Breeding streams of Mayacnephia aguirrei (Diptera : Simuliidae) in Guatemala

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Research Note

Breeding streams of *Mayacnephia aguirrei* (Diptera: Simuliidae) in Guatemala*

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The genus *Mayacnephia* was established by Wygodzinsky and Coscarón (1973) for the Mesoamerican blackflies which were formerly considered to belong to the genus *Cnephia*. This genus contains six species, of which three have been recorded from Guatemala. Their distributions are confined to highlands of Guatemala and Mexico. Bionomics of this taxonomically interesting genus *Mayacnephia* is only poorly known.

Dalmat (1955) studied the physical and limnological conditions of the breeding streams for many Guatemalan blackflies including the three *Mayacnephia* species (which, in his study, were treated as part of *Cnephia*). No studies have since been made on the breeding streams for *Mayacnephia*. We collected many *M. aguirrei* immatures in an endemic area of onchocerciasis in Guatemala in the course of stream survey for vector species of the disease. This paper presents some features of the breeding streams for *M. aguirrei* which were identified through the observations made at that time.

Study Area and Methods

The study area is located to the southwest of the active volcano Pacaya in Department Escuintla, Guatemala. This area is the easternmost part of focus 3 of Figueroa's division (Figueroa, 1974) and survey area B in Yamagata *et al.* (1984). Its extent is about 77 km^2, and all mountainous. The water courses which were traced along and all 120 sampling sites are shown in Fig. 1. Of those sites, 78 were located in perennial streams and the remaining 42 in seasonal streams, where water runs only during the rainy season and for the subsequent one or two months (end of May through November or December). Samplings were conducted in 1978 and/or 1980. Larvae and pupae were collected with tweezers for 10–20 min, and were preserved in a 70% alcohol solution for identification in the laboratory.

Results and Discussion

The sampling sites with *M. aguirrei* immatures were confined to seasonal streams. This species occurred at 33 of the 120 sampling sites (Fig. 1). Thirty-one (93.9%) of the 33 *M. aguirrei*-positive sites were located in seasonal streams, which amounted to 73.8% of the 42 sites in seasonal streams. The remaining two sites (6.1%) were located in perennial streams, amounting only to 2.3% of the 78 sites in perennial streams. The number of larvae collected in the perennial streams was very small, and no pupae were found.

All the sites positive of *M. aguirrei* were located in the uppermost reaches of the streams or their side trickles at the altitude 800–1400 m. The breeding streams run through the forests and coffee plantations in steep and narrow valleys. The streams were often covered by canopies of trees extending from the slopes of both sides. At the plantations canopies of wild grown trees are made use of for the shading of coffee

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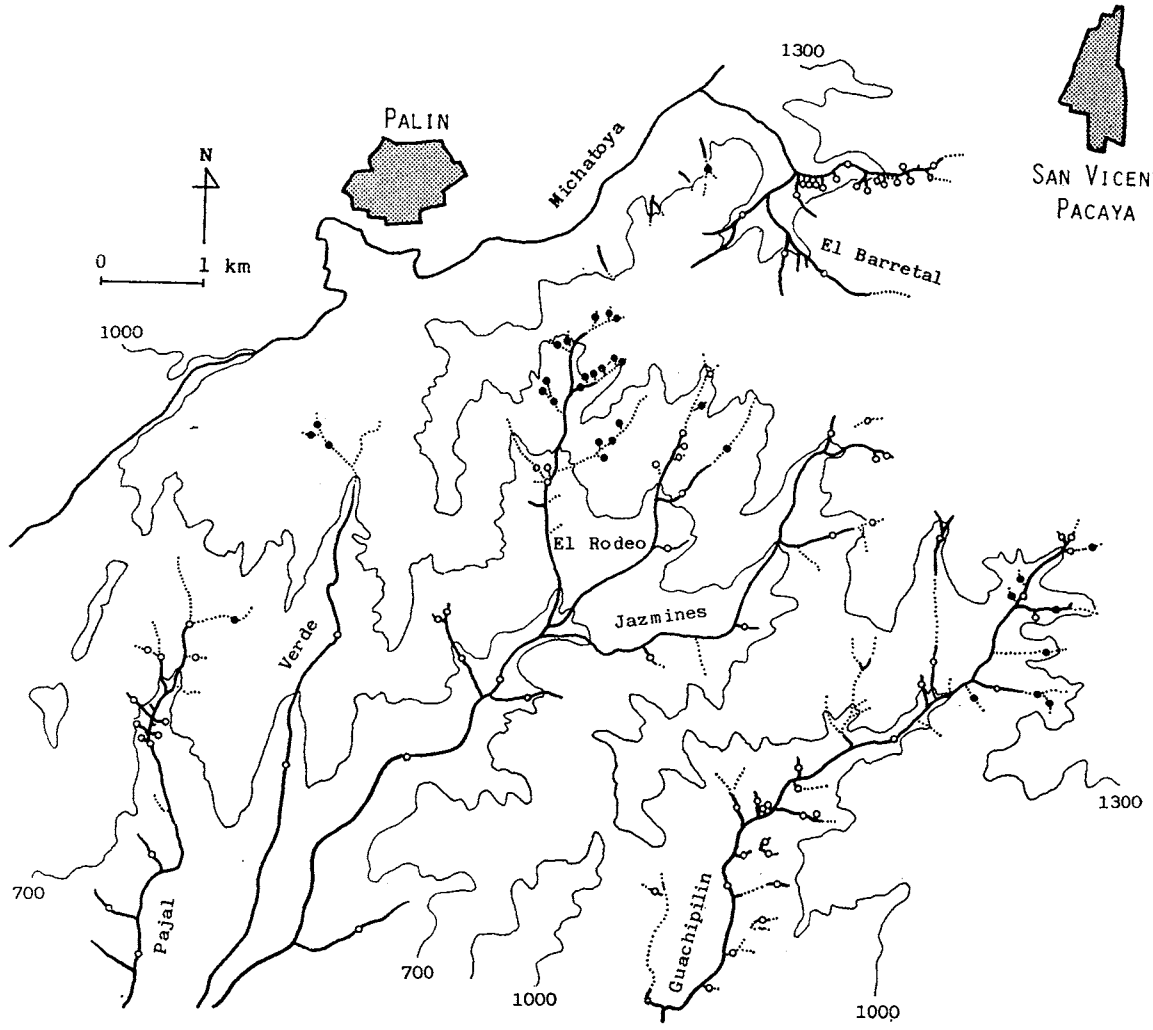

Fig. 1 Streams in the study area and sampling sites.
Thick solid and dotted lines indicate perennial and seasonal streams, respectively. Solid and open circles indicate *M. aguirrei*-positive and *M. aguirrei*-negative sites, respectively. Thin solid lines are contour lines. Numbers show altitude in meters.

plants. Stream bed was of basal rock, gravel, sand and mud. At many sites grasses grew above the surface of water. Larvae of *M. aguirrei* were found attached to basal rock, stones, tree leaves and grasses which were submerged.

The water flow in the breeding streams was unstable, particularly early in the rainy season. Stream discharge was usually 0.1–10 liters/sec but it easily changed corresponding with precipitation. At times flush water caused by heavy rain washed away the larvae with substrates of the streams. The *M. aguirrei* larvae collected in the perennial streams, therefore, may have been those drifted from the upper but temporary streams by such flushes. When precipitation was low the course of water was interrupted by subterraneous parts and *M. aguirrei* larvae were found in water pools and wet spaces between stones where there was only a small amount of water. Larvae of this species may be tolerant of the unstable water flow in such seasonal streams. They could be reared in a glass beaker (1000 ml) with a simple bubbling tool in an air-conditioned room (Okazawa, unpublished).

Although *M. aguirrei* alone occurred in the seasonal streams soon after the beginning of water flow (Okazawa, unpublished), repeated samplings at the same sites revealed that existence of this species predicted subsequent appearance of the vector or potential vector species of onchocerciasis, *Simu-*

lium ochraceum, S. metallicum and *S. horacioi*. The three species were invariably collected at each of all the eight sites positive of *M. aguirrei* in the Guachipilín Stream where repeated samplings were conducted.

M. pachecolunai and *M. roblesi* breed in minute trickles of water in Guatemalan highlands above 2100 m of altitude (Dalmat, 1955). Such rivulets usually dry up during November through March. *M. aguirrei* in the present study was also restricted to the seasonal streams. Two of the other three *Mayacnephia* species described from Mexico, *i.e., M. grenieri* and *M. atzompensis,* breed in cold and small highland streams (Díaz Nájera, 1962). The conditions of those streams are still unkown during the dry season. One remaining species, *M. mixensis,* was collected in a mountain stream, but there is little information on the conditions of the breeding stream. From those facts we can conclude that *Mayacnephia* species have a specific preference for small highland streams, and at least the three Guatemalan species occur only in seasonal streams. This is in contrast to the genus *Simulium,* which invaded into various types of streams at every altitude in Guatemala, showing little preference one way or the other.

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摘　要

グァテマラ共和国における *Mayacnephia aguirrei* の棲息河川

本種の幼虫は山間の標高800～1400mにある小さな流れで採集された．これらの川では雨期だけに水が流れ，乾期には干上がった．雨期の初めは水位が不安定で，時には出水によって幼虫がいなくなった．水位が下がって流れが寸断された時には，幼虫は水溜りや石の間の湿った場所にいた．本種を含め *Mayacnephia* 属の6種の幼虫は中米の高地の小流にのみ棲息する．このうちグァテマラに分布する3種はすべて，雨期だけに水が流れる川に出現する．