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ON *ANOPHELES ALBITARSIS* LYNCH
ARRIBALZAGA IN PANAMA*

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Panama, R. de P.

The studies of recent years, particularly in Europe, on the epidemiology of malaria have demonstrated the importance of Anopheline races in the transmission of the disease. Evidence has been accumulating that in the New World also some of the species of *Anopheles* are divided into distinct races. Townsend⁵ (1933), referring to the work of Hackett, Martini, and Missiroli, stated:

"What we need in America, and particularly in South America, is work along similar lines on our *Nyssorhynchus* species. * * * It seems clear that we shall be able to define the *Nyssorhynchus* forms satisfactorily only by recognizing geographical and physiological races as separate entities and adopting them as our basis of treatment."

Anopheles albitarsis was first reported as being present in Panama by Curry¹ (1932), who said:

"It, too, may prove to be an important vector of malaria."

Later, after additional observations had been made, this author (1934) stated:

"*A. albitarsis* * * * is never taken on the wing or in houses or in the act of biting, even in the immediate vicinity of the most prolific breeding places. It seems to ignore man entirely as a source of blood."

During the past year I have fed *albitarsis* a number of times on man, and was impressed by the marked indifference exhibited by the females to human blood, even under experimental conditions. In contrast with this, in some areas in South America this species is considered to be a malaria vector. Root (1926) believed that epidemiological evidence suggested that it was a dangerous mosquito in Brazil. Davis² (1931) said:

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"The '*brasiliensis*' of Boyd was undoubtedly *A. albitarsis*, as was the '*brasiliensis*' found infected by Godoy and Pinto."

Kumm³ (1932), working in the City of Bahia, reported that

"Between March 27 and April 10, 423 adult *A. albitarsis* were captured in houses. * * * We dissected 240 midguts successfully and found oocysts in fourteen, or 5.8 per cent."

For more than a year I have collected *albitarsis* larvae

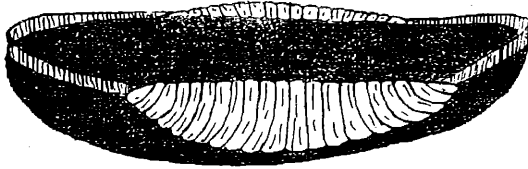


Fig. 1
A. albitarsis (Panama.) Dorso-lateral view.

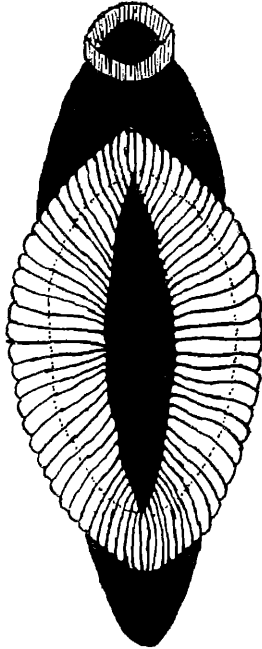


Fig. 2
A. albitarsis (Brazil). Dorsal view.
Redrawn from Root (1926).

at least once a month from patches of *Chara*, *Najas* and *Utricularia* in the southwestern arm of Gatun Lake, and at the same time several hundred eggs were collected, taken to the laboratory, and examined under the microscope. The eggs were identified by breeding out larvae from them, and by obtaining infertile ova from females which had been positively identified by the absence of a black ring on the fifth hind tarsal joint, and by the possession of the two rows of white scales on the first abdominal sternite.

In view of the fact that there seems to be a considerable discrepancy between the biting habits of the females of the Panamanian and Brazilian forms, it is of interest to point out that the eggs of the *albitarsis* of Panama are entirely different from those of the coastal Brazilian *albitarsis* described by Root (1926). According to this author, in the Brazilian form,

“* * * the floats of the two sides meet and fuse at their anterior and posterior ends,”

and there are from 34 to 38 float ridges. *Fig. 1* shows

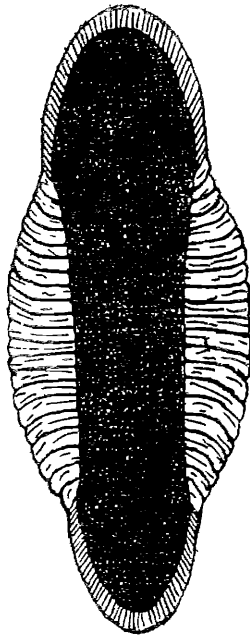


Fig. 3
A. albitarsis (Panama). Dorsal
view.

that in the Isthmian form the floats are small, widely separated and have approximately 20 float ridges. The broad frill, present on both the anterior and posterior parts of the egg, is continuous with the ends of the floats; it borders the dorsal surface and becomes gradually wider as it approaches the ends of the egg. It has no resemblance whatsoever to the peculiar crown-like structure pictured by Root. Finally, Root stated that in the *Nyssorhynchus* group

“* * * one finds the whole ventral and lateral portion of the egg studded with little white stars, each consisting of eight or ten lines radiating from an imaginary common center.”

Save for *tarsimaculatus* and *argyritarsis*, I have examined the ova of all the members of the *Nyssorhynchus* group of Panama, and all, with the exception of *albitarsis*, have rows of silvery spots on the ventral and lateral surfaces, which doubtlessly are Root's⁴ “little white stars.” In *albitarsis*, however, the dorsal, lateral and ventral surfaces are uniformly black.

The differences in the blood-feeding habits of Brazilian and Panamanian *A. albitarsis*, and the marked dissimilarity in the morphology of the eggs of this species in Panama as compared with that of the ova described by Root, indicate that *A. albitarsis* is divided into at least two separate races.

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DISCUSSION (Abstract)

Mr. W. H. W. Komp, U.S.P.H.S., Ancon, Canal Zone.—The late Nelson C. Davis, in an article on “Some South American Mosquitoes,” in Annals of the Entomological Society of Washington (**26**:280, 1933), describes the mosquito:

“In Plate 3 are represented the head and anterior part of the thorax of an atypical *arbitarsis* lava, together with a normal representative of the species. The anomalous condition is con-

ined to the clypeal hairs, the *albitarsis* larva having its internal clypeal hairs rising close together, as in *strodei* larvae. The adult female bred from this larva appeared to be normal in all respects.'

The locality from which the larva was obtained was Sao Salvador, Bahia, Brazil.

Davis's figure shows also a peculiar narrowing and elongation of the larval head, which he does not mention. In 1935, while in Colombia, at the headwaters of the Orinoco River, on the eastern slope of the Andes, I collected nine such larvae, from which I was fortunate enough to rear a male, as well as a series of females. This past September, while in Venezuela, in the delta of the Orinoco River, I found this form of *albitarsis* breeding in great numbers in shallow lakes, and in the same area took typical *albitarsis* larvae. I obtained males from each form, and the male terminalia are indistinguishable. So far as I know, we have only the typical form of *albitarsis* in the Canal Zone. Root's *albitarsis braziliensis* does not differ from the typical *albitarsis* larva in the clypeal hairs, as he says "the larval characters also agree with those of typical *albitarsis*, except that there seems to be a tendency for the outer anterior clypeal hairs to be a little shorter and with more lateral branches in variety *braziliensis*." (Studies on Brazilian Mosquitoes. I. The Anopheles of the Nysorhynchus Group. Amer. Jour. Hyg., 6:705, 1926.

Rozeboom's work, and my larval findings, open up the whole question of races in *albitarsis*. I have no doubt that other neotropical species, particularly *tarsimaculatus*, also split up into races or varieties, just as *maculipennis* does in Europe. A great deal more work is needed, particularly in South America, in order to determine, first, the presence of such races, and second, their relation to the transmission of malaria.

It may be well to point out some of the practical values of such work as Rozeboom's. Venezuela produces more petroleum than any other South American country. It has recently passed an antimalaria law, which, if enforced, will increase very materially the cost of medical services, which must by law be provided for their workmen by the foreign oil companies. We know that an Anopheline called "*albitarsis*" has been found infected in nature up to 5.8 per cent in Brazil. Do we know to what race or variety this *albitarsis* belongs? We do not. Does anyone know the biology, biting habits and infectibility of the race of "*albitarsis*" I found in Colombia and eastern Venezuela? No one does. If you were the medical director of an oil company in Venezuela, spending \$40,000 a year for ditching alone, I think you would like to know.