able to build up, inside the bladder, pressures of nitrogen and argon which exceed those actually measured in any fish if the solubility to these gases in the blood of the bladder were reduced by 1 per cent. They point out that such a reduction would take an addition of some 20 mM electrolyte. Similarly 20 mM lactic acid would suffice (via the Root effect) to explain the observed secretion of oxygen. The increase in lactic acid and carbon dioxide measured in my own investigation represents an increase of some 20–30 mM and should thus be sufficient to explain the observed secretion of all the three mentioned gases.

JOHAN B. STEEN

Institute of Zoophysiology,
University of Oslo.

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ENTOMOLOGY

Anopheles gambiae Complex

THE existence of two fresh-water forms (*A* and *B*) of *Anopheles gambiae* Giles which, when crossed, produce sterile F_1 males has been established by Davidson and Jackson[1]. A salt-water tolerant strain of the same species from near Tanga, Tanganyika, has been shown to be partially incompatible with two strains of the group *A* fresh-water form[2,3], while the variety *melas* has been shown to be incompatible with a fresh-water form (group unknown) from a nearby area in Liberia[4].

Now, the Tanga salt-water form and the *A. melas* from Liberia have been crossed with each other and with each of the two fresh-water forms. Table 1 enumerates these crosses and gives the proportion of male to female offspring in the F_1 generation.

All the crosses produced sterile F_1 males. Sterility was established in three ways: (1) by microscopic examination of the testes; (2) by allowing interbreeding of F_1 males and females in cages and observing the eggs laid by the females; (3) by artificially mating F_1 males and females after the method of Baker *et al.*[5].

The degree of atrophy of the testes varied considerably. In some, the testes were reduced to an organ barely distinguishable from the vas deferens and in which no sign of spermatogenesis could be distinguished. In others the testes appeared normal in size and showed all stages of spermatogenesis up to what appeared to be normal, tailed spermatozoa. These, however, showed no sign of movement in physiological saline. All F_1 adults appeared normal in size and vigour and F_2 eggs were obtained from all but two of the crosses. These eggs were almost invariably sterile and microscopic examination showed no signs of embryonic development. Only on two occasions did a very few larvæ hatch, and these were from the reciprocal crosses between the Pare fresh-water form and the Tanga salt-water form.

An excess of males was always produced from crosses involving fresh-water form males and salt-water form females (both the Tanga strain and *A. melas*). This was most marked in the fresh-water form male × *melas* female cross. The two crosses between fresh-water form females and Tanga salt-water form males produced a slight excess of females in the F_1 generation. Similar crosses between fresh-water females and *melas* males gave a slight excess of males. The reciprocal crosses between the Tanga salt-water form and *A. melas* resulted in near-normal sex-ratios.

That some at least of the hybrid females were reproductively normal was shown by the production of viable offspring from back-crosses. These offspring all showed near-normal sex-ratios (Table 2). In addition to those back-crosses given in this table, the back-cross Tanga salt-water form male × hybrid Tanga male/Pare female was also successful, but no sex-ratio was recorded.

Table 1. CROSSES BETWEEN FRESH-WATER AND SALT-WATER FORMS OF *Anopheles gambiae*

Parents			F_1 generation	
Male	Female	Total	Percentage male	Percentage female
Lagos (*A*)	TSW	66	61	39
Kisumu (*A*)	TSW	250	56	44
Pare (*B*)	TSW	156	56	44
Bobo (*B*)	TSW	138	60	40
TSW	Lagos (*A*)	1,010	42	58
TSW	Pare (*B*)	998	36	64
Kisumu (*A*)	*melas*	113	76	24
Liberia (*A*)	*melas*	326	99	1
Pare (*B*)	*melas*	122	81	19
melas	Diggi (*A*)	94	51	49
melas	Pare (*B*)	88	60	40
melas	TSW	62	45	55
TSW	*melas*	193	57	43

Lagos, Lagos, Nigeria; Diggi, Diggi, W. Sokoto, N. Nigeria; Kisumu, Kisumu, Kenya; Pare, Pare, Tanganyika; Bobo, Bobo Dioulasso, Upper Volta; Liberia, Kpain, Liberia; TSW, Tanganyika salt-water form; *melas*, *Anopheles melas*, Liberia.
A—group *A*, *B*—group *B*, see Davidson and Jackson (ref. 1).

Table 2. BACK-CROSSES BETWEEN FRESH-WATER AND SALT-WATER FORMS OF *Anopheles gambiae*

Parents			F_1 generation	
Male	Female hybrid	Total	Percentage male	Percentage female
TSW	*melas* ♂/TSW ♀	134	47	53
melas	*melas* ♂/TSW ♀	20	45	55
Diggi	*melas* ♂/Diggi ♀	305	46	54
melas	*melas* ♂/Pare ♀	19	37	63
melas	Pare ♂/*melas* ♀	21	57	43

Footnotes of Table 1 apply here.

It would thus appear that *Anopheles gambiae* is a complex of at least four partially incompatible forms. Whether any or all of these deserve rank as separate species remains to be seen. If complete absence of gene-flow constitutes a criterion of specific rank, then these forms cannot be considered as separate species. A restricted flow is possible through back-crossing, at least in the artificial conditions of the laboratory.

G. DAVIDSON

Ross Institute of Tropical Hygiene,
London School of Hygiene and Tropical Medicine,
London, W.C.1.

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