INTERSEXES IN *AEDES NIGRIPES* (ZETT.) (DIPTERA:CULICIDAE) [1]

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Intersexes in arctic and subarctic mosquitoes have been produced in the laboratory by rearing larvae at temperatures higher than those which these species normally experience in the field (Anderson and Horsfall, 1963; Brust and Horsfall, 1965; Brust, 1966). In *Aedes nigripes* (Zett.), an arctic species, intersexes have been collected in nature at Baker Lake (64° N.L.), Northwest Territories. It is assumed that these intersexes were caused by an increased developmental temperature occurring in an arctic pool, but this does not exclude other possibilities.

Adults of *A. nigripes* were actively flying from 0600 hrs. to 2300 hrs. during July 21–28, 1965. One intersex landed on the author's clothing and was collected with a small aspirator. Although the intersex had female oral stylets, it did not take blood. It fed on a dilute honey mixture for 8 days but laid no eggs.

Adults of *A. impiger* (Walker) were also collected but no intersexes were observed. The larvae of *A. impiger* and *A. nigripes* had all completed their development by July 21 in the immediate area around Baker Lake. Employees at the Department of Transport Station had observed the first mosquito adults in 1965 on June 30 so it is quite possible that emergence of both species was completed before the middle of July. Both *A. nigripes* and *A. impiger* occur at Lake Hazen (81° N.L.), and their development period there would be considerably later in the season. Nonetheless, the flying season of *A. nigripes* at Lake Hazen in 1963 began on July 8 and 50 percent of the total male population for that year was obtained by July 17 (Corbet 1965).

Male adults were scarce at Baker Lake by July 21, but 32 males were collected on the leeward side of buildings. Amongst the males collected on the walls of the building, one intersex of *A. nigripes* was observed. The maxillary palpi were normal but the hypopygium was unrotated. This individual was kept alive for 7 days on honey, but the hypopygium failed to rotate.

RESULTS AND DISCUSSION. The first intersex of *A. nigripes* had abbreviated male maxillary palpi (Figures 1, 2). Each palpus consisted of 4 segments instead of the normal 5, and was approximately one-third as long as the proboscis. Both palpi were similar to the palpi of adults of *A. communis* (Michigan population) when larvae were reared at 23° C. (see Brust and Horsfall, 1965). The oral stylets were of female form and included two maxillae, two mandibles, a hypopharynx, and a labrum.

The antennae were mainly male (Figure 2). Some degree of feminization occurred in the distal sections of the flagellar segment. Sections 12 and 13 were shorter than those in a normal male. Sections 8, 9, 10 and 11 were heavily sclerotized at their proximal ends, similar to those of *A. communis* when larvae were reared at 21° C. (Brust and Horsfall 1965).

The tarsal claws of the prothoracic and mesothoracic legs were of male form on both the right and left sides.

The external parts of abdominal segments 9 and 10 consisted of a pair of female cerci, a female postgenital plate, and a pair of rudimentary male basistyles (Figure 3). The basistyles consisted of two lobes which were ventral to the cerci, similar to those observed in adults of *A. communis* when reared at 23° C. (Brust and Horsfall, 1965). The ventral lip of the genital opening was in turn ventral to the rudimentary basistyles.

The internal organs of reproduction

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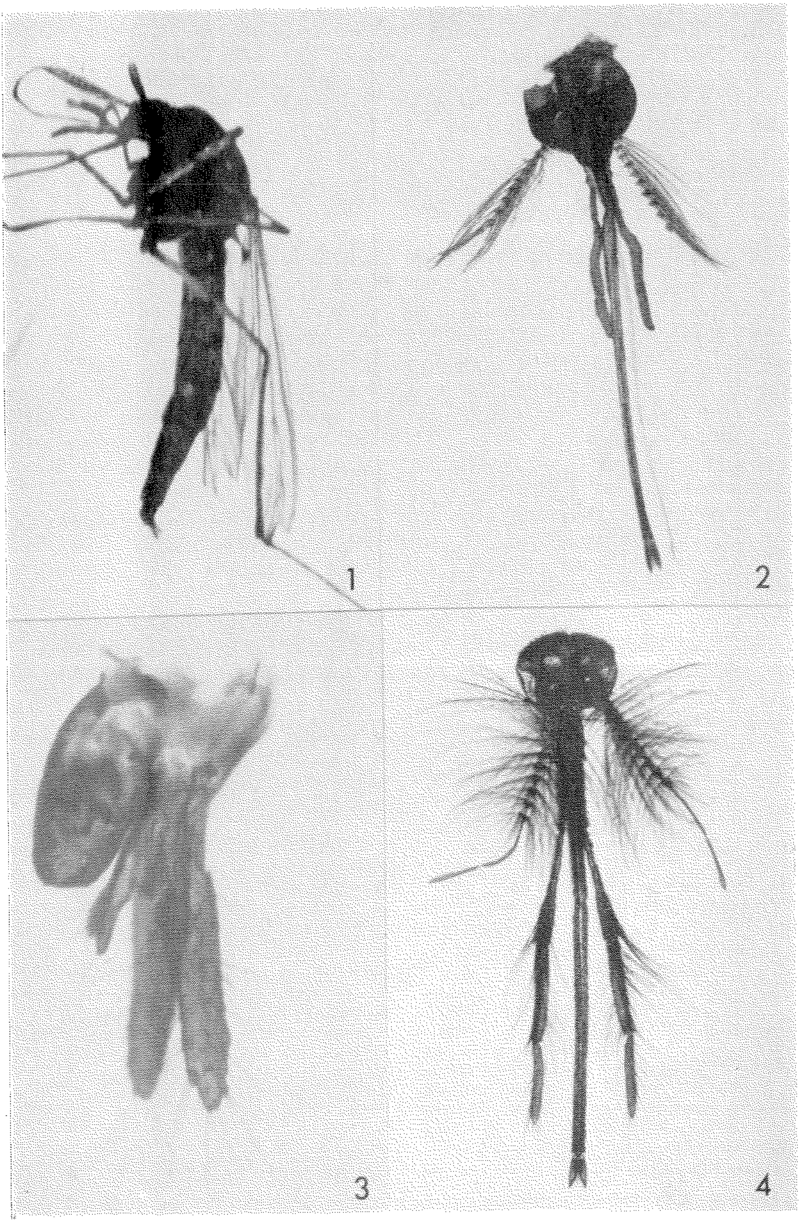

FIGS. 1–4.—Intersexes of *A. nigripes.*

FIG. 1.—Intersex showing suppressed maxillary palpi and feminized genitalia. X10

FIG. 2.—Head of the same individual showing apparent male antennae, suppressed maxillary palpi and female maxillary stylets. X18

FIG. 3.—Genitalia of same individual showing female cerci and a postgenital lobe. Ventral in position to these is seen a rudimentary male basistyle. X120.

FIG. 4.—Head of a second intersex showing maxillary palpi and normal male antennae. X18

were of female form. No male structures could be found. The gonads were developed to Christophers' stage III (Christophers, 1960), with quite a heavy yolk deposit obscuring the nucleus. The egg follicle had an elongate shape.

The second intersex[2] (head Figure 4) had a masculine form. The hypopygium was unrotated when the individual was captured and remained so even after keeping it alive for 7 days. The male genitalia were similar to those of adults of *A. communis* reared at 21° C. (Brust and Horsfall, 1965). The paraprocts were reduced and in their place appeared blunt, hairy extensions which in *A. communis* give rise to female cerci.

The internal organs of reproduction were of male form. Both intersexes of *A. nigripes* were examined for mermithid parasites but none were found.

It is assumed that the intersexes of *A. nigripes* were caused by elevated rearing temperatures since increased developmental temperatures cause intersexes of the same type in arctic and subarctic species of this genus (Brust and Horsfall, 1965; Anderson and Horsfall, 1963). However, a mermithid parasite, *Hydromermis,* causes intersexes in chironomids (Rempel, 1940; Rempel *et al.,* 1962) but none have been reported to cause intersexes in mosquitoes.

The daily mean air temperature at Baker Lake during June was 2.8° C. and for July 10.6° C. in 1965. The highest June air temperature was 15° C. and this occurred on June 30; the highest July air temperature before July 18 or during the developmental period for these intersexes was 17.2° C. However it should be recalled that a developmental site may be insolated for nearly the entire day during the months of June and July in the arctic. Water temperatures can be considerably higher than air temperatures. During days of high insolation water temperatures ranging from 22°–25° C. were recorded in pools (8–12 inches deep) having a dark background, when the air temperature ranged from 10°–13° C. for the entire day. Water temperatures did not change appreciably when the air temperature rose to 25° C. Between air temperatures of 10°–25° C., at least, water temperatures appeared to be dependent upon the amount of insolation and wind speed, the latter presumably affecting the rate of evaporation cooling.

[2] A third intersex of *A. nigripes* was collected at Baker Lake on July 22, 1966. Both antennae were partly male; two rudimentary sclerites were attached to the dorsal lip of the genital opening in the position that rudimentary male basistyles occur in intersexes of *A. communis.* All other dimorphic structures were female. The spermathecae were without sperm; the ovaries were developed as in intersex one.

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