

Malaria Eradication in Ceylon

ONE of the most important vectors of malaria in India, and the only vector so far reported in Ceylon, is *A. culicifacies*. Afridi and Puri¹ reviewed the available literature relating to this species in India. Covell² lists the countries where this mosquito has been found, its breeding places, adult habits and relation to malaria. In India, this is reported to be a domestic species. James and Gunasekera³ were the first to find this species infected in Nature in Ceylon. Carter and Jacocks⁴ confirmed these findings. During the various regional epidemics that occurred in Ceylon during and since 1934, this was the only anopheline species found infected with malarial parasites. According to Carter (unpublished reports), *A. culicifacies* in Ceylon is domestic in its habits and has been captured in dwellings and in human-baited traps. It breeds profusely in the sand pools and rock pools in the beds of streams and rivers. The breeding places so far described were in the close vicinity of human habitations.

A scheme of country-wide residual spraying of DDT was inaugurated in Ceylon in 1945, and during the past four years a remarkable reduction in malaria endemicity has been brought about. Encouraged by these results, the question of total eradication of the vector species on the lines of work undertaken in Brazil, Egypt, Cyprus and Sardinia was seriously contemplated. But considerable doubts about the feasibility of undertaking total eradication were entertained for various reasons, one of which was the possibility of *A. culicifacies* breeding in jungle areas away from all human habitation.

In a preliminary survey carried out in 1948 in connexion with the Gal Oya irrigation project in the dry zone (annual rainfall of 50–75 in. with practically no rains during eight months of the year), a jungle area on the eastern side of Ceylon, L. F. Gunaratne (unpublished report) had found the larvæ of *A. culicifacies* in sand pools in the bed of the Gal Oya at a distance of more than a mile from the nearest human habitation. Before total eradication was undertaken, it was considered necessary to carry out further investigations into the breeding of this species in the jungle areas.

Two areas, one in the north-west and the other in the south-east parts of Ceylon, were selected, and an intensive search was made both for adults and for larvæ in the available water collections. In the north-western area, the search was confined chiefly to the sand and rock pools in the beds of two perennial rivers, all other ground-water having practically dried up at the time the search was made. In the south-eastern area, besides two rivers, there were small collections of ground-water such as pools, channels, swamps and tanks, which were searched. Thatched huts, 15 ft. × 15 ft. × 8 ft., were erected in both areas close to the banks of these rivers, and captures of adults were made continuously throughout the night, using human bait.

In the north-western area, 6,250 yards of the margins of the two rivers yielded 2,572 anopheline larvæ, of which 295 (11.4 per cent) were *A. culicifacies*. In numerous disconnected sand and rock pools with a total area of 1,210 sq. yd. were found 9,968 anopheline larvæ, of which 3,831 (37.9 per cent) were *A. culicifacies*. The nearest human habitation was at a distance of two to five miles from these rivers, which flow through dense jungle in which there was scrub as well as high forest forming

an impenetrable belt. A total of 247 anopheline adults, of which 123 (50.6 per cent) were *A. culicifacies*, were caught in 100 catching hours, some while in the act of feeding on human baits and others while resting on the thatch after the feed.

In the south-eastern area, 2,445 yards of river margins yielded 1,960 anopheline larvæ, of which only six (0.3 per cent) were *A. culicifacies*. Seventy sand and rock pools with a total surface area of 120 sq. yd. had 1,994 anopheline larvæ, of which 236 (11.9 per cent) were *A. culicifacies*. The nearest human habitations were at distances of four to seven miles from the sections of the rivers which were examined. Of the other collections of ground-water examined in this area, the only one which had a single larva of *A. culicifacies* was an earth channel taking off from a tank. Two catching stations, one at a distance of four miles from the nearest human habitations and the other at six miles, yielded 85 *A. culicifacies*, which is 87.6 per cent of a total of 97 adult anophelines caught in 40 catching hours.

There was no question of larval drift from upstream, for the pools which are the main breeding places were disconnected isolated pools. The adult-catching stations were put up in the midst of thick jungle into which adult *A. culicifacies* could not have been transported passively by vehicles, since no vehicles could be taken to these areas. Nor could they have infiltrated such long distances from the nearest villages through the thick belt of scrub and high forest. Further, a good many were freshly emerged adults with their wing markings intact. There is no reason to doubt that this species is breeding in the jungle at long distances away from human habitation. This finding is contrary to the views held hitherto that in Ceylon *A. culicifacies* is a domestic species living in close proximity to human habitation. In these circumstances, it is obvious that eradication of this species in Ceylon is not a practical proposition.

A detailed study of *A. culicifacies* in Ceylon will be reported elsewhere.

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¹ Afridi, M. K., and Puri, I. M., *J. Malaria Inst. India*, **3**, No. 1, 1 (1940).

² Covell, G., *J. Malaria Inst. India*, **5**, No. 4, 401 (1944).

³ James, S. P., and Gunasekera, S. T., *Sessional Paper 34* (1913).

⁴ Carter, H. F., and Jacocks, W. P., *Ceylon J. Sci.*, **D**, **2**, Pt. 2, 67 (1929).

An Improved Method for Mounting Mosquito Larvæ

THE successful preparation of permanent mounts of mosquito larvæ has for long been an arduous and uncertain operation; mounts in balsam are time-consuming and frequently unsatisfactory, while mounts in chloral gum media do not keep well in some climates. The most recent advance is the medium of Bhatia¹, consisting of pine rosin in eucalyptus oil, which is simple to use and gives a fair result. However, comparative tests of this medium against another which I have recently developed