

A Tentative Annotated List of the Culicidae of the Island of Hispaniola¹

John N. Belkin

and

Sandra J. Heinemann

Department of Zoology

University of California

Los Angeles, California, U.S.A.

The mosquito fauna of the island of Hispaniola, which is divided politically between the Republic of Haiti on the west and the Dominican Republic on the east, has attracted little attention in the past. Disregarding erroneous records, the combined lists for the 2 republics compiled by Porter (1967) from the literature include only 38 species of the subfamily Culicinae (Culicidae of Stone, Knight and Starcke, 1959). For the Dominican Republic the list is based almost entirely on the collections (88-152) made by August Busck from 6 August to 28 September 1905 as recorded in Howard, Dyar and Knab (1915; 1917). The list for Haiti is based largely on collections of William A. Hoffman from August 1924 to December 1925, identified and reported by Root (1927). The few records additional to these were gathered from scattered sources as indicated under the species in the list.

In connection with the project "Mosquitoes of Middle America," a topotypic survey was carried out by members of our staff, J.N. Belkin, E.F. Drake and T.E. Rogers, in the Dominican Republic from 19 June to 14 September 1971. We are indebted to Dr. Jorge Chiriboga of the Puerto Rico Nuclear Center for making the preliminary contacts for us and to Drs. J.M. Alvarez V., G. Batista del Villar and C. Lopez Dominguez of the Departamento de Investigaciones Cientificas, Universidad Autonoma de Santo Domingo for providing facilities, transportation and an assistant, J. Gomez. In addition to obtaining the majority of the species originally described from the Dominican Republic, the survey team found 8 species of the subfamily Culicinae, 3 species of the subfamily Chaoborinae and 2 species of the subfamily Dixinae not previously recorded from Hispaniola, and confirmed the records of all but 4 species of Culicidae (sensu lato) previously reported from the island.

The present list has been compiled from preliminary identifications of the material from the above-mentioned survey and very brief earlier surveys made for the project by D.C. Watson in Haiti (27 June-8 July 1968) and the Dominican Republic (15-25 July 1968). We have also included all previous records that appear to be reliable and authentic. For an island of the size of Hispaniola, nearly 30,000 square miles, the recorded mosquito fauna is disappointingly meager, being smaller than that of Jamaica which as an area of about 4,450 square miles. This is undoubtedly due in part to the very limited field work done to date on Hispaniola. We have included in the list 7 species, not as yet definitely recorded from the island, that should be present as they occur both in Jamaica and Puerto Rico, respectively west and east of Hispaniola. These species are marked by an asterisk (*).

The mosquito fauna of Hispaniola is remarkably similar to that of Jamaica. Of the known

¹Contribution from project "Mosquitoes of Middle America" supported by U.S. Public Health Service Research Grant AI-04379 and U.S. Army Medical Research and Development Command Research Contract DA-49-193-MD-2478.

species of the subfamily Culicinae only 8 are not known from Jamaica. Among these, only *Sabethes (S.) bipartipes*, *Culex (C.) duplicator* and the 3 species of *Wyeomyia sororcula* complex appear to be endemic. Of the others, *Culex (C.) habilitator* has been found in Puerto Rico, Virgin Islands and the northern Lesser Antilles; *Culex (C.) carcinophilus* has been reported from Cuba and Puerto Rico; and *Culex (Micraedes) antillumagnorum* is known from Cuba, Puerto Rico and St. Thomas in the Virgin Islands. We have not studied the species in the subfamilies Chaoborinae and Dixinae in sufficient detail to determine their identity and affinities.

Nearly all the named species in the list can be identified with the aid of the keys in "The Culicidae of Jamaica" (Belkin, Heinemann and Page, 1970). For the 4 species not included in these keys we have given brief diagnostic characters for the adults, male genitalia and larvae to separate them in these keys.

SUBFAMILY CULICINAE

Genus *Anopheles*

Subgenus *Anopheles*

1. *crucians* Wiedemann, 1828. Apparently first reported by Komp (1942:5). Similar to Jamaican populations. Uncommon.
2. *grabhamii* Theobald, 1901. First recorded by Howard, Dyar and Knab (1917:1009). Similar to topotypic Jamaican population. Common.
3. *vestitipennis* Dyar & Knab, 1906. Apparently first recorded by Dyar (1928:459) erroneously as Dominica instead of Dominican Republic. Rare.

Subgenus *Nyssorhynchus*

4. *albimanus* Wiedemann, 1820. Originally described from the island (as Santo Domingo). Common.

Genus *Uranotaenia*

5. *cooki* Root, 1937. Originally described from Port-au-Prince, Haiti. Apparently rare; not found during our surveys.
6. *lowii* Theobald, 1901. First recorded by Root (1927). Common.
7. *socialis* Theobald, 1901. First recorded by Root (1927). Uncommon.

Genus *Culex*

Subgenus *Culex*

8. *bahamensis* Dyar & Knab, 1906. Apparently first recorded by Porter (1967). Common.
- *9. *chidesteri* Dyar, 1921 complex. Not recorded as yet but should be present on island as

forms of this complex are known from Jamaica, Cuba, Puerto Rico and the Lesser Antilles.

10. *corniger* Theobald, 1903. First recorded by Howard, Dyar and Knab (1915:246). Common.
11. *duplicator* Dyar & Knab, 1909. Originally described from the Dominican Republic; apparently endemic to Hispaniola but because of general similarity to *bahamensis* possibly mistaken for it elsewhere. Adults will run to *bahamensis* in keys, couplet 9 for males and 13 for females. Both sexes are easily separated from *bahamensis* by the very broad and conspicuous white rings on the hindtarsi instead of very narrow dingy light rings in the latter. The male genitalia will not run through couplet 1 of the key as the paraproct is not sclerotized and has no differentiated blunt teeth, unlike all other species of *Culex* in the key. The immature stages, formerly unknown, occur in ground pools and rockholes. The larva is very similar to *bahamensis* but has a complete anal saddle and 2 pairs of gills. It will run to *quinquefasciatus* in the key but can be immediately separated by the spiculate body and especially siphon, and by the siphonal hairs midventral in position, both features of *bahamensis*. Common.
12. *habilitator* Dyar & Knab, 1906 (= *eremita* Howard, Dyar & Knab, 1913). Both nominal species originally described from the Dominican Republic. Females will run to *chidesteri* in couplet 12 of the key; they appear to be distinguishable from the latter by the narrower basal transverse pale abdominal bands. Males will not run through the key beyond couplet 7 as the palpus exceeds the proboscis by slightly more than segment 5, and palpal segment 4 has a complete ventral line of white scales. However they can be separated from all the other species in the key by the characteristic shape of the clasper and the subapical lobe of the sidepiece which are readily seen in whole specimens. The male genitalia will run to couplet 2 but are distinguished from all the species in the key by the clasper which is greatly swollen externally in the basal two-thirds and very narrow distally, and by the slender digitiform process of the subapical lobe which bears a long rod and 2 simple setae. In Hispaniola immature stages have been collected only in crabholes, but in the Virgin Islands and Lesser Antilles they are known from a wide range of habitats. The larva is extremely similar to *nigripalpus* and will run to the latter in the key. Possibly it may be distinguished from *nigripalpus* by having prothoracic hair 7-P usually double instead of triple. This species appears to be uncommon.
13. *janitor* Theobald, 1903. Reported here for the first time from the island, where it has been found once each in a tire and a bamboo pot in addition to its normal breeding sites in crabholes. Apparently uncommon.
14. *nigripalpus* Theobald 1901 (*carmodyae* Dyar & Knab, 1906; *regulator* Dyar & Knab, 1906). Originally described from the island as *carmodyae* and *regulator* and reported as *carmodyae* and *similis* by Howard, Dyar and Knab (1915:255,342). Probably the most common and widespread indigenous species on the island.
15. *quinquefasciatus* Say, 1823. First reported from the island by Howard, Dyar and Knab (1915:357). This ubiquitous introduced species is common throughout the island in domestic and peridomestic situations.
16. *secutor* Theobald, 1901 (*lamentator* Dyar & Knab, 1906). Originally described from the island as *lamentator* and reported under that name by Howard, Dyar and Knab (1915:276).

The current synonymy appears to be correct. As in Puerto Rico, it occurs at lower elevations than in Jamaica (type locality). May be more common than our records indicate.

Subgenus *Melanoconion*

17. *atratus* Theobald, 1901. First record from island attributed erroneously to Howard, Dyar and Knab by Root (1927) who reported the species from Haiti. Apparently uncommon.
18. *carcinophilus* Dyar & Knab, 1906. Originally described from the island. Adults will run to *inhibitor* in the key, but at least the females may possibly be separated by a more distinct white orbital line. The male genitalia are very similar to *inhibitor* but seta *a* (basal) of the proximal division of the subapical lobe is nearly sessile instead of arising from a process subequal to that of seta *b*, and the outer margin of the clasper has a rather prominent expansion in the region of the wrinkles which tend to be more prominent and spiculelike in dorsal aspect (see Rozeboom and Komp, 1950, fig. 14). The larva will not run beyond couplet 13; it apparently resembles *opisthopus* but has the siphon uniformly moderately pigmented, with the distal subdorsal hair removed from the apex and the sub-ventral hairs (9-11) longer, thinner and single to triple; abdominal hair 7-I is single instead of double and head hair 6-C apparently shorter. This species, known to breed in crab-holes, is apparently rare and was not found during our surveys.
19. *erraticus* (Dyar & Knab, 1906). Apparently first recorded from the island by Stone, Knight and Starcke (1959:270). Apparently uncommon.
20. *inhibitor* Dyar & Knab, 1906. Originally described from the island. Apparently uncommon.
- *21. *iolambdis* Dyar, 1918. Not recorded as yet but should be present on the island as it has been found in Jamaica and Puerto Rico. A dark female (USNM) collected by August Busck near Santo Domingo (probably coll. 89 or 94 but not marked) and identified as *atratus* may possibly belong to this species.
- *22. *opisthopus* Komp, 1927. Not recorded as yet but should be present on the island as it has been found in Jamaica and Puerto Rico.
23. *pilosus* (Dyar & Knab, 1906). Reported here for the first time from the island. Apparently uncommon.

Subgenus *Micraedes*

24. *antillumagnorum* Dyar, 1928. First recorded from the island as *bisulcatus* by Howard, Dyar and Knab (1915:308). Adults cannot be differentiated at present from *arawak* Berlin, 1970 and *bisulcatus* (Coquillett, 1906). The male genitalia differ from these species in the following features: paraproct with at least 10 apical teeth; clasper without sub-basal setae on external margin; ninth tergite lobe usually with 6 moderately long setae; proximal division of subapical lobe without sclerotized saberlike setae on tergal surface. The larvae differ from the other 2 species in metathoracic hair 1-T with at least 15 branches; hair 2-II stellate, with at least 15 branches; hair 6-I usually with 3 branches. Found only in bromeliads in Hispaniola; apparently uncommon.

Genus *Deinocerites*

25. *cancer* Theobald, 1901. First recorded from the island by Howard, Dyar and Knab (1915:205). Common in crabholes.

Genus *Mansonia*Subgenus *Mansonia*

- *26. *dyari* Belkin, Heinemann & Page, 1970. Not recorded as yet but should be present on the island as it is known from Jamaica and Puerto Rico.
- *27. *flaveola* (Coquillett, 1906). Not recorded as yet but should be present on the island as it is known from Puerto Rico, St. Thomas and apparently Jamaica.
28. *titillans* (Walker, 1848) complex. Recorded here for the first time on the basis of 2 females from Dajabon, Dominican Republic. As noted by Belkin, Heinemann and Page (1970:106) the taxonomic status of the northern populations of the *titillans* complex is uncertain. This species may be more common locally than our single record indicates.

Genus *Orthopodomyia*

29. *signifera* (Coquillett, 1896). First recorded from the island as *waverleyi* by Root (1927:465). T.J. Zavortink informs us that the population from Hispaniola, although fairly distinct, should be assigned to *signifera*. Not uncommon in treeholes.

Genus *Psorophora*Subgenus *Grabhamia*

30. *infinis* (Dyar & Knab, 1906). Originally described from the island; erroneously synonymized with *cingulata* (Fabricius, 1805) by Lane (1953:762). Uncommon.
31. *insularia* (Dyar & Knab, 1906). Originally described from the island. Locally common in seaside coral rockholes.
32. *jamaicensis* (Theobald, 1901). First recorded from the island by Howard, Dyar and Knab (1917:584); erroneously synonymized with *confinnis* (Lynch Arribalzaga, 1891) by Aitken (1940:677). The most common temporary pool breeder on the island.
33. *pygmaea* (Theobald, 1903). Apparently first specifically recorded from the island by Lane (1953:773). Uncommon, but easily confused with *jamaicensis*.

Subgenus *Janthinosoma*

34. *ferox* (Humboldt, 1819). First recorded from the island as *posticata* by Howard, Dyar and Knab (1917:552). Apparently rare as elsewhere in the West Indies.
35. *johnstonii* (Grabham, 1905). Recorded here for the first time. Apparently very localized but occasionally abundant.

Genus *Aedes*Subgenus *Ochlerotatus*

36. *hemisurus* Dyar & Knab, 1906. First recorded from the island as *scapularis* by Howard, Dyar and Knab (1917:787). Widespread and apparently not uncommon locally in temporary pools.
37. *pertinax* Grabham, 1906. First recorded from the island under this name as well as *nubilus* (for dark specimens) by Howard, Dyar and Knab (1917:794,723). Usually found in association with *hemisurus*.
38. *sollicitans* (Walker, 1856). Recorded here for the first time on the basis of 18 females in 2 collections from Dajabon and El Limon, Dominican Republic and a collection of immature stages from the vicinity of Port-au-Prince, Haiti. Apparently restricted in distribution, but probably locally abundant in salt marshes and mangrove areas.
39. *taeniorhynchus* (Wiedemann, 1821). First recorded from the island as *niger* by Howard, Dyar and Knab (1917:675). Apparently not a major pest as elsewhere in the West Indies, but probably locally abundant in salt marshes and mangrove areas.
40. *tortilis* (Theobald, 1903) complex (*balteatus* Dyar & Knab, 1907). Originally described from the island as *balteatus*; exact taxonomic status not determined. Apparently widespread but not common; very few rearings obtained during survey.
- *41. *calumnior* Belkin, Heinemann & Page, 1970 from Jamaica and Grand Cayman, or *obturator* Dyar & Knab, 1907 from the Bahamas and Mona Island. One of these species or a similar form is likely to be found on Hispaniola.

Subgenus *Gymnometopa*

42. *mediovittatus* (Coquillett, 1906). Originally described from the island; recently removed from the subgenus *Finlaya* to the monotypic *Gymnometopa* by Zavortink (1972:72). Widespread and common in treeholes and rockholes, and occasionally in bamboo.

Subgenus *Howardina*

43. *albonotatus* (Coquillett, 1906). Originally described from the island. Widespread and common; breeding principally in leaf axils of heliconias, aroids and bromeliads but also found in bamboo, treeholes, fallen leaves and nuts, and artificial containers.

Subgenus *Stegomyia*

44. *aegypti* (Linnaeus, 1762). First recorded from the island as *calopus* by Howard, Dyar and Knab (1917:839). This ubiquitous introduced domestic and peridomestic species is probably more widespread on the island than our collections indicate. It was found breeding in rockholes as well as in artificial containers.

Genus *Wyeomyia*

45. *mittchellii* (Theobald, 1905) (*ochrura* Dyar & Knab, 1906; *glaucocephala* Dyar & Knab, 1906; *abia* Dyar & Knab, 1908). Originally described from the island under the above synonyms; type locality of *abia* erroneously stated to be Dominica (see Belkin, 1970). The most common and widespread sabethine on the island; breeding in leaf axils of aroids (*Xanthosoma* and *Dieffenbachia*), bromeliads and heliconias.
46. *nigritubus* Galindo, Carpenter & Trapido, 1951. Recorded here for the first time from a single collection in bamboo along Rio Catalina in El Seibo Province, Dominican Republic.
47. *sororcula* Dyar & Knab, 1906 (*fratercula* Dyar & Knab, 1906). Originally described from the island under the above names; *fratercula* erroneously from Martinique (see Belkin, 1970). There are at least 3 species of the *sororcula* complex in the Dominican Republic breeding in bromeliads, heliconias and aroids. All of these will run to *sororcula* in the keys in "The Culicidae of Jamaica." Which one of these is the true *sororcula* has not been determined at this time.
48. *sororcula* complex, sp. 1. See above under 47.
49. *sororcula* complex, sp. 2. See above under 47.

Genus *Limatus*

50. *hoffmani* Root, 1927. Originally described from the island. Apparently rare; not found during our surveys.

Genus *Sabethes*Subgenus *Sabethes*

51. *bipartipes* Dyar & Knab, 1906. Originally described from the island and collected at least 4 times in the past; 3 of these collections in Haiti. Apparently rare; not found during our surveys.

Genus *Toxorhynchites*Subgenus *Lynchiella*

52. *portoricensis* (von Röder, 1885) [*haitiensis* (Dyar & Knab, 1906)]. Originally described from the island as *haitiensis*. Widespread but not common; collected primarily in tree-holes, once each in bamboo, rockhole, coconut shell and heliconia axil.

SUBFAMILY CHAOBORINAE

53. *Corethrella appendiculata* Grabham, 1906. First recorded from Hispaniola by Dyar and Shannon (1924:216). Apparently uncommon.
54. *Corethrella* sp., bromeliad form. Possibly the same or related to species breeding in

bromeliad axils in Puerto Rico.

55. *Corethrella* sp., rockhole form. Apparently an undescribed species.
56. *Corethrella* sp., ground pool form. The identity of the single larva collected cannot be determined at this time.
- *57. *Sayomyia* sp. A species of this genus probably occurs on Hispaniola as elsewhere in the West Indies.

SUBFAMILY DIXINAE

58. *Dixella* sp. Known only from a single female whose identity cannot be determined at this time.
59. *Mesodixa* sp. Known only from 5 larvae and 1 pupa in a single collection.

ERRONEOUS RECORDS AND CORRECTIONS

The following corrections should be made in the world catalog (Stone, Knight and Starcke, 1959) and/or Porter's check list (1967) for records from Hispaniola:

1. *Uranotaenia sapphirina* = *socialis*
2. *Culex bisulcatus* = *antillumagnorum*
3. *Psorophora cingulata* = *infinis*
4. *Psorophora confinnis* = *jamaicensis*
5. *Aedes scapularis* = *hemisurus*
6. *Aedes serratus* = *pertinax*
7. *Aedes (H.) busckii* (Coquillett, 1906). This species occurs only in the Lesser Antilles. The record from the Dominican Republic should be eliminated as it is due to an error in the statement of the type locality in the original description as San Domingo instead of Dominica Island (Howard, Dyar and Knab, 1917:862).
8. *Wyeomyia medioalbipes* = *mittchellii*. The name *medioalbipes* does not appear in Porter's general list of species but is included questionably in the list of species for the Dominican Republic together with *mittchellii*. The confusion is probably due to an anticipation of Stone's (1969:3) synonymy of *mittchellii* with *medioalbipes*. We do not accept this synonymy (see Belkin, Heinemann and Page, 1970:208).
9. *Wyeomyia ulocoma* = *mittchellii*. The record of *ulocoma* from the Dominican Republic is probably due to an error in the inclusion of some larvae of "*ulocoma*" from Trinidad among larvae of *ochrura* (= *mittchellii*) both collected by August Busck (Dyar and Knab, 1906a:229, 1906b:140; Dyar, 1924:106; Belkin, Heinemann and Page, 1970:208). No

species of the *ulocoma* type is known from the West Indies and this record should be removed.

10. *Wyeomyia vanduzeei* = *sororcula*. The records of *vanduzeei* from Hispaniola are based on the former synonymy of *sororcula* with *vanduzeei* Dyar and Knab, 1906. Belkin, Heinemann and Page (1970:212) removed *sororcula* from this synonymy. True *vanduzeei* apparently does not occur on Hispaniola.
11. *Toxorhychites guadeloupensis*. The record from Haiti appeared first in Lane (1953:127). It is undoubtedly due to either a *lapsus* or a misidentification as no specimens of *guadeloupensis* from the Greater Antilles have been found in any museum. This record should be eliminated.

REFERENCES

- Aitken, Thomas H.G.
1940. The genus *Psorophora* in California (Diptera, Culicidae). *Rev. Entomol.* 11:672-682.
- Belkin, John N.
1970. Corrected type localities for *Wyeomyia abia* D. & K., 1908 and *W. fratercula* D. & K., 1906. *Mosq. Syst. Newsl.* 2:57-58.
- Belkin, John N., S.J. Heinemann and W.A. Page
1970. The Culicidae of Jamaica (Mosquito Studies. XXI). *Am. Entomol. Inst., Contrib.* 6(1). 458 p. (Also published as *Inst. Jam., Bull. Sci. Ser.* 20)
- Dyar, Harrison G.
1924. Notes on the sabethids of the West Indies (Diptera, Culicidae). *Insecutor Inscitiae Mens.* 12:104-107.
1928. The mosquitoes of the Americas. Wash., Carnegie Inst. Wash. (Publ. 387). 616 p.
- Dyar, Harrison G. and F. Knab
1906a. The larva of Culicidae classified as independent organisms. *N.Y. Entomol. Soc., J.* 14: 169-230.
1906b. Diagnoses of new species of mosquitoes. *Biol. Soc. Wash., Proc.* 19:133-142.
- Dyar, Harrison G. and R.C. Shannon
1924. The American Chaoborinae (Diptera, Culicidae). *Insecutor Inscitiae Mens.* 12:201-216.
- Howard, Leland O., H.G. Dyar and F. Knab
1915. The mosquitoes of North and Central America and the West Indies. Vol. 3. Systematic description (in two parts). Part I. Wash., Carnegie Inst. Wash. (Publ. 159). p. 1-523.
1917. The mosquitoes of North and Central America and the West Indies. Vol. 4. Systematic description (in two parts). Part II. Wash., Carnegie Inst. Wash. (Publ. 159). p. 525-1064.
- Komp, William H.W.
1942. The anopheline mosquitoes of the Caribbean Region. *Natl. Inst. Health, Bull.* 179. 195 p.
- Lane, John
1953. Neotropical Culicidae. Sao Paulo, Univ. Sao Paulo. 2 vol.
- Porter, John E.
1967. A check list of the mosquitoes of the Greater Antilles and the Bahama and Virgin Islands. *Mosq. News* 27:35-41.

Root, Francis M.

1927. Note on the mosquito fauna of the Republic of Haiti. *Am. J. Hyg.* 7:463-469.

Rozeboom, Lloyd E. and W.H.W. Komp

1950. A review of the species of *Culex* of the subgenus *Melanoconion* (Diptera, Culicidae). *Entomol. Soc. Am., Ann.* 43:75-114.

Stone, Alan

1969. Bredin-Archbold-Smithsonian biological survey of Dominica: The mosquitoes of Dominica (Diptera: Culicidae). *Smithson. Contrib. Zool.* 16. 8 p.

Stone, Alan, K.L. Knight and H. Starcke

1959. A synoptic catalog of the mosquitoes of the world (Diptera, Culicidae). Wash., Entomol. Soc. Am. (Thomas Say Found., vol. 6). 358 p.

Zavortink, Thomas J.

1972. Mosquito Studies (Diptera, Culicidae). XXVIII. The New World species formerly placed in *Aedes* (*Finlaya*). *Am. Entomol. Inst., Contrib.* 8(7). 206 p.