

Literature Pertaining to the Mosquitoes
and the Mosquito-Borne Diseases of Guam (Conclusion)¹

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ABSTRACT. The annotated bibliography of the mosquitoes and the diseases associated with them on the island of Guam published earlier in *Mosquito Systematics* is expanded and concluded.

An initial bibliography of 220 references including articles, papers and reports concerning either mosquitoes or mosquito-borne diseases on Guam was published in this journal (Vol. 8(4) 1976). An additional 81 references have been catalogued and are listed below. Annotations and errata pertaining to the original compilation which is referred to here as Part I of this bibliography are also presented.

A bibliography is, in essence, a history. In this instance it traces discovery and determination of the mosquito fauna and chronicles incidence of the diseases associated with it on Guam. Since both have been documented comprehensively in the literature, it is felt that this bibliography will be of value to future studies of the mosquitoes or diseases on Guam or in the Mariana Islands.

There is no assurance that this bibliography includes all references for Guam. It has not been possible, for example, to research the Japanese literature for that period (1920-1945) when the Mariana Islands, with the exception of Guam, were included in the Japanese Mandate Territory and data for Guam could have been incorporated with studies on the other islands. The bibliography does, however, withstand cross indexing from all known references, so it is concluded with the following entries.

BIBLIOGRAPHY

- Beardsley, C. 1964. *Guam past and present*. C. E. Tuttle Co., Tokyo. 262 p. An abundance of all species of mosquitoes occurs on Guam, but the genus *Anopheles* is not represented on the island, p. 56.
- Bishop, F. C. and C. B. Philip. 1952. Carriers of human diseases. p. 147-160. *In: 1952 Yearbook of Agriculture-Insects*. U.S. Dep. Agriculture, Washington, D.C. Dengue fever incapacitated large numbers of our troops on Guam and other Pacific islands during World War II, p. 149.
- Brody, J. A. and F. L. Dunn. 1959. CDC malaria surveillance report - 1958. U.S. Dep. Health, Education, and Welfare, Public Health Service Communicable Disease Center (Surveillance Section). 9 p. (mimeographed). Guam is designated as the source of 1 case of malaria in military personnel, Table II, p. 8.

¹The views expressed herein are those of the author and do not necessarily reflect the views of the United States Air Force or the Department of Defense.

- Brygoo, E. R. 1953. Epidemiology of filariasis in the South Pacific. Part III. Epidemiology. p. 17-52. *In: Filariasis in the South Pacific. Conf. Filariasis and Elephantiasis, Papeete, Tahiti, French Oceania, 21 Aug - Sep 1951. South Pacific Commission, Noumea, New Caledonia. Comments in the "Summary of Discussion," p. 48-52, that anophelines had been introduced into Guam from the Philippine Islands, but that the conditions suitable for the establishment of anophelines on this island might not exist in other territories, p. 48.*
- Carano, P. and P. C. Sanchez. 1964. *A complete history of Guam.* C. E. Tuttle Co., Tokyo. 452 p. A small outbreak of Japanese B encephalitis occurred on Guam early in 1948. Gives case data, p. 327.
- Clapp, M. 1971. Mrs. Mosquito: Pest Offers Threat Here. *Pacific Daily News, Sunday News Magazine*, 31 Oct 1971, p. 3A. Article based on the survey of the mosquito fauna of Guam accomplished by the U.S. Air Force in 1971. (see Reisen, et al 1971b).
- Cox, L. M., E. J. Dorn, K. C. McIntosh, and M. G. Cook. 1917. *The island of Guam.* 4th ed. Government Printing Office, Washington, D.C. Comments on the origin of mosquitoes on Guam and protection from these insects, p. 27.
- Cox, L. M., E. J. Dorn, K. C. McIntosh, M. G. Cook, and A. H. White. 1926. *The island of Guam.* 5th ed. Government Printing Office, Washington, D.C. Comments are identical with those printed in the 1917 or 4th ed., p. 21.
- Curran, C. H. 1945. *Insects of the Pacific World.* Macmillan, New York. 317 p. Remarks on p. 21 that "*Anopheles* mosquitoes do not occur on the small, scattered Pacific islands, nor on such large islands as Guam and Saipan; consequently malaria cannot exist, because both man and *Anopheles* are essential to the existence of malaria."
- Davis, P. V. 1963. Japanese encephalitis. *Milit. Med.* 128(11): 1091-1907. Reviews JE on Okinawa; refers to the ecological factors bearing upon the JE virus and meteorological and topographical factors which should be constantly under surveillance, and suggests that these might have played a role in the explosive outbreaks observed in Guam in 1948, p. 1096.
- Eklund, C. M. 1972. Encephalitis, infectious. p. 208-220. *In: Top, F. H., Sr., and P. F. Wehrle, eds., Communicable and Infectious Diseases.* 7th ed. C. V. Mosby Co., Saint Louis. States "Japanese B encephalitis has been a health problem in Guam, where American troops and civilians are stationed," p. 217.
- Esaki, T. 1939. Injurious Arthropoda to man in Mandated South Sea Islands of Japan (First Report). p. 230-252. *In: Osaka Hakubutsu Gakkai, Volumen Tubilare pro Professore Sadao Yoshida, Vol. I. Osaka Natural History Society, Institute for Research in Microbic Diseases, Osaka Imperial University, Japan. (Title in English, text in Japanese). Cites the mosquitoes collected by D. T. Fullaway (1912) on Guam, p. 252.*

- Faust, E. C., P. C. Beaver, and R. C. Jung. 1968. *Animal agents and vectors of human disease*. 3rd ed. Lea & Febiger, Philadelphia. 461 p. States that *Anopheles subpictus indefinitus* appeared on Guam during World War II, but that up to the present time (1965) malaria transmission has not taken place, p. 96.
- Fontaine, R. E. 1965. The current status of the *Aedes aegypti* eradication program in the United States and 1964 summary of mosquito-borne encephalitides in the United States. Proc. Calif. Mosq. Control Assoc. 33: 19-23. States that indigenous infestations of *Aedes aegypti* have been found in 10 southeastern states and overseas in Puerto Rico, the Virgin Islands, Hawaii and Guam, p. 20.
- Freeborn, S. B. 1951. The continuing interest of the University of California in mosquito control. Proc. Calif. Mosq. Control Assoc. 19: 45-48. Refers to S. F. Bailey and his duty as director of the control phase for the dengue fever epidemic on Guam in 1945, p. 48.
- Gelman, A. C. 1966. Distribution of selected communicable diseases in the tropical and subtropical areas of the world. p. 873-897. In: Hunter, G. W., III, W. W. Frye, and J. C. Swartzwelder, eds., *A Manual of Tropical Medicine*. 4th ed. W. B. Saunders, Philadelphia.
- Gerberg, E. J. and R. H. Arnett, Jr. 1976. A pictorial key to the mosquito larvae of the Seychelles. Mosq. Syst. 8(4): 343-346. Includes Guam (Mariana Isl.) in the geographical distribution for *Aedes albopictus*, p. 343.
- Gordon, J. E., ed. 1965. Arthropod-borne viral encephalitides. 1. Mosquito-borne. p. 33-35. In: Control of Communicable Diseases in Man. 10th ed. Am Public Health Assoc., 1790 Broadway, New York. Japanese B encephalitis is recognized in western Pacific islands from Japan to Guam, p. 34.
- Guam, Government of. 1975. Environment impact assessment for aerial ULV application of Malathion at three ounces per acre in Guam. 42 p. + Tabs A-E. (mimeographed). Examines the impact, on man and his environment, of the administration of 95% Malathion at the rate of 3 ounces per acre by aerial application to prevent an outbreak of dengue fever among the civilian community following the influx of Vietnamese refugees during "Operation New Life."
- Haddock, R. L. 1973. *A history of health on Guam*. 2nd ed. Cruz Publ. Co., Guam. 50 p. Cites the dengue fever (1944) and Japanese B encephalitis (1948) epidemics on Guam, and the outbreaks of malaria which occurred in 1966 and again in 1969, p. 29, 32. Two dengue fever (1921, 1944) and 1 Japanese B encephalitis (1947) outbreaks are in the chronology of epidemics reported on Guam, p. 38-39.
- Hammon, W. McD. 1953. Japanese B encephalitis and other related infections on Guam and in other Pacific areas. Proc. 7th Pacific Science Congr. Pacific Science Assoc. 7: 341-347. Comprehensive review of Japanese B encephalitis in both U.S. military and natives of Guam during and after the 1948 outbreak.

- Hammon, W. McD. 1965. Diseases transmitted by an arthropod vector: Viral infections. p. 290-311. In: Sartwell, P. E., ed., (*Maxcy-Rosenau*) *Preventive Medicine and Public Health*. 9th ed. Appleton, Century, Crofts, Inc., New York. Refers to "the only recorded virgin outbreak" (of Japanese B encephalitis), on Guam in 1948, p. 305. Guam is a designated area for occurrence of Japanese B encephalitis in Table 1. Arthropod-borne Viruses Probably Infecting Man - by Vector (or Suspect Vector); Immunologic Group and Geographic Distribution. p. 292.
- Hammon, W. McD., D. M. Rees, J. Casals, and G. Meiklejohn. 1949. Experimental transmission of Japanese B encephalitis virus by *Culex tritaeniorhynchus* and *Culex pipiens* var. *pallens*, suspected natural vectors. *Am. J. Hyg.* 49(1): 46-50. Refers to the transmission by laboratory infected mosquitoes on Guam by Hodes in 1946, p. 46. Transmission was affected by *Culex jepsoni* (= *Culex sitiens*), *Cx. quinquefasciatus* and *Aedes vexans* (= *Culex sitiens*), *Cx. quinquefasciatus* and *Aedes vexans* (= *Aedes nocturnus* (?)).
- Hammon, W. McD., W. D. Tigertt, G. Sather, and H. Schenker. 1949. Isolations of Japanese B encephalitis virus from naturally infected *Culex tritaeniorhynchus* collected in Japan. *Am. J. Hyg.* 49(1): 51-56. Discusses the isolations of the virus in Japan and other Pacific area countries. *Aedes pandani* and *Culex quinquefasciatus* were collected from Guam, frozen, and a portion tested in San Francisco, with negative results, p. 53.
- Hawking, F. and D. A. Denham. 1976. The distribution of human filariasis throughout the world. Part I. The Pacific region, including New Guinea. *Trop. Dis Bull.* 73(5): 347-373. Reviews human filariasis throughout the world. Periodic filariasis occurs in the Marianas and is transmitted by *Culex pipiens fatigans*, p. 349; at present infection with *Wuchereria bancrofti* does not occur on Guam, p. 351.
- Horsfall, W. R. and H. W. Fowler, Jr. 1973. Bionomics. p. 3-134. In: Horsfall, W. R., H. W. Fowler, Jr., L. J. Moretti, and J. R. Larsen, eds., *Inland Floodwater Mosquito, Aedes vexans*. Univ. Illinois Press, Urbana. Under geographic distribution, p. 7, notes that Reisen, et al 1972, reported that the trinomials *Aedes v. nocturnus* and *Aedes v. nipponii* occur on Guam.
- Hoyer, L. C. and L. E. Rozeboom. 1977. Genetic relationships between several autogenous and anautogenous populations of the *Aedes* (*Stg.*) *scutellaris* group of mosquitoes. *J. Med. Entomol.* 13(4-5): 463-468. The range of the *Ae. scutellaris* group of mosquitoes extends to the Marianas (Guam) in the north, p. 463.
- Hunter, G. W., III, W. W. Frye, and J. C. Swartzwelder, eds. 1960. *A manual of tropical medicine*. 3rd ed. W. B. Saunders, Philadelphia. 892 p. See entries for A. B. Sabin 1960, and C. N. Smith 1960.
- Hunter, G. W., III, W. W. Frye, and J. C. Swartzwelder, eds. 1966. *A manual of tropical medicine*. 4th ed. W. B. Saunders, Philadelphia. 931 p. See entries for A. C. Gelman 1966, and T. H. Work 1966.

- Hurlbut, H. S. 1945. Personal communication to R. M. Bohart, reported in Bohart, R. M. and R. L. Ingram (1946), p. 19, and repeated in part by W. J. Perry (1949), p. 752. Bohart & Ingram: "H. S. Hurlbut (1945) reared [*Culex*] *sitiens* in the laboratory on Guam in 25 percent sea water and less successfully in fresh water. He found that it fed readily on chicken, mouse, rabbit, and man."
- Hurlbut, H. S. and J. I. Thomas. 1949. Potential vectors of Japanese encephalitis in the Carolina Islands. *Am. J. Trop. Med.* 29(2): 215-217. Refers to the discovery of Japanese B encephalitis on Guam by W. McD. Hammon, p. 215.
- Iyengar, M. O. T. 1959a. A brief review of the epidemiology of filariasis in the South Pacific. Paper presented at 6th Int. Congr. Trop. Med. Malar. (Lisbon), Sep 1958, and reprinted by South Pacific Commission Study Group on Filariasis, South Pacific Commission, Noumea, New Caledonia. Report of the study Group. Annex II. 5 p. Two races of *Wuchereria bancrofti* occur: the nocturnal periodic race transmitted by night-biting mosquitoes occurs in the north and west; the non-periodic race transmitted by day-biting mosquitoes occurs in the east and southwest. Zone A with nocturnal periodic *W. bancrofti* transmitted by *Culex fatigans* comprises the Micronesian area of the Marianas (Guam) and other islands, p. 1.
- Iyengar, M. O. T. 1959b. A resume of filariasis control work carried out in the territories of the South Pacific. South Pacific Commission Study Group on Filariasis, South Pacific Commission, Noumea, New Caledonia. Report of the Study Group. Annex III. 17 p. There is no scheme for filariasis control in the Trust Territories. In Guam, where there is no endemic filariasis, some mosquito control work is being carried out, p. 3.
- Iyengar, M. O. T. 1965. Epidemiology of filariasis in the South Pacific. South Pacific Commission, Noumea, New Caledonia. South Pacific Commission Tech. Paper No. 148. 183 p. Infection with *Wuchereria bancrofti* occurs in the Mariana Islands, but it does not occur on Guam at this time.
- James, M. T. and R. F. Harwood. 1969. *Herm's medical entomology*. 6th ed. Macmillan, New York. 484 p. Japanese B encephalitis was apparently introduced into Guam, p. 214.
- Knies, P. T. 1955. Foreign quarantine. p. 271-324. In: Coates, J. B., Jr., and E. C. Hoff, eds., *Preventive Medicine in World War II, Environmental Hygiene*. Vol. 2. Office Surgeon General, Dep. U.S. Army, Washington, D.C. In 1945 the entire island of Guam was sprayed methodically and systematically with DDT by means of C-47 aircraft to reduce the risk of accidental transportation of insect pests from island to island, or from that Pacific area to the mainland of the United States, p. 300.
- Knight, K. L. and A. Stone. 1977. *A catalog of the mosquitoes of the world (Diptera: Culicidae)*. 2nd ed. Thomas Say Foundation. Entomol. Soc. Amer., College Park, Maryland. Vol. 6. 611 p. Includes species, with collection records, of the mosquitoes described from the island of Guam.

- Knott, J. I. 1944. Filariasis in Guam, Mariana Islands, U.S.A., October 1944. (mimeographed). Report of a microfilarial survey of 517 natives in the Agana district of Guam. The infection rate was 0.00 percent for Guam. (Cited by Iyengar 1944, and Massal & Kerrest 1953).
- Komp, W. H. W. and A. Stone (collaborators). 1954. Medically important arthropods: The Order Diptera. p. 714-753. In: Mackie, T. T., G. W. Hunter, III, and C. B. Worth, eds., *A Manual of Tropical Medicine*. 2nd ed. W. B. Saunders, Philadelphia. Notes that Japanese B encephalitis occurs in Guam, Table 54, p. 648.
- Kumm, H. W. 1956. The arthropod-borne virus encephalitides. p. 375-385. In: Maxcy, K. F., ed., (*Rosenau*) *Preventive Medicine and Public Health*. 8th ed. Appleton, Century, Crofts, Inc., New York. Japanese B encephalitis has been identified from Guam, p. 382.
- Lathrop, G. D. 1975. Preventive medicine aspects of Operation Newlife, Guam, TTPI, April-May 1975. Epidemiology Division, USAF School of Aerospace Medicine (AFSC), Brooks Air Force Base, Texas. 9 p. + 6 attachments. (mimeographed). Consultant report. Evaluates the epidemiological aspects of mosquito-borne infections on Guam, including vector control methods.
- Ludlam, K. W. 1970. A bibliography of the potential vectors of *Dirofilaria immitis* (Leidy). Dep. Ent., Univ. Maryland, College Park, Maryland. 11 p. (mimeographed). Literature review. Presents a list of mosquito species in which complete larval development of *Dirofilaria immitis* has been observed. These include *Aedes aegypti*, *Ae. guamensis*, *Ae. pandani*, *Culex annulirostris*, *Cx. pipiens quinquefasciatus*, and *Cx. sitiens* from Guam.
- Mackie, R. A. 1974. Results of survey to determine the Breteau Index for *Aedes albopictus* on Guam, August 1974. Dep. Public Health and Social Services (Environmental Health Section), Gov. Guam. 2 p. (mimeographed). Results of a general island community survey to determine the Breteau Index for *Ae. albopictus*.
- Mackie, R. A. 1975. Information for the Eleventh Biennial Vector Control Conference. Dep. Public Health and Social Services (Environmental Health Section), Gov. Guam. 3 p. (mimeographed). Summarizes vector-borne disease threats on Guam during 1974-75.
- Massal, E. and J. Kerrest. 1953. Filariasis, elephantiasis and related aspects in the South Pacific area. Part VII. Annotated bibliography. p. 89-100. In: *Filariasis in the South Pacific*. Conf. Filariasis and Elephantiasis, Papeete, Tahiti, French Oceania. 21 Aug - 1 Sep 1951. Includes papers by Crow 1910, Esaki 1940, Farner 1944, Farner & Bohart 1945, and Knott 1944.
- McClelland, G. A. H. 1974. *Stegomyia*. p. 69-89. In: Pal, R. and R. H. Wharton, eds., *Control of Arthropods of Medical and Veterinary Importance*. Plenum Press, New York. Refers to the anti-*Aedes aegypti* program to control dengue fever on Guam in 1945 which resulted in the subsequent disappearance of *Ae. aegypti* and its replacement by *Ae. albopictus* which was not known on the island in 1945, p. 71.

- McDonald, J. L. 1969. Japanese B encephalitis in the Western Pacific. U.S. Navy Disease Vector Control Center, Naval Air Station, Jacksonville, Florida. Tech. monogr. 2(1): 1-12. (mimeographed). Refers to the JBE epidemic on Guam in 1947-48, p. 1, 7, and states that the disease was apparently transmitted by *Culex annulirostris* Skuse, p. 5.
- Meiklejohn, G., I. B. Stacy, and T. W. Simpson. 1953. Dengue antibody in South Pacific residents. Proc. 7th Pacific Science Congr. Pacific Science Assoc. 7: 348-355. A neutralizing antibody for a Hawaiian strain dengue virus was found in the sera of natives and persons of European origin collected on Guam in 1946.
- Miles, J. A. R. 1960. Epidemiology of the arthropod-borne encephalitides. Bull. Wld. Hlth. Org. 22: 339-371. Refers to the 1947-48 epidemic of Japanese B encephalitis on Guam with the comment that it appeared to have been an isolated episode with disappearance of the virus from the island after the acute outbreak, p. 344.
- Morrill, A. W., Jr. 1953. Army insect control operations in the Far East. J. Econ. Ent. 46(2): 270-276. Cites *Aedes aegypti* and *Ae. albopictus* on Guam, p. 271, and suggests on p. 272 that the establishment of these two species was thought to be traceable to excessive dependency on fogging by the military population rather than to support of sanitation and basic treatments for mosquito control.
- Musel, R. 1971. Diseases once easily halted now speeding around the world. *Daily Journal*, Tupelo, Mississippi, Thursday Morning, July 22, 1971, p. 5/1. Notes 5 new disease carrying mosquitoes having been identified on Guam (see Reisen, et al 1971).
- Nowell, W. R. 1976a. An annotated bibliography of the mosquitoes and mosquito-borne diseases of Guam (Diptera: Culicidae). Mosq. Syst. 8(4): 355-385. Bibliography of articles and references pertaining to the mosquitoes and mosquito-borne infections of man on Guam.
- Nowell, W. R. 1976b. Entomology consultation: Andersen Air Force Base, Guam. U.S. Air Force 1st Med. Serv. Wing (PACAF) Ent. Rep. No. 76-004. 8 p. (mimeographed). Evaluates continuing effects of Typhoon Pamela (May 1976) on the base environment and pest animal populations associated with it.
- Nowell, W. R. 1976c. Mosquito survey, Island of Rota (Mariana Islands). U.S. Air Force 1st Med. Serv. Wing (PACAF) Ent. Rep. No. 76-001. 10 p. (mimeographed). Discusses the mosquito-borne diseases on Guam, p. 2, 4, and suggests that 2 of the 3 species of mosquitoes found to be new to Rota during this 1976 survey might have been introduced from Guam, p. 4.
- Nowell, W. R. 1977. International quarantine for control of mosquito-borne diseases on Guam. Aviat. Space Environ. Med. 48(1): 53-60. Lists the mosquito species reported from Guam, discusses the mosquito-borne diseases known to have occurred on the island, and attributes the increases and incidences to breakdowns in local international quarantine procedures.

- Nowell, W. R. and D. R. Sutton. 1977. The mosquito fauna of Rota Island, Mariana Islands (Diptera: Culicidae). *J. Med. Entomol.* 14(4): 411-416. Discusses the possibility of introduction of mosquito species from Guam and Saipan to Rota, and reviews the mosquito-borne diseases which have occurred on Guam.
- Perry, W. J. 1949. The mosquitoes and mosquito-borne diseases of the Treasury Islands (British Solomon Islands). *Am. J. Trop. Med.* 19(5): 747-758. Refers to the development of *Culex sitiens* on Guam in 25 percent sea water, p. 752. (see Hurlbut, 1945).
- Petrishcheva, P. A., Ye. N. Levkovich, and S. T. Boldyrev. 1963. Japanese encephalitis. State Publishing House for Medical Literature, Moscow. (Translation No. 1115, U.S. Army Biological Laboratories, Fort Detrick, Frederick, Maryland, 9 June 1964. 149 p.) References the very large epidemic of JE which occurred in 1947-1948 on the island of Guam, where previously no cases had been noted. Cites Hammon, et al 1958, and suggests that the arrival of 60,000 Europeans [Americans?] on the island who considerably diluted the immune segment of the permanent local population brought about the epidemic outbreak of the disease, p. 8-9. JE is reported to be widespread on Guam, p. 121.
- Pinkovsky, D. D. 1977. Entomology consultation: Andersen Air Force Base, Guam. U.S. Air Force 1st Med. Serv. Wing (PACAF) Ent. Rep. No. 77-003. 15 p. (mimeographed). Reviews the vector surveillance program and pest control procedures on the base.
- Pinkovsky, D. D., A. C. Ramos, and D. R. Sutton. 1977. Guam. p. 4. *In*: 1976 PACAF Mosquito Identification Summary. U.S. Air Force 1st Med. Serv. Wing (PACAF) Tech. Rep. No. 77-2. (mimeographed). Lists the species and forms of mosquitoes collected during routine surveys on Andersen AFB, Guam, during Feb-Dec 1976.
- Rosen, L. L. 1953. Mosquito vectors of human filariasis in Oceania. Part II. Entomology. p. 9-16. *In*: Filariasis in the South Pacific. Conf. Filariasis and Elephantiasis, Papeete, Tahiti, French Oceania, 21 Aug - 1 Sep 1951. South Pacific Commission, Noumea, New Caledonia. Endemic infection with the periodic variety of *Wuchereria bancrofti* has been reported from the Marianas. *Aedes guamensis* is named as the vector, p. 11.
- Sabin, A. B. (collaborator). 1954. Virus diseases with special effect on nervous system. p. 34-50. *In*: Mackie, T. T., G. W. Hunter, III, and C. B. Worth, eds., *A Manual of Tropical Medicine*. 2nd ed. W. B. Saunders, Philadelphia. The virus of Japanese B encephalitis has been recovered from human beings in Guam, p. 40.
- Sabin, A. B. 1956. Dengue. p. 383-394. *In*: *Diagnostic Procedures for Virus and Rickettsial Diseases*. 2nd ed. Am. Public Health Assoc., New York. Positive C-F tests for dengue fever have been obtained with the sera of people who had clinically diagnosed dengue fever in Guam 1 or more years before the bleeding, p. 385.
- Sabin, A. B. (rev. by I. Gordon). 1960. Japanese B encephalitis. p. 29-30. *In*: Hunter, G. W., III, W. W. Frye, and J. C. Swartzwelder, eds., *A Manual of Tropical Medicine*. 3rd ed. W. B. Saunders, Philadelphia. The JBE virus has been recovered from human beings in Guam, p. 29.

- Sawyer, C. H. 1969. Malaria, Guam 1969. Letter, U.S. Air Force 5th Epidemiol. Flight (PACAF), APO San Francisco 96528, to Commander, HQ 863 Medical Group (SAC), APO San Francisco 96334, 2 p. + 3 attachments. (unpublished). Presents parasitologic and entomologic evaluations of the 6 cases of malaria which occurred on Guam during 1969.
- Service, M. W. 1976. *Mosquito ecology*. J. Wiley & Sons, New York. 583 p. Uses the coincidence of the apparent introduction around 1944 of *Aedes albopictus* on Guam and the subsequent decrease in larval incidence of the indigenous mosquito, *Aedes guamensis*, as an example of species replacement due to larval competition, p. 535.
- Shattuck, G. C. 1951. *Diseases of the tropics*. Appleton, Century, Crofts, Inc., New York. 803 p. Notes that Japanese B encephalitis has occurred in Guam, p. 453.
- Shaw, R., Jr. 1977. Preventive medicine in the Vietnamese refugee camps on Guam. *Milit. Med.* 142(1): 19-28. Presents entomological considerations, p. 21, with incidence data for malaria and dengue fever in the refugee population on Guam, p. 25-26.
- Siler, J. F. 1935. Dengue fever. p. 402-408. *In*: McKinley, E. B., ed., *A Geography of Disease*. Suppl., *Am. J. Trop. Med.* Vol. 15(5), XXV + 495 p. Guam is included in the international summary of incidence of dengue fever, Table 125, p. 408.
- Sirivanakarn, S. 1976. Medical entomology studies III. A revision of the subgenus *Culex* in the Oriental Region (Diptera: Culicidae). *Contrib. Am. Entomol. Inst. (Ann Arbor)* 12(2): 1-272. Guam is included in the distribution of *Culex (Culex) sitiens* Wiedemann, p. 99.
- Smith, C. N. 1960. Medically important arthropods (introduction). p. 656-670. *In*: Hunter, G. W., III, W. W. Frye, and J. C. Swartzwelder, eds., *A Manual of Tropical Medicine*. 3rd Ed. W. B. Saunders, Philadelphia. Guam is included in the geographic distribution of Japanese B encephalitis in Table XI.1. Human Diseases Transmitted by Arthropods - Virus Diseases, p. 662.
- Swezey, O. H. 1937. Entomological report of Guam. Part II. *Guam Recorder* 13 (11): 8-9, 22, 26 (Feb 1937). *Culex quinquefasciatus* was found breeding in many different kinds of containers and an *Aedes* sp. was found breeding in the axils of *Pandanus* leaves, p. 9, 22. Comments that no malaria mosquitoes are yet known in Guam, p. 22. (Part I of this report was also published in *The Guam Recorder* 13(10): 13, 15, 47-48 (Jan 1937), but the data on the mosquitoes were not mentioned prior to Part II).
- U.S. Dep. H.E.W. 1974. Malaria. *In*: Table III. Cases of Specified Notifiable Diseases. Public Health Service, Center for Disease Control, Morbidity and Mortality Wkly. Rep. 23(42): 359 (19 Oct 1974). Two cases of malaria are shown for Guam during 1974. These cases were diagnosed in Vietnamese refugees.

- U.S. Dep. H.E.W. 1976a. Health information for international travel 1976. Public Health Service, Center for Disease Control, Bureau of Epidemiology (Quarantine Division), Atlanta, Georgia. Suppl., Morbidity and Mortality Wkly. Rep. Vol. 25, October 1976. 80 p. HEW Publ. No. (CDC) 76-8280. Guam recommends yellow fever vaccination for travel to infected areas, p. 60. Also: Health information for international travel 1977. Suppl., Morbidity and Mortality Wkly. Rep. Vol. 26, August 1977. 96 p. HEW Publ. No. (CDC) 77-8280. Same annotation, p. 26.
- U.S. Dep. H.E.W. 1976b. International notes: quarantine measures. Public Health Service, Center for Disease Control, Morbidity and Mortality Wkly. Rep. 25(6): 48 (14 Feb 1976). Guam recommends yellow fever vaccination for travel to infected areas.
- U.S. Dep. H.E.W. 1976c. International notes: quarantine measures. Public Health Service, Center for Disease Control, Morbidity and Mortality Wkly. Rep. 25(29): 236 (30 Jul 1976). Guam recommends yellow fever vaccination for travel to infected areas.
- U.S. Dep. H.E.W. 1977a. Control of dengue. Public Health Service, Center for Disease Control, Bureau of Tropical Diseases (Vector Biology and Control Division), Vector Topics 2: 1-39. References 6 confirmed cases of dengue fever having been imported into Guam from Vietnam during the admission to the United States of refugees from that southeast Asian area in 1975. States that because of early detection and extensive efforts toward mosquito control, no spread to the residents of Guam occurred, p. 3.
- U.S. Dep. H.E.W. 1977b. Malaria surveillance: annual summary 1976. Public Health Service, Center for Disease Control, Atlanta, Georgia. 27 p. Reviews a previously unreported case of fatal malaria that occurred in 1975. The victim was a Vietnamese female refugee who had arrived from Vietnam within 19 days prior to hospitalization and was admitted to a Guam hospital during May 1975, p. 13.
- U.S. Dep. H.E.W. 1977c. Reported morbidity and mortality in the United States 1976. Public Health Service, Center for Disease Control, Morbidity and Mortality Wkly. Rep. 25(33): Annual Summary 1976 (Aug 1977). Reports 1 case of malaria for Guam in Table 5: Reported Cases of Notifiable Diseases by Geographic Division and by State, United States, 1976, p. 9.
- U.S. Navy Dep. 1944. Mandated Marianas Islands. Office Chief Naval Operations, Navy Dep., Washington, D.C. Civil Affairs Handbook OPNAV 50E-8 (15 Apr 1944). The genus *Anopheles* has not been reported, but *Aedes aegypti* and *Culex quinquefasciatus* are present, p. 19. Incidence and vector data for malaria, filariasis, and dengue fever on Guam are shown on p. 103.
- Vandenberg, S. R. 1926. Agricultural Experiment Station notes: Mosquitoes. Guam Recorder 3(5): 122-123 (Aug 1926). Reports 5 species of mosquitoes occurring on Guam: *Culex fatigans*, *Cx. sp.*, *Stegomyia facia*, *Aedes scutellaris*, and one unnamed species. The genus *Anopheles* is not known to be present on Guam, p. 122.

- Vandenberg, S. R. 1928. Mosquitoes. Guam Recorder 5(6): 124 (Sep 1928).
Five species of mosquitoes occur on Guam, but the genus *Anopheles* is not represented on the island.
- Velimirovic, B. 1969. History and geographical distribution of Japanese encephalitis. p. 1-3. *In*: Report on the Second Regional Seminar on Virus Diseases: Mosquito-Borne Virus Diseases (Arboviruses). W.H.O. Regional Office Western Pacific, Manila, Philippines, 6-11 Oct 1969, WPR/416/69, 58 p. A single epidemic of JE occurred in Guam in 1947. The virus was apparently introduced, was not reported previously, and has not reappeared since, p. 2. *Culex annulirostris marianae* was considered to be the vector, p. 6. Dengue fever virus on Guam, p. 49/50; JE virus on Guam, p. 51/52; Arbovirus disease map, showing Guam, p. 57/58. (see W.H.O. 1969, in Part I of this bibliography).
- Ward, R. A. 1977. Recent changes in the epidemiology of malaria relating to human ecology. Proc. 15th Int. Congr. Entomol., Washington, D.C., p. 523-529. Points out that *Anopheles barbirostris*, an Oriental vector of malaria, became established on Guam, and was probably introduced via cargo vessels or aircraft en route from southeast Asia to the United States of America, p. 526.
- Work, T. H. 1966. Virus diseases in the tropics. p. 1-41. *In*: Hunter, G. W., III, W. W. Frye, and J. C. Swartzwelder, eds., *A Manual of Tropical Medicine*. 4th ed. W. B. Saunders, Philadelphia. Japanese B encephalitis is in serological group/complex B and is vectored by a mosquito in a number of geographic areas, including Guam, p. 36.
- World Health Organization. 1966. Special subjects. 1. Malaria. *Epidem. Vital Statist. Rep.* 19(3): 89-99. Guam is included in Table 1.1: Number of Cases and Deaths, 1955-1964, p. 96. The following data (cases only) are offered:
- | | | | | |
|------|---|------------------|------|------------------------------|
| 1955 | 3 | (imported cases) | 1960 | 5 |
| 1956 | 6 | | 1961 | 5 |
| 1957 | 3 | | 1962 | 0 |
| 1958 | 0 | | 1963 | 0 (preliminary or estimated) |
| 1959 | 1 | | 1964 | + (data not yet available) |
- World Health Organization. 1967. Special subject: Summary of demographic and health statistics published. *Epidem. Vital Statist. Rep.* 20(3): 169-310. Dengue fever is included in monthly reports from Guam according to Table 3. Published Statistics of Notified Cases of Infective and Parasitic Diseases: Diseases Attributable to Viruses, p. 277.
- World Health Organization. 1972. Status of malaria eradication during the first semester of the year 1971. W.H.O. *Wkly. Epidem. Rec.* 47(9): 93-107. Guam is included in Table 4: Supplementary List of Malaria-Free Areas, with notification date of 14 Nov 1963, p. 102.
- World Health Organization. 1976. Information on malaria risk for international travellers. Second Edition (updated). W.H.O. *Wkly. Epidem. Rec.* 51(24): 181-200. According to Table 1, p. 195, there is no risk of contracting malaria in Guam, and no preventive measures against malaria are required.

Additional References on Guam Culicidae*

- Anonymous. 1967. Insects not known to occur in the United States. A mosquito (*Culex tritaeniorhynchus* Giles). U.S. Dept. Agr. Coop. Econ. Ins. Rept. 17 (42): 951-952. Description and illustrations with notes on its distribution, including Guam.
- Iyengar, M.O.T. 1956. Annotated bibliography of filariasis and elephantiasis. Part 2. So. Pacific Commission Tech. Paper No. 88:1-114.
- Iyengar, M.O.T. 1960. A review of the mosquito fauna of the South Pacific (Diptera: Culicidae). So. Pacific Commission Tech. Paper No. 130:1-103. Guam species cited under "Marianas".
- Reid, C. F., N. Habib, V. Jay and C. Simonini. 1939. Bibliography of the island of Guam. H. W. Wilson, Co., New York, 102 pp.
p. 63. provides the following abstract of Hornbostel, H. G. 1925. "Origin of mosquito pest in Guam. Its possible eradication by removing standing water. Suggests introduction of gambusias fish which live on mosquito larvae."

ADDITIONAL ANNOTATIONS FOR PART I

- Bryan, E. H., Jr. 1949. *Aedes aegypti*, *Ae. albopictus*, *Ae. pandani*, *Anopheles subpictus* and *Culex quinquefasciatus* are listed with their vector capabilities, p. 17-18.
- Fullaway, D. T. 1912. Mosquitoes are listed on p. 33.
- Hornbostel, H. G. 1925. Discusses the introduction of mosquitoes on Guam via water tanks on whaling ships, and suggests using mosquito fish to control the populations.
- Huang, Y. -M. 1972. Add "distribution list, p. 68-69."
- Iyengar, M. O. T. 1954. Guam is included in the charts of summary data regarding prevalence of endemic microfilarial infection (p. 8), and periodicity of *Wuchereria bancrofti* infections, p. 34. *Culex fatigans* is considered the likely vector of filarial infection in the Marianas (including Saipan) (p. 39), but there are no data available regarding the vector, p. 43.
- Iyengar, M. O. T. 1955. *Anopheles subpictus* has been recorded from Guam, probably as a war-time introduction, p. 5, 22. Notes on *Aedes guamensis*, p. 9, 29; *Ae. oakleyi*, p. 10, 30; *Ae. albopictus*, p. 29; *Ae. pandani*, p. 29; *Culex litoralis* and *Cu. annulirostris marianae*, p. 11, 33, from Guam. List of mosquitoes of the Mariana Islands, p. 45.

*Editor's Note.

These references were submitted by Dr. Ronald A. Ward following his review of this article but arrived too late to be coordinated with the author. I have taken the liberty of including them here.

- Knight, K. L., R. M. Bohart, and G. E. Bohart. 1944. Mosquito distribution for Guam includes *Aedes aegypti*, p. 49; *Ae. oakleyi*, p. 54; *Ae. pandani*, p. 54; *Ae. scutellaris pseudoscutellaris*, p. 55; and *Culex quinquefasciatus*, p. 63.
- May, J. M. 1954. Add "in Atlas of Diseases" at the end of the annotation.
- McKinley, E. B. 1935. Add "See J. F. Siler, 1935" at the end of the annotation.
- Mumford, E. P. and J. L. Mohr. 1944. Dengue fever and filariasis are included for Guam in Table 1: Distribution of Communicable Diseases in the Pacific, p. 2. Dengue fever on Guam, p. 5. Exiled Samoans are said to have brought non-periodic filariae to the Marianas, and filariasis is reported from Guam but elephantiasis does not occur there, p. 24.
- Oakley, R. G. 1940. Lists *Aedes aegypti*, *Ae. pandanus*, *Ae. oakleyi*, *Ae. scutellaris* var. *pseudoscutellaris*, *Ae. scutellaris* var., and *Culex quinquefasciatus* from Guam.
- Reinert, J. F. 1973. Read: Reviews the taxonomy and collection records, including those on Guam, for *Aedes vexans vexans* (Meigen), p. 71, 74, and *Aedes vexans nocturnus* (Theobald), p. 74, and states
- Satterlee, R. C. 1928b. Portions of the 1928a report are extracted for *The Guam Recorder*. The statement pertaining to the presence of *Anopheles* in micronesia is not included.
- Swezey, O. H. 1936. Lists two species of mosquitoes: *Culex quinquefasciata* and an *Aedes* sp., with breeding notes for each. The larvae of the *Aedes* were found in the accumulated water at the axils of *Pandanus* leaves, p. 313.

ERRATA FOR PART I

- Bryan, E. H., Jr. 1949. Read Committee for Commission
- Holway, R. T. 1964d. Read Mosquito survey on Guam - 1964 for Mosquito survey for naval activities on Guam
- Hornbostel, H. G. 1925. Read Guam Recorder 2(21):268 (Dec.)
- Hurlburt, H. S., J. D. Maple, C. S. Wilson, S. R. Fallander and C. N. Husman. 1947. Read Hurlbut, H. S. for Hurlburt, H. S.
- Iyengar, M. O. T. 1954. Read South Pacific Commission for Command
- Iyengar, M. O. T. 1955. Read South Pacific Commission for Command

- Knight, K. L., R. M. Bohart and G. E. Bohart. 1944. Add 71 p.
- Knight, K. L. and H. S. Hurlburt. 1949. Read H. S. Hurlbut for H. S. Hurlburt.
- Mumford, E. P. and J. L. Mohr. 1944. Read ... communicable diseases and their..
- Oakley, R. G. 1946. Revise to read U.S. Commercial Co. (Honolulu), Economic Survey of Micronesia, Report No. 14(2):1-82. (unpublished).
- Russell, P. F. 1959. Read Insects and the epidemiology of malaria
- Satterlee, R. C. 1928b. Read Guam Recorder 5(6):121
- South Pacific Commission. 1951. Read So. Pacific Commission for So. Pacific Command
- South Pacific Commission. 1959. Read So. Pacific Commission for So. Pacific Command.
- Wester, W. H., Jr. 1918. Incorrectly listed. Author is W. H. Weston, Jr. Revise bibliographic data to read: Control of the disease situation in Guam. p. 45-62. *In*: Guam Agricultural Experiment Station Report for 1917. This entry should be delted from the bibliography because it pertains to agricultural pests and does not include mosquitoes or address mosquito-borne diseases.