

Pupal Differences Between Species A and B of the *Anopheles gambiae*
Group From Kaduna, West Africa

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ABSTRACT. A combination of setal characters identifies 94 per cent, of a sample of pupae of species A and B of the *Anopheles gambiae* group from Kaduna, Nigeria, West Africa. The characters differ from those used for pupae from Kisumu, E. Africa.

Introduction

This is the third paper recording the results of an attempt to find external morphological differences between species A and B of the *Anopheles gambiae* group. The methods were described in the two earlier papers (Reid 1973*, 1975), the first of which was on larvae from Kaduna. The pupae with which the present paper is concerned were associated with those larvae, except that there were some additional pupal skins of A which lacked matching larval skins. Those larvae and their resulting pupae were reared between February and April 1968 from laboratory colonies established in October 1967 with eggs from Africa laid by wild-caught females (Reid, 1973).

Results

Out of 20 pairs of setae or combinations of pairs examined, eight were used to distinguish between A and B in the sample. Details of these are given in Table I below, which may be compared with Table I in the paper on pupae from Kisumu, E. Africa (Reid, 1975). The single pairs of setae (characters 1 to 6 in the first column) are the same, except that seta 3, III (Kisumu) is replaced by 5, III. Another similarity is that among the single pairs of setae, 4, II and 9, VIII give the lowest degree of overlap between A and B for both the Kisumu and Kaduna samples. But whereas in the Kisumu sample species B has a lower mean number of branches on the pair 4, II and a higher number on 9, VIII than A, the reverse is true for the Kaduna sample.

The following key, which uses characters 7 and 3 from Table I, can be applied to those 84 of the specimens (45 A, 39 B) which had the necessary pairs of setae complete with countable branches for one or both characters.

*Reid 1973, Table 2, p. 91; transpose the column headings "No. larvae in overlap" and "Range".

Table 1
 Showing the range, mean number of branches, overlap zone and proportion of specimens in overlap, for 8 pairs or combinations of pairs of setae on pupae of species A and B originating from Kaduna, Nigeria.

Setal pairs and combinations	A		B		Overlap zone	No. in overlap		Total A + B in overlap Proportion %
	No. exam.	No. branches Range Mean	No. exam.	No. branches Range Mean		A	B	
1. 1,II	44	6-11 8.3	39	5-10 7.1	6-10	42	37	79/83 95
2. 2,II	47	8-13 10.0	40	7-12 9.6	8-12	45	39	84/87 97
3. 4,II	45	5-11 8.0	39	8-17 12.2	8-11	27	12	39/84 46
4. 5,III	48	8-13 10.0	40	9-17 11.7	9-13	46	33	79/88 90
5. 2,VIII	49	4-6 4.8	41	4-7 6.1	4-6	49	32	81/90 90
6. 9,VIII	40	19-40 29.3	36	14-26 21.2	19-26	14	29	43/75 57
7. 9,VIII - 4,II	35	12-32 20.8	34	-1 to +16 8.7	12-16	6	6	12/69 17
8. (1,II + 2,II + 9,VIII) - (4,II + 5,III + 2,VIII)	31	13-38 24.9	31	-5 to +17 7.5	13-17	1	4	5/62 8

Provisional Key to the Pupae of Species A and B from Kaduna, West Africa

Sum of the branches on both setae 9, VIII minus sum of the branches on both setae 4, II is 17 or more; and/or sum of the branches on both setae 4, II is 7 or less. species A
 The first sum is 11 or less; and/or the second sum is 12 or more
 species B

This key identifies 74/84 or 88 per cent, of the pupae. Of the unidentified 10 (7 A, 3 B), the cumbersome character 8 identifies 2 A, raising the total identified to 76/84 or 90 per cent. This is not as good a result as the comparable figure of 96 per cent for the Kisumu pupae and there are fewer useful characters additional to those in the key. However, one other minor character may be mentioned. This is the greater frequency of occurrence in B than in A of one to three small fine spur-branches on the main branch of seta 5, III, well distal to the points of origin of the other principal branches. In B such spurs were present in 21/40 (52%), compared to 5/48 (10%) of A; that is a specimen with such a spur or spurs on 5, III was about 5 times more likely to be B than A. On this basis three more specimens can be identified as probably species B (which in fact they were), raising the total identified to 79/84 or 94 per cent. In the Kisumu pupae spur-branches on 5, III were found in 1/10 A and 2/10 B.

Differences in the shape of the male genital lobes were less than in the male pupae from Kisumu and not of use for identification.

Discussion

The results reported here and in the two earlier papers suggest that where species A and B occur together about 90 per cent, or more of the larvae and pupae can be identified. Further, the results from Kaduna show that most individuals can be identified in both the larval and pupal stage, whilst those few which cannot be identified as larvae are nearly all identified by their pupae and vice versa.

It had been hoped that by using sympatric material of A and B from both East and West Africa, characters with a wide geographic application for distinguishing A from B might be discovered. However, this hope has not been realised.

Acknowledgments

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References

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