

### THREE NEW ANOPHELINE RECORDS FROM NEW GUINEA

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#### *Anopheles karwari* (James)

Although widely distributed in the Oriental Region, this species has not previously been recorded with certainty from New Guinea or elsewhere in the Australasian Region. Its nearest point of occurrence as recorded by Swellengrebel and Rodenwaldt (1932 p. 188), was in western Celebes, and these authors mention it (p. 85) as "doubtfully found in New Guinea." The finding of the species in considerable numbers at Hollandia, in northern New Guinea, during 1945, is, therefore, of interest.

The first specimen collected by the present writers was obtained on January 20, 1945, when one female was identified in a light-trap collection from a large rain-forest clearing about two miles east of Lake Setani. At the same time we were informed by K. L. Knight and L. E. Rozeboom of their capture of a single female the previous day at a location about fourteen miles away. On March 16, a few larval specimens of *karwari* were brought to our laboratory by W. A. Shelton and a subsequent investigation of the location from which they were obtained showed a heavy infestation of adults of the species. The writers are indebted to Sergeant Shelton for assistance in the observations on its habits reported below.

The area was a rolling plateau about four miles north of the eastern end of Lake Sentani, at an elevation of about 500 feet. Beginning about 200 yards from a small military camp (the 161st Photo Signal Laboratory) was a treeless, grassy bog about a half mile long by a quarter mile wide largely covered with water a few inches deep. This bog was judged to be the principal source of large numbers of *A. karwari* adults that were found around the camp, but, unfortunately for purposes of study, was being treated with oil for anopheline control. Larvae were to be found only in pockets that had been missed by the spraying crews and most of these larvae were small. Difficulty was experienced in rearing this species to the fourth instar or to the adult stage for identification. During the period from March 16 to May 6, a total of 134 anopheline larvae and pupae were obtained by dipping over the area, of which 29

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fourth instars and 25 reared adults (14 males and 11 females) were identified as *karwari*. These were taken in sunlit wheel ruts along the edge of the bog, in shell holes, and in natural depressions, all with clear water. A few more were also obtained in the shallow water in the bog around grass stems and pitcher plants. Agitation and muddying of the water in the wheel ruts brought more larvae to the surface than could be obtained by collecting from the undisturbed water. Although these unshaded waters appeared favorable for the breeding of the subspecies of *A. punctulatus*, only four larvae of *A. p. farauti* were taken on one occasion from a natural grassy pool.

In April, several foxholes were dug in the field for study and were left unsprayed. During the first two weeks about 55 anopheline larvae, mostly small, were collected from these holes, and three females of *A. karwari*, one female of *A. p. farauti*, and one male of *A. p. punctulatus* were reared from these. The third week about 50 larvae were taken, all of which were identified as *A. p. punctulatus*.

Besides the anophelines, larvae of *Culex whitmorei* were taken in the pools of the bog and were sometimes the only species present. *Culex halifaxi*, *C. pullus*, and a species of the *C. vishnui* group were also taken on occasion.

At the military camp about 200 yards from the edge of the bog, numerous adults of *karwari* were found at night in lighted tents on almost all inspections made by Sergeant Shelton during the period of investigation from March to June. As many as 116 were collected in one tent between 7:30 and 8:30 p. m., 85 another night between 9:30 and 10:30, and 89 on a third night between 6:30 and 8:00. Except for a single male, all adults were females. They began entering the tents when the lights were turned on at dusk (about 5:50 p. m.) and seemed to reach a maximum soon afterwards. Heavy winds at this time reduced the numbers entering the tents but light rains apparently did not. The females seemed to be strongly attracted to lights as they rested immobile on the tent walls nearest the lights and moved reluctantly when disturbed. They were noticed to disperse when the lights were turned off. During one night when observations were made in one tent at varying intervals, 25 adults were counted on the tent walls at 6:25, 56 at 6:40, 47 at 7:20, 94 at 8:15, 20 at 10:35, and 10 at 10:50. After the lights had been turned off at 11:00, 7 were counted in the tent at 11:15, 20 at 11:55, 2 at 12:10, 5 at 2:00 a. m., and 2 at 4:00 a. m. Most of the specimens noted after the tent was darkened were resting on mosquito nets covering several sleeping men. During the daytime, very few resting *karwari* could be found in any of the tents.

That *A. karwari* is a rather silent and painless biter is indicated by the discrepancies between the statements of the men living in these tents and observations of the mosquito's biting habits. The men maintained that they were not bothered by mosquito bites in the evening, although several spoke of small welts which were attributed to such bites. From personal observation, Sergeant Shelton reported that the females bit quite readily but were wary and easily disturbed. During the evening referred to in the preceding paragraph, with several men sitting around in their shorts, 14 bites were recorded between 5:45 and 11:05 p.m. On another night, eight bites were noted during the same period. When the lights were turned out, biting activity increased. Most of the biting occurred about the ankles. Examination of mosquito nets after the men had retired sometimes showed females attempting to bite parts of the body touching the nets. In a few attempts to feed specimens, both wild-caught and reared, placed in cages, none could be induced to bite.

*A. karwari* has not been recorded in the literature as a natural vector of malaria although laboratory infection of the species has been reported. In dissections of 119 females from the location mentioned above, none was found to harbor malaria parasites (Tofaleti and King, 1946, in ms.).

*Anopheles lungae* (Belkin and Schlosser, 1944)

This species, which was recently described from Guadalcanal in the Solomon Islands, was taken at Hollandia by the junior author and Staff Sgt. Walter Christ in May, 1945. Larvae were found in a few densely shaded, muddy hog wallows in a sago swamp near Poe village on the south side of Lake Sentani, and adults were reared from them. Sixteen larvae were taken the first time, but none was found on four subsequent visits. On the fifth visit two larvae were taken under conditions similar to the above. In the pools at the time of the first visit were larvae of a species of *Aedes* (*Aedes*). Taken with the last collection were specimens of *Bironella gracilis* and a species of *Culex* (*Lophoceraomyia*). No adults of *lungae* were taken in houses in the native village about 200 yards from the breeding place, although large numbers of *Anopheles punctulatus punctulatus*, *A. p. farauti*, and their intermediate forms were present in the houses. Morphologically, both the adults and larvae are very similar to the species as described by Belkin and Schlosser and to specimens sent by them to the present writers from the type locality. Minor differences noted were that in our material the white ring at the tip of palpal segment 3 in the female is about twice as long as in the Guadalcanal specimens, and hair 11 of the larval

propleural group is single in some specimens and branched from 2 to 4 times in others, instead of having from 3 to 5 branches as described for *lungae*. These differences seem too slight to warrant separation of the two as possible subspecies without having larger series for comparison.

*Anopheles punctulatus* ?var.

One female of what appeared to be a new variety of the *punctulatus* series of *Anopheles* was obtained in a light-trap collection on the night of April 19, 1945. The trap was operated at the edge of a rain forest a few hundred yards from the location at which the first specimen of *A. karwari* was taken. The writers are informed that a specimen of possibly the same form was collected in another area at Hollandia by members of a Naval malaria control unit recently described as *A. clowi* by Rozeboom and Knight (1946).

The palpus of our specimen is typical of the *punctulatus* series in having a pale ring followed by a narrow dark ring on the apical half of segment 3. The proboscis resembles that of some specimens of the "intermediate" form in having an elongate, pale-scaled spot ventrally on the apical third of the labium. The most apparent difference from other forms of this group occurs in the markings of the tarsi, the last four segments of the fore and mid tarsi and the last three of the hind tarsi being entirely yellowish-scaled except for narrow basal dark rings on each segment and an additional small dark spot sub-bassally on segments 2 or 3 in some cases. While the tarsal pale scaling varies considerably in other forms of this group, it seems to be more extensive in this specimen than in the extremes previously noted in the other forms. The wing fringe has a longer pale-scaled area, which extends from the tip of vein 5.1 to the tip of the anal vein. The spotting of the wing veins appears rather typical of the group and vein 1 has about twelve dark spots, two of which are based of the presector dark area.

### References

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