquitoes.
134. Tobi. Oct. 20. Swamp near taro patch, full sun. Center of island, old phosphate diggings. Culex (C.) annulirostris, 11L, 2P.
135. Tobi. Oct. 20. Treehole (Breadfruit) in deep shade near old Japanese naval station. Aedes (S.) hensilli, 13♂, 10♀, 30L, 15P.
136. Tobi. Oct. 20. Rat eaten coconut in shade on opposite side of island from village. Aedes (S.) hensilli, 12♀.
137. Tobi. Oct. 20. Tridacna shell in village, partial shade. Aedes (S.) hensilli, 28♂, 5♀, 40L, 30P.

138. Tobi. Oct. 20. Taken while biting in daytime (1600), near village. Aedes (S.) hensilli, 4♀; Culex (C.) annulirostris, 4♀.
139. Jolo, Sulu, Philippines. Oct. 28. Resting in provincial jail.
140. Jolo, Sulu, Philippines. Oct. 31. Fish pond near provincial jail; Tilapia present; partial shade.
141. Jolo, Sulu, Philippines. Oct. 31. Stagnant pool in school garden; no fish; open sun.
142. Jolo, Sulu, Philippines. Oct. 31. Ditch near fish pond, partial shade.
143. Jolo, Sulu, Philippines. Oct. 31. Funeral urn in cemetery, open sun.
144. Siasi, Sulu, Philippines. Nov. 2. Swamp near constabulary barracks.
145. Siasi, Sulu, Philippines. Nov. 2. Near barracks, ground pool with waste water from wash house, open sun.
146. Siasi, Sulu, Philippines. Nov. 2. Near barracks, pipe in ground, partial shade.
147. Siasi, Sulu, Philippines. Nov. 2. Treehole at base of tree near dispensary.
148. Bongao, Sulu, Philippines. Nov. 5. Treehole near school, shaded.
149. Bongao, Sulu, Philippines. Nov. 5. Treehole near school, shaded.
150. Sanga Sanga, Sulu, Philippines. Nov. 6. Treehole in coconut tree along trail, partial shade.
151. Sanga Sanga, Sulu, Philippines. Nov. 6. Canoe in sea-gypsy camp, open sun.
152. Sandaken, North Borneo. Nov. 18. Ground pools in center of town.
153. Keningau, North Borneo. Nov. 25. Ground pool, partial shade.
154. Keningau, North Borneo. Nov. 25. Bamboo stumps.

TAXONOMIC TREATMENT

1. Anopheles (Cellia) farauti Laveran, 1902

LOCALITIES. -New Hebrides: *Vao (42). *Tikopia (27). Santa Cruz Islands: *Vanikoro (41), Santa Cruz (74), *Temotu (65, 70). *Nuguria (114). *Tabar Islands: Tatau (122). New Guinea: Wewak (127).

This widespread and important vector of malaria and periodic filariasis is sometimes considered to be a subspecies of punctulatus Doenitz, 1901 and has been confused with the latter in the past. All the rather scanty and poor anopheline material from the area covered by this report appears to be referable to farauti but there is considerable variation in the larvae from the different populations. The present records extend the range of this species to several outlying islands but not beyond Buxton's line. Of particular interest is the collection from Tikopia which is said to be malaria-free and also the one from the Nuguria atoll. There is a strong possibility that farauti is spread to some extent by natives in canoes but natural dispersal (possibly by birds) cannot be discounted even to atolls if they have exposed fresh or brackish water (in taro gardens at least). A. farauti is largely a nocturnal biter but has been reported attacking man occasionally in the daytime.

2. Culex (C.) pacificus Edwards, 1916

LOCALITIES. -New Hebrides: *Vao (43, 50), *Aoba (61).

C. pacificus appears to be an entirely innocuous species and is precinctive to the New Hebrides.

3. Culex (C.) quinquefasciatus Say, 1823

LOCALITIES. -New Hebrides: *Vao (42, 49), Espiritu Santo (66). *Santa Cruz Islands: Vanikoro (34, 35). *Wuvulu (130).

The ubiquitous Southern House Mosquito, also known as C. fatigans, is an introduced species in the South Pacific and appears to be associated almost exclusively with Europeans and other adventive populations on or near the coasts and is seldom found in native villages. C. quinquefasciatus is primarily a crepuscular and nocturnal biter.

4. Culex (C.) near whittingtoni Belkin, 1962

LOCALITY. -New Guinea: *Wewak (129).

Other collections of this form were made during the war in New Guinea. It appears to be quite similar to litoralis Bohart, 1946 from the Marianas and may be conspecific with whittingtoni from the Solomons. Nothing is known of the blood feeding habits of this species.

5. Culex (C.) annulirostris Skuse, 1889

LOCALITIES. - *Rotuma (10, 14). Tikopia (27). *Santa Cruz Islands: Vanikoro (41). *Sikiana (99, 103). *Nuguria (116). *Tabar Islands: Tatau (122). New Guinea: Wewak (127). *Tobi Island (134, 138).

C. annulirostris is probably the most widespread and most variable mosquito in the South Pacific area. In spite of its abundance and attraction to man this species does not appear to be important in the transmission of any human disease in the South Pacific although its role as a vector has not been thoroughly investigated in this area. It breeds commonly in canoes and various types of artificial containers and may therefore be dispersed, in part at least, by man. C. annulirostris is predominantly a crepuscular and nocturnal biter.

6. Culex (C.) squamosus (Taylor, 1914)
det. E. N. Marks

LOCALITY. - *Wuvulu (130).

This species is represented by a single female which is "unusually small... but I have a very similar male from Nadzab, N. G. which is an undoubted squamosus" (Marks, in litt.). C. squamosus is apparently not attracted to man.

7. Culex (Culiciomyia) fragilis Ludlow, 1903

LOCALITY. - *Admiralty Islands: Manus (125).

It is surprising that this widespread Oriental, Indomalayan and Australasian species was collected only once on the expedition. C. fragilis is primarily a container breeder but is known to utilize ground pools as well. It appears to be closely associated with man but is not known to bite.

8. Culex (Mochtogenes) femineus Edwards, 1926

LOCALITIES. - New Hebrides: *Vao (48, 52), Malekula (56, 57, 58). This innocuous relict species is precinctive to the New Hebrides.

9. Culex (Lophoceraomyia) buxtoni Edwards, 1926

LOCALITY. - New Hebrides: *Malekula (58).

This species has been variously considered to be a variety or subspecies of hilli Edwards, 1922 or conspecific with fraudatrix (Theobald, 1905) or solomonis Edwards, 1929. However it appears to be a distinct form which is probably precinctive to the New Hebrides although very similar forms have been found in the Belep group north of New Caledonia and on Rennell and Bellona islands. C. buxtoni seldom attacks man and appears to be of no economic importance.

10. Culex (Lophoceraomyia) walukasi Belkin, 1962

LOCALITY. - Solomon Islands: Florida (108).

This form has been confused in the past with solomonis Edwards, 1929. It appears to be exclusively a container breeder and is not known to feed on man.

11. Culex (Lophoceraomyia) South Pacific sp. 13 (Aoba form)

LOCALITY. - *New Hebrides: Aoba (61).

This form remains undescribed as it is represented only by 1 larva and 1 pupa. It seems to be very similar to one of the forms mentioned under the following species.

12. Culex (Lophoceraomyia) South Pacific sp. 15 (Santa Cruz forms)

LOCALITIES. - Santa Cruz Islands: *Vanikoro (32), Santa Cruz (74, 76). Reef Islands: Naelo (78).

It appears that at least 2 species are represented in this material which consists entirely of larvae but it is possible that one of these is conspecific with Culex (Lophoceraomyia) sp. 13 from Aoba. One of these forms may also be conspecific with 2 females previously collected on Santa Cruz Island (A. G. Carment, BMNH). Some of the larvae were collected in containers and it seems probable that one of the species was introduced to Naelo. It is probable that these forms seldom if ever bite man.

13. Culex (Lophoceraomyia) South Pacific sp. 18 (Solomons rock pool forms)

LOCALITY. - Solomon Islands: Florida (107, 109A).

This unnamed form is represented by larvae and possibly an egg raft. None of the related forms are known to bite man.

14. Culex sp.

LOCALITY. - *Admiralty Islands: Manus (123).

A single pupa of a species of Culex cannot be identified with certainty but may possibly be annulirostris.

15. Aedes (Finlaya) sp. in quasirubithorax subgroup
det. E. N. Marks

LOCALITY. - *Tabar Islands: Tatau (117, 118).

This species is represented only by larvae and pupae. E. N. Marks (in litt.) states that "specific identification of larvae in this subgroup cannot at present be made with certainty and there is some doubt whether the species recorded as quasirubithorax from New Guinea is in fact that species." It is probable that this species does not attack man.

16. Aedes (Finlaya) notoscriptus (Skuse, 1889)

LOCALITIES. - *Tabar Islands: Tatau (118). *Admiralty Islands: Manus (125). New Guinea: Wewak (129). *Wuvulu (130).

No data are available on the blood feeding habits of this form in the area covered by the expedition, all collections consisting of immature stages or reared adults.

17. Aedes (Finlaya) sp. probably in papuensis subgroup
det. E. N. Marks

LOCALITY. - *Tabar Islands: Tatau (118).

Only 2 second instar larvae were collected and these cannot be definitely identified. It is probable that this species does not bite man.

18. Aedes (Finlaya) hollingsheadi Belkin, 1962

LOCALITY. - *Sikiana (101).

This species is a member of the kochi group and is widespread in the Solomon Islands proper (Bougainville, Arundel, New Georgia, Guadalcanal). The Sikiana material, reared from pandanus leaf axils, appears to be very similar to that from Guadalcanal. It seems probable that this species was introduced by the natives to Sikiana in pandanus or possibly taro from the Solomons. This species has never been collected biting.

19. Aedes (Finlaya) oceanicus Belkin, 1962

LOCALITIES. -Samoa: Tutuila (1, 2, 3, 4, 5, 7). ?*Hoorn (Horne, Futuna) Islands: Alofi (10-2), record questionable.

This member of the kochi group has been confused in the past with samoanus (Gruenberg, 1913). It is known from the 3 main islands of Samoa and from Vavau and Tongatabu in the Tonga group and may be present also on Wallis Island. I suspect that this species originated through hybridization between 2 other members of the kochi group, possibly samoanus and fijiensis Marks, 1947. The distribution of this species is suggestive of dispersal by natives probably in the egg, larval and pupal stages in taro and possibly pandanus carried in canoes. This dispersal has not been as extensive as in the case of Aedes (Stegomyia) polynesiensis probably because of a lesser degree of salt tolerance in the immature stages and more exacting ecological requirements in the breeding sites. The above-mentioned record from Alofi Island is questionable since it is based on a single larva included in an individual rearing of a treehole breeding form (Aedes (Stegomyia) futunae); it is possible that this larva is a contamination from a collection made on Tutuila. Since it has been shown that members of the kochi group may be involved in the transmission of non-periodic filariasis (Symes, Roy. Soc. Trop. Med. Hyg., Trans. 49: 280-282, 1955) and since oceanicus and samoanus were confused in epidemiological studies on Samoa, the vector propensities of these forms should be investigated anew. In all probability this species is nocturnal like its relative, samoanus, but there is no definite information on its blood feeding habits.

20. Aedes (Verrallina) lineatus (Taylor, 1914)

LOCALITIES. -New Hebrides: *Aoba. *Santa Cruz Islands: Vanikoro (36, 37). Sikiana (103, 104). Ontong Java (119). *Nuguria.

This widespread species does not extend east of Buxton's line. A. lineatus is frequently found breeding near villages and in taro gardens. It appears to have been extensively dispersed by natives probably in the egg stage in soil attached to taro or other cultigens. However it is possible that some of this dispersal has been accomplished by natural means (egg stage by wind and birds). Although it is frequently abundant and feeds avidly on man in the daytime, lineatus is not known to be involved in the transmission of any human disease.

21. Aedes (Aedimorphus) nocturnus (Theobald, 1903)

LOCALITY. -*Rotuma (10, 19, 20).

The exact taxonomic status of this widespread Pacific form cannot be determined at present. It has been regarded often as a subspecies of vexans (Meigen, 1830) which is represented in all the major zoogeographic regions except the Malagasy, Ethiopian and Neotropical. A. nocturnus is frequently found breeding in taro gardens in the South Pacific where it does not occur together with Aedes (Verrallina) lineatus except in the New Hebrides. For the present I regard nocturnus as a distinct species but it is possible that it is nothing more than a strain of vexans which has been widely dispersed in the egg stage in soil by natives as well as recent adventives. It is also possible

that nocturnus, like lineatus, has been dispersed by wind as well as by birds. Females of nocturnus attack man readily in the neighborhood of breeding sites and may become serious nocturnal pests following heavy rains but are not known to be involved in disease transmission.

22. Aedes (Stegomyia) albolineatus (Theobald, 1904)

LOCALITIES. -Solomon Islands: Florida (105). *Tabar Islands: Tatau (117, 118).

A. albolineatus, as currently understood, exhibits a great deal of variation throughout its wide reported range in the Australasian, Indo-malayan and Oriental regions and it is possible that several forms are confused under this species. Although at times very abundant, this container breeder is seldom attracted to man and appears to be entirely innocuous.

23. Aedes (Stegomyia) tulagiensis Edwards, 1926

LOCALITIES. -Santa Cruz Islands: Santa Cruz (77). *Reef Islands: Naelo (79, 85), Nupani (92).

One of the outstanding entomological contributions of the expedition has been the discovery of tulagiensis and the closely related A. (Steg.) robinsoni in the Santa Cruz Islands. A. tulagiensis was formerly known by the 2 females of the original collection and there was some doubt as to whether it came from the Santa Cruz Islands or the Solomons. These 2 species I have placed provisionally in the edwardsi group which is represented elsewhere in the world only by edwardsi (Barraud, 1923) from the Andaman Islands and a similar if not identical form from southern Indochina. In describing tulagiensis Edwards considered it to be only a variety of edwardsi. Although these 2 forms are superficially very similar there is no question in my mind that they are specifically distinct to judge by the differences in ornamentation and chaetotaxy of the adults and the male genitalia. It may even be that edwardsi is not closely related to the South Pacific species but without comparison of the immature stages (unknown in edwardsi and the Indochinese form) this problem cannot be resolved.

The remarkable disjunct distribution of the edwardsi group might prompt the speculation that tulagiensis and robinsoni have been introduced into the Santa Cruz group by Polynesians from the Malayan area along a southern route into the South Pacific. However it seems to me that the edwardsi group is a relict one and human migrations have had nothing to do with the disjunct distributions as we see them today. A further possibility is that the group, if it is a monophyletic one, has been overlooked in intermediate areas. The South Pacific species of the group show a combination of characters of the albolineatus and scutellaris groups and there is a strong suggestion that they may have arisen through hybridization between members of these 2 groups. Such hybridization may have occurred independently in the west between different members of the same groups and therefore edwardsi and the Indochinese form may represent an entirely different phyletic line from that of tulagiensis and robinsoni. This fascinating phylogenetic problem cannot be resolved with our present knowledge of these species. A. tulagiensis has been found breeding in

treeholes and in a "spiny palm" (pandanus?). The bionomics of the adults are unknown but it would appear from the capture of the 2 females of the type collection that this species is attracted to man.

24. Aedes (Stegomyia) robinsoni Belkin, 1962

LOCALITY. - *Santa Cruz Islands: Vanikoro (38, 40).

This species is a close relative of tulagiensis (see above) and appears to be precinctive to the island of Vanikoro. It is remarkable that there are 2 species of the same group in the Santa Cruz group on islands separated by a distance of less than 100 miles. This species was not taken biting.

25. Aedes (Stegomyia) aobae Belkin, 1962

LOCALITY. - *New Hebrides: Aoba (60, 61, 62).

This is a remarkable member of the scutellaris group that is known also by a single female from Vanua Lava Island in the Banks group north of the New Hebrides. Three females of this species were taken biting on Aoba.

26. Aedes (Stegomyia) futunae Belkin, 1962

LOCALITY. - *Hoorn (Horne, Futuna) Islands: Alofi (8, 9, 10).

This form is a very clearly marked species of the scutellaris group that is undoubtedly endemic to this group of islands. It appears to be the dominant member of the group on Alofi and may be an equally or more important vector of filariasis in the group than polynesiensis which has also been collected on Alofi. It was taken biting man in the bush in the daytime.

27. Aedes (Stegomyia) hebrideus Edwards, 1926

LOCALITIES. - New Hebrides: *Vao (42, 43A, 48, 49, 51, 52), Malekula (53). Tikopia (22, 25, 26, 29, 30, 31, 31A). Santa Cruz Islands: Santa Cruz (76), *Temotu (72, 73). Reef Islands: *Naelo (78), Nupani (95, 96, 97). Ontong Java (110, 111, 112, 113, 119). *Nuguria (114, 115, 121). *Wuvulu (130, 131, 132).

This form has been synonymized in recent years with scutellaris (Walker, 1859) but I find that it differs from the latter in constant details of the claspette of the male genitalia and therefore regard it as a distinct species for the present. This species is known only from the above-mentioned localities and from Rennell and Bellona islands.

From the known distribution it appears that hebrideus has been dispersed by the western Polynesians in a manner similar to polynesiensis by eastern Polynesians. The original home of hebrideus cannot be determined at present but it seems to me that the most likely site is somewhere in the New Hebrides-Santa Cruz area. There is a possibility also that hebrideus, as polynesiensis, is a species of hybrid origin. Whatever its origin, hebrideus appears to have been dispersed by Polynesians along the outlying islands of the Solomons, Bismarck Archipelago and New Guinea. It is of interest that hebrideus is not found

on Sikiana which has instead a population of varuae, undoubtedly spread from the Santa Cruz area.

The population of hebrideus from Wuvulu is an aberrant one as noted by E. N. Marks, who identified it as scutellaris and noted some similarity with a form of scutellaris from the Admiralty Islands (in litt.). It seems probable that some introgression between these forms is occurring on Wuvulu which shows indication of the introduction of mosquitoes from adjacent areas in the presence of Culex (C.) quinquefasciatus and Aedes (Finlaya) notoscriptus. A. hebrideus is a persistent diurnal biter apparently throughout its range.

28. Aedes (Stegomyia) hensilli Farner, 1945
det. R. M. Bohart

LOCALITY. - *Tobi Island (135, 136, 137, 138).

The population of the scutellaris group on Tobi shows a condition which may be analogous to that found in hebrideus on Wuvulu. Basically the Tobi form appears to be hensilli which, according to R. M. Bohart (in litt.), shows considerable variation through most of its known range in the Carolines from Palau to Nukuoro Atoll. However, I believe that this population shows introgression with scutellaris which has been reported from the adjacent large island groups to the west of Tobi as well as from the western Carolines. This form was taken biting in the daytime on Tobi.

29. Aedes (Stegomyia) polynesiensis Marks, 1951

LOCALITIES. - Samoa: Tutuila (6). *Hoorn (Horne, Futuna) Islands: Alofi (9, 10, 11).

This most important vector of non-periodic filariasis in the South Pacific is known only from the immense area south of the equator from Fiji and the Ellice Islands eastward to the Marquesas and Easter Island. Its original home is not known and it is possible that it was formed through hybridization between 2 other members of the scutellaris group in the South Pacific, one of which may have been pseudoscutellaris (Theobald, 1910) from Fiji and the other upolensis Marks, 1957 from Samoa. At any rate it is quite clear that polynesiensis has been widely dispersed by the eastern Polynesians, probably as breeding populations in canoes. It is of interest that polynesiensis does not occur on some of the more remote islands or groups in the southeastern Pacific area such as Rotuma, Niue and Tonga and that it has not been carried over Buxton's line into the area occupied by the western Polynesians. There is a suggestion that polynesiensis has contributed to the formation of the Niue species through hybridization with tongae Edwards, 1926 and that on Wallis Island hybridization may be occurring at present between polynesiensis and an endemic form. On the other hand in several other areas polynesiensis occurs sympatrically with closely related species, notably pseudoscutellaris and horrescens in Fiji, upolensis in Samoa, and futunae in the Hoorn group. A. polynesiensis is largely a diurnal biter but is said to show a distinct peak in biting activity in late afternoon and a lesser one in early morning.

30. Aedes (Stegomyia) quasiscutellaris Farner & Bohart, 1944

LOCALITY. -Solomon Islands: Florida (106, 107).

A. quasiscutellaris is the dominant member of the scutellaris group in the Solomons proper and has been reported elsewhere only from Nissan Island but the latter record may be erroneous. This species very seldom bites man in the Solomons.

31. Aedes (Stegomyia) rotumae Belkin, 1962

LOCALITY. -Rotuma (12, 13, 14, 15, 17, 18, 20, 21).

It has been known for some time that the population of the scutellaris group on the isolated island of Rotuma was distinct from any of the described species. The material collected on the expedition included all stages of this species and permitted its description. This species is apparently the only member of the scutellaris group on Rotuma and therefore it is presumed to be the vector of filariasis on this island. However only one female was taken biting at night along with numerous Aedes (Aedimorphus) nocturnus and apparently none were found biting during the day.

32. Aedes (Stegomyia) scutellaris (Walker, 1859)

LOCALITY. -New Guinea: Wewak (128, 129).

The common species of the scutellaris group in New Guinea is considered for the present to be conspecific with the true scutellaris from the Aru Islands. As indicated above the "scutellaris" of the New Hebrides, Santa Cruz group and the Polynesian outliers of the Solomons, Bismarcks, and New Guinea is treated here as a distinct form, hebrideus. A. scutellaris is said to be a vicious diurnal biter in New Guinea.

33. Aedes (Stegomyia) varuae Belkin, 1962

LOCALITIES. -*Santa Cruz Islands: Vanikoro (33, 38), Santa Cruz (71, 76), Temotu (65). *Reef Islands: Naelo (78, 80). Sikiana (98, 100).

This member of the scutellaris group has long been confused with tongae Edwards, 1926 from the Tonga Islands and this prompted the speculation in Buxton and Hopkins (London Sch. Hyg. Trop. Med., Mem. 1: 103, 1927) that the Tongans transported this mosquito on their voyages. The material of all stages collected on the expedition clearly establishes that this species is distinct from tongae. It shares with the latter only superficial features in ornamentation and the development of the claspette of the male genitalia. This species was undoubtedly introduced by the natives to Sikiana. It is of interest that this species competes successfully with hebrideus which is dominant in the area. There are suggestions that varuae may have been formed through hybridization. This species was not taken biting on the expedition.

34. Aedes (Stegomyia) sp. near gurneyi

LOCALITY. - *New Guinea: Wewak (129).

The single known male resembles gurneyi Stone & Bohart, 1944 from the Solomons in general features but differs in details of ornamentation and of the claspette. It was mass reared from a collection containing scutellaris and it appears that some of the larvae in this collection may be of this species (see next species). This undoubtedly new species cannot be described without additional material.

35. Aedes (Stegomyia) sp. in scutellaris group

LOCALITIES. - *Tabar Islands: Tatau (117). New Guinea: Wewak (129).

Included here are forms of the scutellaris group that cannot be identified with certainty because of poor condition or absence of males. It is probable that both collections are of the New Guinea scutellaris but it is possible that the form on Tatau is hebrideus and that the Wewak collection contains larvae of the preceding species.

36. Armigeres (A.) breinli (Taylor, 1914)

LOCALITIES. - *Santa Cruz Islands: Temotu (67). *Reef Islands: Nupani (95, 97).

These collections represent the easternmost records of this species which is otherwise known from the Solomons, Bismarcks and New Guinea. A. breinli typically breeds in coconut shells with a great deal of decaying meat. Although it is possible that this species has been spread to the Santa Cruz area by natives, the absence of this form from the outlying islands in the Solomons suggests that breinli is not readily transported over ocean barriers and therefore it seems probable that its presence in the Santa Cruz area is due to natural dispersal. A. breinli is a vicious diurnal biter around native villages, particularly in the shade.

37. Tripteroides (T.) bonneti Belkin, 1962

LOCALITY. - * Santa Cruz Islands: Temotu (69).

The discovery of this species in the Santa Cruz Islands is of great zoogeographic interest since it connects the distribution of the subgenus Tripteroides in Fiji and the Solomons. This relict form shows a number of unusual features and may have to be placed into a separate group when the larva is discovered. It is not known to bite man.

38. Tripteroides (T.) distigma (Edwards, 1925)

LOCALITY. -Solomon Islands: *Florida (105).

This unusual species was formerly known only by the holotype female from Tulagi. The material collected on the expedition includes a male reared from

a pupa which is definitely distigma and 6 larvae which are presumably of this species since they were found together with the pupa and since throughout the Solomons there appears to be only one species of this group in any given locality. T. distigma is probably seldom attracted to man.

39. Tripteroides (T.) sp. in bimaculipes group

LOCALITY. - *Tabar Islands: Tatau (117).

Since specific identification of larvae (the only stage collected) is impossible in this group this species cannot be identified at present. The bimaculipes group shows a great deal of local speciation and it is possible that this form is an endemic relict on the Tabar Islands.

40. Tripteroides (Rachionotomyia) rotumanus (Edwards, 1929)

LOCALITY. - Rotuma (18).

T. rotumanus is an innocuous container breeder precinctive to Rotuma. The presence of this member of the caledonicus group, which includes melanesiensis, on the isolated island of Rotuma is of great zoogeographic interest.

41. Tripteroides (Rachionotomyia) melanesiensis Belkin, 1955

LOCALITIES. - New Hebrides: *Vao (40, 43, 45, 46, 47, 48, 51), Malekula (53, 55, 57, 58), *Aoba (59, 61). *Tikopia (23, 27, 31). *Santa Cruz Islands: Vanikoro (33, 38, 40). *Reef Islands: Naelo (81, 83, 86), Fenualoa (91), Nupani (92).

T. melanesiensis, formerly confused with caledonicus (Edwards, 1922), is a dominant container breeding species reported previously from New Caledonia, Loyalty Islands, New Hebrides and Banks Islands. The new records mentioned above from Tikopia, Santa Cruz and Reef Islands are of considerable zoogeographic interest. T. melanesiensis may have been dispersed by natives rather widely since it appears to be highly tolerant of conditions in breeding sites and is known to breed in canoes. However it seems probable that its occurrence in the Santa Cruz group is due to natural dispersal. This species is easily overlooked since the females are seldom attracted to man.

GEOGRAPHIC TREATMENT

In the following treatment of the mosquito fauna of the individual islands or island groups the numbers preceding the species name refer to the sequence in which the species are discussed in the Taxonomic Treatment. For additional remarks on individual species see these discussions.

SAMOA

Only 2 container breeding species of mosquitoes are represented in the collections, both reported in the past from Tutuila and the other islands of the group.

SPECIES COLLECTED:

19. Aedes (Finlaya) oceanicus: Tutuila (1, 2, 3, 4, 5, 7). Indigenous or introduced.
29. Aedes (Stegomyia) polynesiensis: Tutuila (6). Indigenous or introduced.

HOORN (HORNE, FUTUNA) ISLANDS

As far as I can determine these are the first records of mosquitoes from this group. The record of Aedes (Finlaya) oceanicus may be erroneous; it is based on a single larva included in an individual rearing of Aedes (Stegomyia) futunae and may be the result of contamination with material collected in Samoa. The precinctive Aedes (Stegomyia) futunae appears to be at least as common and as strongly anthropophilic as polynesiensis and therefore may be an important vector of filariasis in this group.

SPECIES COLLECTED:

- *19. Aedes (Finlaya) oceanicus: Alofi (10-2). The record is questionable, see above.
- *26. Aedes (Stegomyia) futunae: Alofi (8, 9, 10). Precinctive.
- *29. Aedes (Stegomyia) polynesiensis: Alofi (9, 10, 11). Probably spread by natives.

ROTUMA

Only one previous mosquito collection has been made on the isolated island of Rotuma. It is of interest that the ubiquitous Aedes (Stegomyia) polynesiensis is apparently not found on this island. The related precinctive Aedes (Stegomyia) rotumae is therefore presumably the vector of filariasis on Rotuma. All the previously reported species of mosquitoes from the island are represented in the expedition collections except Toxorhynchites sp. introduced by R. W. Paine (1934).

SPECIES COLLECTED:

- *5. Culex (C.) annulirostris: (10, 14). Indigenous or introduced.
- *21. Aedes (Aedimorphus) nocturnus: (10, 19, 20). Indigenous or introduced.
31. Aedes (Stegomyia) rotumae: (12, 13, 14, 15, 17, 18, 20, 21). Precinctive.
40. Tripteroides (Rachionotomyia) rotumanus: (18). Precinctive.

NEW HEBRIDES

Among the 10 species collected by the expedition on 4 islands in the New Hebrides are 2 species new to this group, bringing the total of mosquitoes definitely known to inhabit these islands to 28. The islands of Aoba and Vao have apparently never been sampled for mosquitoes before.

SPECIES COLLECTED:

1. Anopheles farauti: *Vao (42). Indigenous.
2. Culex (C.) pacificus: *Vao (43, 50), *Aoba (61). Precinctive.
3. Culex (C.) quinquefasciatus: *Vao (42, 49), Espiritu Santo (66). Introduced.

8. Culex (Mochthogenes) femineus: *Vao (48, 52), Malekula (56, 57, 58). Precinctive.
9. Culex (Lophoceraomyia) buxtoni: Malekula (58). Probably precinctive.
- *11. Culex (Lophoceraomyia) South Pacific sp. 13: Aoba (61). Probably precinctive.
20. Aedes (Verrallina) lineatus: *Aoba (60, 62). Indigenous.
- *25. Aedes (Stegomyia) aobae: Aoba (60, 61, 62). Indigenous, known elsewhere only on Vanua Lava, Banks Islands.
27. Aedes (Stegomyia) hebrideus: *Vao (42, 43A, 48, 49, 51, 52). Malekula (53). Probably indigenous.
41. Tripteroides (Rachionotomyia) melanesiensis: *Vao (40, 43, 45, 46, 47, 48, 51), Malekula (53, 55, 57, 58), *Aoba (59, 61). Indigenous.

TIKOPIA (TICOPIA, TUCOPIA)

I have seen only one other mosquito collection from Tikopia (Sydney Univ., School of Public Health and Tropical Med.) and this consisted of 2 of the species collected on the expedition. It is probable that all 4 species have been introduced to the island by the natives, although it is possible that farauti and annulirostris are indigenous. The record of farauti is of particular interest since this island is reported to be malaria free.

SPECIES COLLECTED:

- *1. Anopheles farauti: (27).
5. Culex (C.) annulirostris: (27).
27. Aedes (Stegomyia) hebrideus: (22, 25, 26, 29, 30, 31, 31A).
- *41. Tripteroides (Rachionotomyia) melanesiensis: (23, 27, 31).

SANTA CRUZ ISLANDS

The collections of the expedition have added 8 species to the 4 previously known from these islands and all the latter were also collected. These collections are of extraordinary interest and they indicate, as I had suspected, that this area is the most critical one for an understanding of the dispersal of mosquitoes in the South Pacific both before and after the advent of man. All the species are considered here to be either indigenous or endemic except Culex (C.) quinquefasciatus which is a European introduction, but it is possible that some of the other species have been spread by natives from adjacent areas.

SPECIES COLLECTED:

1. Anopheles farauti: *Vanikoro (41), Santa Cruz (74), *Temotu (65, 70). Indigenous.
- *3. Culex (C.) quinquefasciatus: Vanikoro (34, 35). Introduced.
- *5. Culex (C.) annulirostris: Vanikoro (41). Indigenous.
12. Culex (Lophoceraomyia) South Pacific sp. 15: *Vanikoro (32), Santa Cruz (74, 76). Probable precinctive.
- *20. Aedes (Verrallina) lineatus: Vanikoro (36, 37). Indigenous.
23. Aedes (Stegomyia) tulagiensis: Santa Cruz (77). Precinctive.
- *24. Aedes (Stegomyia) robinsoni: Vanikoro (38, 40). Precinctive.
27. Aedes (Stegomyia) hebrideus: Santa Cruz (76), *Temotu (72, 73). Probably indigenous.

- *33. Aedes (Stegomyia) varuae: Vanikoro (33, 38), Santa Cruz (71, 76), Temotu (65). Probably originally precinctive and spread by natives to Sikiana.
- *36. Armigeres (A.) breinli: Temotu (67). Probably indigenous.
- *37. Tripteroides (T.) bonneti: Temotu (69). Precinctive.
- *41. Tripteroides (Rachionotomyia) melanesiensis: Vanikoro (33, 38, 40). Probably indigenous.

REEF (SWALLOW, MATEMA) ISLANDS

Only one species of mosquito was previously known from these islands. This and 5 additional species collected by the expedition are all known from the adjacent Santa Cruz Islands. Although it is possible that some of these species are indigenous, all of them are considered for the present to have been spread by the natives.

SPECIES COLLECTED:

- *12. Culex (Lophoceraomyia) South Pacific sp. 15: Naelo (78).
- *23. Aedes (Stegomyia) tulagiensis: Naelo (79, 85), Nupani (92).
- 27. Aedes (Stegomyia) hebrideus: *Naelo (78), Nupani (95, 96, 97).
- *33. Aedes (Stegomyia) varuae: Naelo (78, 80).
- *36. Armigeres (A.) breinli: Nupani (95, 97).
- *41. Tripteroides (Rachionotomyia) melanesiensis: Naelo (81, 83, 86), Fenualoa (91), Nupani (92).

SIKIANA (SIKAIANA, STEWART)

Of the 3 species formerly known from Sikiana only Anopheles farauti was not collected on the expedition and 2 additional species were found. The discovery of Aedes (Finlaya) hollingsheadi is of particular interest (see Taxonomic Treatment). All the species are considered here to have been spread by natives from adjacent islands but it is possible that at least annulirostris has been dispersed by natural means.

SPECIES COLLECTED:

- *5. Culex (C.) annulirostris: (99, 103).
- *18. Aedes (Finlaya) hollingsheadi: (101).
- 20. Aedes (Verrallina) lineatus: (103, 104).
- 33. Aedes (Stegomyia) varuae: (98, 100).

SOLOMON ISLANDS

The mosquito collections of the expedition in the Solomons proper were confined to Florida Island. No additions were made to the 102 species known from the group but the rediscovery of Tripteroides (T.) distigma was a very significant contribution.

SPECIES COLLECTED:

- 10. Culex (Lophoceraomyia) walukasi: Florida (108).
- 13. Culex (Lophoceraomyia) South Pacific sp. 18: Florida (107, 109A).
- 22. Aedes (Stegomyia) albolineatus: Florida (105).

30. Aedes (Stegomyia) quasiscutellaris: Florida (106, 107).
 38. Tripteroides (T.) distigma: *Florida (105).

ONTONG JAVA (LORD HOWE ATOLL)

Of the 5 species previously definitely known from this very large atoll, Anopheles farauti, Culex (C.) sitiens Wiedemann, 1828 and Culex (C.) annulirostris were not found. All the species occurring on the atoll appear to have been introduced by the natives.

SPECIES COLLECTED:

20. Aedes (Verrallina) lineatus: (119).
 27. Aedes (Stegomyia) hebrideus: (110, 111, 112, 113, 119).

NUGURIA (FEAD) ISLANDS

No previous collections of mosquitoes are known from these atolls. All the species found are probably introduced by the natives.

SPECIES COLLECTED:

- *1. Anopheles farauti: (114).
 *5. Culex (C.) annulirostris: (116).
 *20. Aedes (Verrallina) lineatus: (115).
 *27. Aedes (Stegomyia) hebrideus: (114, 115, 121).

TABAR (GARDNER) ISLANDS

I have not been able to find any record of previous collections from these high islands. In view of the nature of the mosquito fauna of these islands and their proximity to New Ireland it seems probable that the species found are largely indigenous or possibly introduced from New Ireland. The village of Tatau is on the island of Tatau which is also known as Korumbo or Sos and is the large middle island of the 3 in the group.

SPECIES COLLECTED:

- *1. Anopheles farauti: Tatau (122).
 *5. Culex (C.) annulirostris: Tatau (122).
 *15. Aedes (Finlaya) sp. in quasirubithorax subgroup: Tatau (117, 118).
 *16. Aedes (Finlaya) notoscriptus: Tatau (118).
 *17. Aedes (Finlaya) sp. in papuensis subgroup: Tatau (118).
 *22. Aedes (Stegomyia) albolineatus: Tatau (117, 118).
 *35. Aedes (Stegomyia) sp. in scutellaris group: Tatau (117).
 *39. Tripteroides (T.) sp. in bimaculipes group: Tatau (117).

ADMIRALTY ISLANDS

Apparently none of the 3 species collected on Manus Island have been reported previously in the literature (Iyengar, So. Pacific Comn., Tech. Paper 86, 1955).

SPECIES COLLECTED:

- *7. Culex (Culiciomyia) fragilis: Manus (125).
- *14. Culex sp.: Manus (123).
- *16. Aedes (Finlaya) notoscriptus: Manus (125).

NEW GUINEA

The 3 collections made near Wewak contain species which all have been previously reported from New Guinea except for an undescribed form in the scutellaris group of Aedes (Stegomyia).

SPECIES COLLECTED:

- 1. Anopheles farauti: Wewak (127).
- 4. Culex (C.) near whittingtoni: *Wewak (129).
- 5. Culex (C.) annulirostris: Wewak (127).
- 16. Aedes (Finlaya) notoscriptus: Wewak (129).
- 32. Aedes (Stegomyia) scutellaris: Wewak (128, 129).
- *34. Aedes (Stegomyia) sp. near gurneyi: Wewak (129).
- 35. Aedes (Stegomyia) sp. in scutellaris group: Wewak (129).

WUVULU (WUWULU, MATTY, MATY) ISLAND

As far as I have been able to determine the expedition's collection of mosquitoes is the first to have been made on this low coral island covered with an extensive coconut plantation. All 4 species are probably introduced although squamosus may be indigenous. I have identified the species in the scutellaris group as hebrideus on the basis of the male claspette but the ornamentation of the legs is suggestive of the populations of scutellaris in the Admiralty Islands (Marks, *in litt.*). It seems probable that 2 stocks of the scutellaris groups have been introduced to this island but it is impossible to tell which of the two, hebrideus or scutellaris, was the first introduction. Culex (C.) quinquefasciatus is undoubtedly a European introduction and the remaining species are typical New Guinea forms.

SPECIES COLLECTED:

- *3. Culex (C.) quinquefasciatus: (130).
- *6. Culex (C.) squamosus: (130).
- *16. Aedes (Finlaya) notoscriptus: (130).
- *27. Aedes (Stegomyia) hebrideus: (130, 131, 132).

TOBI (LORD NORTH) ISLAND

No mosquito collections have been previously reported from this island. Both species found are in all probability introduced. The interesting problem of hensilli, a species in the scutellaris group, is discussed in the Taxonomic Treatment.

SPECIES COLLECTED:

- *5. Culex (C.) annulirostris: (134, 138).
- *28. Aedes (Stegomyia) hensilli: (135, 136, 137, 138).