BIOLOGICAL OBSERVATIONS ON THE *ANOPHELES GAMBIAE* COMPLEX *

by

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A series of experimental observations were made on the biology of each of the members of the complex except *A. gambiae* C. The aim of these experiments was to supply some useful work hypotheses for testing by field ecologists and entomologists in order to get to a better ecotypic definition of the members of the complex and particularly of *A. gambiae* A and *A. gambiae* B. Our knowledge of the biological differentiation existing between these two forms is extremely poor.

From the biogeographical standpoint, the few data available show a greater adaptive capacity of *A. gambiae* A in wet, humid and subhumid regions, and of *A. gambiae* B in arid or semiarid regions.

The greater adaptive capacity of *A. gambiae* B to arid climate seems confirmed by some laboratory observations. The mosquitoes were placed into hermetically sealed glass containers, in which RH 10% was maintained by means of anhydrous $CaSO_4$ which indicator while the environmental temperature was about 27° C. Under these conditions parous females, in the Christopher's stage II have shown in 48 hours a mortality of 60-100% in *A. gambiae* A, and less than 40% in *A. gambiae* B.

The choice of a wet surface instead of open water seems to represent an important adaptive mechanism. Experimental observations have shown that placing in the cage two containers, one with free water another with filter paper, at RH around 70%, *A. gambiae* A generally deposits on wet paper less than 30% of its eggs, *A. gambiae* B from 30 to 50%, *A. merus* and *A. melas* over 60%. The preference for marginal situations probably implies an important mechanism for prior occupation of temporary environments strictly depending on seasonal rains and tides.

The egg hatching depends mainly upon temperature, the degree of atmospheric saturation and the presence or absence of open water as substratum; high temperature and RH, like the deposition on water stimulate the hatching. The contrary is observed with low temperatures and RH and when the oviposition takes place on wet surfaces.

Besides the influence of such extrinsic factors there are quiescence phenomena in the egg induced by the environmental conditions which the adult females experienced during the gonotrophic cycle. The main factor causing the quiescent condition seems to be the retardation of the oviposition. This very interesting phenomenon may result from the absence of suitable conditions or from the increased saturation deficiency. At RH higher than 75% in almost all forms of the *A. gambiae* complex a complete synchronism is observed between the end of the gonotrophic cycle and oviposition that results in a complete hatching of the eggs. With the increase of the saturation deficiency a progressive failure of oviposition takes place that is more apparent in *A. gambiae* B than in *A. gambiae* A.

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In the samples of *A. gambiae* B examined the oviposition is deferred for 24 hours or more in some of the females at RH 60-70% and at temperature of 27°C, while in *A. gambiae* A strains, such as Diggi, Muheza, Nkolmekok, the oviposition takes place normally. An intermediate type of behaviour has been observed in *A. gambiae* A such as the Man and Kisumu colonies. The reaction to decrease in RH can be tentatively explained as an alarm reaction that may be very important in the occupation of temporary larval environments strictly dependent on seasonal rains and on the subsequent rapid drying. Less than 10% of eggs derived from delayed oviposition of *A. gambiae* B placed on a wet surface at 27°C and about 70% RH hatch while the hatching rate reaches 50% when the substratum is free water; hatching is over 80% when the atmosphere is saturated.

The eggs that remain quiescent have been preserved for up to 24 days on wet filter paper, a significant embryonal mortality has been observed only after 12-15 days. Hatching may be easily caused by adding water or by hitting the egg groups with water drops. If we assume that at the beginning of the rain season these eggs accumulate at the edge of temporary water, we can easily explain the close relationship between rain and *A. gambiae* density observed in some régions