

## DIURNAL SWARMS OF *CULEX TERRITANS* WALKER, AND THE CREPUSCULAR SWARMING OF *AÈDES* ABOUT A SMALL GLADE IN ALASKA

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Recent publications on swarming of male malaria mosquitoes (Belkin *et al.*, 1951; Muirhead-Thomson, 1951; Senior-White *et al.*, 1953; Wharton, 1953) reaffirm, it seems to us, the direct relationship between swarming and mating, which was challenged by Nielsen and Greve (1950). The shocking paucity of knowledge on the habits of adult male mosquitoes is underlined. To observe the totally unrecorded swarming and mating of the commonest Malayan *Anopheles*, for example, Wharton had only to step out "on the open lawn in front of the Institute (for Medical Research) bungalow" where, we are told, *A. philippinensis* swarms "with few exceptions were found on every night throughout the year when they were sought." Nevertheless, actual observation of mating mosquitoes in the brief tropical twilight is extremely difficult (Senior White, l. c., p. 171).

The purpose of this communication is to contribute to knowledge from Alaska where swarms are also commonplace and rather more easily observed in the persistent subarctic twilight. Mating at very high rates has been observed in Alaskan swarms (Frohne & Frohne, 1952). In contrast to the brief swarming period characteristic of tropical mosquitoes, northern species commonly swarm an hour or more. Bates (1949) suggests that strictly diurnal mosquitoes (tropical), whose habits might be observed in the light of day, probably do not swarm. It is therefore of interest to report *diurnal* swarms of an Alaskan mosquito, *Culex territans*, which we encountered in the afternoon while watching mating swarms of the blackfly, *Simulium venustum*.

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Location of an area in which to study swarming conveniently near to camp was done by guesswork early in the spring. We were unfamiliar with the region before the spring mosquito larval survey. The small study area near Chitina, which was subsequently inspected for swarms on favorable evenings all summer, was selected in May when wigglers of the rare and local *Aedes pseudodiantaeus* Smith, 1952 were dipped in an adjacent quaking bog. We were not rewarded with swarming of *pseudodiantaeus* but there were swarms of *Aedes communis* and *A. canadensis*, and of several dance flies, midges, and a crane fly in a glade amongst willow alders, and spruces. *Aedes excrucians* swarmed close by the bog, but, so far as we know, only on the evenings of June 20 and 21. The afternoon swarms of *Culex territans* took place about half mile away on a bluff overlooking the Copper and Chitina rivers. Since further observations at Chitina will be delayed for several years it appears worthwhile to record our preliminary findings.

*Culex territans*, DIURNAL SWARMS. We have seen no references to swarming of any of the *Culex apicalis* Adams complex. Marshall (1938) stated "no information appears to be obtainable." Six swarms were observed August 27 and 28 in the afternoons on the slopes of the Copper River bluff above three pale-leaved scrub willows and a clump of poplar sucker. The earlier date there were three swarms over particular isolated willows, two of which were sites used again on the 28th. The swarms had a definite focus just over the bushes but individual mosquitoes moved up and down from about 7 to 10 feet above the ground at the foot of the tree. These males emerged from and retreated into the foliage below. No females

ere seen. Although the largest swarm numerically had 40-50 participants for 3-30 minutes of the swarming period—before 3:30 p.m. (Alaska Standard Time)

5:45—the swarms were usually very small. About three to six mosquitoes were constantly changing off with others from slow to maintain the swarm. Netting the active males had no lasting effect; the swarm reappeared in a minute or two. All swarms broke up or played out entirely before 6 p.m. both days.

Weather was similar on August 27 and 28 except that it was warmer, 17 degrees at the ground at 5:30 p.m. August 27, and cooler, 13 degrees, the following afternoon. After heavy night rains, morning sunshine preceded afternoon cloudiness with scarcely any breeze. There was no sunshine either afternoon but light reflection from the white clouds was considerable. Insect activity on the bluff was unusually great that day and included swarming of the blackfly, *Simulium venustum*.

The peak of *C. territans* emergence in the region occurred about July 15, more than a month before these observations were made. It is not unlikely that these small swarms were relicts composed of old males. No later mosquito swarms were found August 29-September 2 when traps set in.

**SWARMS OF *Aedes communis*.** The most abundant mosquito of the area was seen swarming four evenings in the latter half of June in a secluded recess of the margin of the glade among alders, willows, and a high spruce. Wesenberg-Uttle (1920-21) has described similar little swarms in the "deep shadows of the trees." He saw such swarming and mating "at every time of day."

On June 16 at about 8:30 p.m. a small swarm of approximately 15 males was found in the glade recess at 8-10 feet elevation. It persisted until nearly 9:15. Observation was difficult, but two un doubted mating pairs were seen, one of which was secured. After a light rain in early afternoon the evening had been warm and calm.

Upon our return June 19 at 8:15 p.m. after a two-day absence, a dance fly, *Rhamphomyia* sp., was caught carrying a male mosquito near a much larger swarm of 50-100 males at the identical site. Mating was seen in this swarm; 15 pairs were counted in 20 minutes. Instead of flying upwards like *Aedes punctor*, the copulating pairs of *communis* dropped through the swarm. Quite possibly other pairs departing laterally in the foliage were overlooked. The weather was fine with a bright sunset, no wind, and thunder-showers in early afternoon, but the evening was cool: 11 degrees C. at 8:20, and 8 degrees at 9:35 when swarming stopped.

June 20 was warm before afternoon showers led to a cool evening: 12 degrees C. at 8 p.m., 9 degrees at 9:30. *Communis* swarmed as before with 30-40 males active at any moment for over an hour, but there appeared to be no mating.

June 21 was a hot afternoon (exceeding 30 degrees C.), cooled by brief thunder-showers. The evening was again cool: 14 degrees C. at 8:30, 10 degrees at 9:30. The swarm was consistently larger than the day before, but only three copulations, one with a supernumerary male interfering, were observed in 15 minutes close watching. The glade was not visited again until June 27, a windy evening with no swarms. Finally on June 28 at 8:45 p.m. an ultimate, lone male *communis*, swarming alone at the site was taken.

***Aedes excrucians* SWARMS.** In a paragraph on male swarming habits of mosquitoes at Whitehorse, Dyar (1920, cited in Bates, 1949) refers to "an occasional *excrucians*, high up and flying wildly." We have found no other references to swarming of *excrucians*.

On June 20 at 9:50 p.m. after cessation of *communis* swarming at the glade, two large *excrucians* swarms of several hundred males each were observed in a clearing about 40 yards from the quaking bog. These males were presumably relatively young because larvae of the species were still common in the bog June 3. The grass and weeds in the clearing were

scarcely more than a foot high and no bushes or other objects stood in any apparent relationship to the swarms which were moving about horizontally over radii of 8 or 10 feet. The foci were relatively high, 10-20 feet. Visibility was unfortunately low, but in collecting specimens two copulating pairs were distinctly seen, and one of the females was caught. The pairs both descended slowly, i.e. there was evidently no nuptial flight, although copulation began high in the air. It was cool: 9 degrees C. at 9:30 (cf. weather of that date under *communis*).

The following evening *excrucians* swarms were sought all around the bog periodically from 8 to 9:30 when a large diffuse swarm of several hundred males materialized at the clearing site of the night before. However, this third swarm had no persistent focus at all. Transitory concentrations involving hundreds of males came together and dispersed at various points over a radius of 20-30 feet and usually 10-12 feet in the air. These males were all "flying wildly," and they produced an audible hum. Conditions for observing were unfavorable. No mating was seen. The site was next visited June 27 and then checked from time to time in July and August but no other *excrucians* swarms were found.

*Aedes cataphylla*. Dyar (1928, cited in Bates, 1949) reported "the males swarm high over spaces between bushes or small trees in open country." To Wesenberg-Lund (1920-21) *cataphylla* swarmed precisely like *communis* (v.s.).

The larval dipping showed *cataphylla* adults were already on the wing late in May, but it was not until July 18 that a swarm of this species was found. At 8:40 p.m. about 30 males were swarming 12-15 feet above the ground in the identical recess of the glade where *communis* had swarmed nearly a month before. There was no mating, apparently, so that it is reasonable to assume the swarm was a non-functional one composed of old males. It was a cloudy day with a moderate, variable wind, rather cool but still 11.5 degrees C. at 9 p.m. There was intense

insect activity, manifested especially by mosquitoes, that evening. No other swarms of *cataphylla* were found, but on July 20 an individual male was caught in the glade recess rising and falling in the typical swarming behavior.

**SUMMARY.** Repeated inspections for male mosquito swarms were made at sunset around a small bog near Chitina, Alaska during the summer of 1953. The following crepuscular species were observed swarming:

- (1) *Aedes communis*, the latter half of June, in a secluded recess of a small glade;
- (2) *Aedes cataphylla*, about a month later, in the same location;
- (3) *Aedes excrucians*, June 20 and 21 in a large, open clearing.

Copulation at low rates was seen in some of the swarms of *Aedes communis* and *excrucians*.

While observing afternoon swarms of the blackfly, *Simulium venustum*, late in August diurnal swarms of the mosquito *Culex territans*, were discovered. The mosquito, at least as to swarming of males is apparently non-crepuscular.

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