

POSSIBLE SIMPLIFIED GRAVIDITY TECHNIQUE FOR DETECTING PHYSIOLOGICAL RESISTANCE OF *ANOPHELES GAMBIAE* TO BHC*

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In the Lowveld of the Transvaal it is virtually impossible in 24 hours to collect adequate numbers of *Anopheles gambiae* (the local vector of malaria) for Busvine tests. We therefore devised a new rationale for detecting physiological resistance to BHC, the residual insecticide which is employed for the spraying of Bantu huts.

It is well known that *A. gambiae* completes ovulation inside huts. If she is physiologically resistant to BHC, she will continue to complete ovulation indoors, without being killed by this residual insecticide.

Our findings are published, because after further investigations, this simplified technique might possibly be used for detecting physiological resistance in other parts of the world.

Technique

Huts which have been sprayed with BHC in the Nelspruit sub-region during October 1957, as well as unsprayed earthen holes (and dongas) in river banks in the same sub-region, and unsprayed huts in the Nylstroom sub-region, were check-sprayed with pyagra from 10 a.m. to 4 p.m. during March 1958 for gravidity data for detecting resistance.

Results

Collected data are summarized in Table I.

TABLE I. GRAVIDITY DATA: 10 A.M. — 4 P.M.: MARCH 1958

Resting Sites	Number of Resting Sites	Males	Females			Total Females	
			Unfed	Fed	Half-gravid		Fully-gravid
Holes and dongas ..	253	39	16	14	5	0	35
Unsprayed huts ..	135	37	12	30	39	58	139
BHC-sprayed huts ..	1,041	47	66	60	9	0	135

1. *Earthen Holes and Dongas.* During the month the Nelspruit field staff only found 35 females in earthen holes (and dongas) along rivers where *gambiae* breeds. This shows how impossible it is to collect enough females for Busvine tests in the field during one day. This total of 35 females, compared with the 39 males, is of interest as yielding a sex ratio of 1 : 1. Absence of fully-gravid females between 10 a.m. and 4 p.m. indicates that *A. gambiae*, at least in earthen holes, becomes fully-gravid during the night, and oviposits before 10 a.m.

2. *Unsprayed Huts.* It is instructive that 58 fully-gravid females were found in unsprayed huts between 10 a.m. and 4 p.m., whereas no fully-gravids were discovered in earthen holes. The ecology of females which shelter or feed in unsprayed huts, therefore, apparently differs markedly from the ecology of those in earthen holes. In the domestic economy of *A. gambiae*, a hut is apparently more profitable than an earthen hole; possibly because goats, cattle and

domestic animals daily provide blood meals more regularly and during longer periods.

3. *BHC-Sprayed Huts.* In 1,041 BHC-sprayed huts, from a total of 135 females, no fully-gravid females were found; whereas in unsprayed huts a total of 139 females yielded 58 fully-gravids. Dead *gambiae* were found in BHC-sprayed huts; and because, as far as we know, the literature has no record of repellent effect of BHC, we assume that females were killed by the BHC before they could become fully-gravid.

Absence of Physiological Resistance

Considering the fact that not a single fully-gravid *A. gambiae* was found in any of the 1,041 BHC-sprayed huts, we must assume that the BHC had killed the females before they could complete ovulation. We therefore conclude that during March 1958, in the Nelspruit sub-region, there was no physiological resistance of *gambiae* to BHC.

Absence of Behaviouristic Resistance

Because dead *gambiae* were found in BHC-sprayed huts, and considering the considerable ratios of males and unfed, fed, and even half-gravid females, it appears that during March 1958, in the Nelspruit sub-region, there was no behaviouristic resistance of *gambiae* to BHC.

Duration of Effective BHC

From the data it appears that, even 6 months (October 1957 to March 1958) after application, the residual effect of BHC was still adequate.

Recommendation

We recommend that before and during malaria eradication campaigns, this simplified technique, together with Busvine tests, should be employed for detecting physiological resistance.

SUMMARY

As *Anopheles gambiae* completes ovulation indoors, the presence of fully-gravid females in BHC-sprayed huts would indicate physiological resistance.

Gravidity data from earthen holes and dongas, unsprayed huts, and BHC-sprayed huts, obtained by checking with pyagra, are analysed and discussed. Physiological resistance was absent.

This simplified technique (together with Busvine tests) is recommended for detecting physiological resistance.

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