found by the seven observers as a whole in each of the three groups, and shows which differences are statistically significant at the 5% level.

The signs that discriminated between the clinically normal group and the others were primary sector narrowing, distal sector narrowing, calibre variation and hypertensive retina (undefined). This confirms the clinical experience that the fundus of hypertensives does often differ in some way from that of non-hypertensives, but, although the observers were of the opinion that this had " something to do with diminished vasculature ", it was not possible to define it further to their satisfaction.

It is concluded that signs such as arteriole narrowing, calibre variation and AV crossing phenomena, although carefully defined, were observed with poor precision and with much difference between observers whether they were observed ophthalmoscopically or from black and white photographs or from colour diapositives. Observations on the presence or absence of undefined " hypertensive retina " were made with the same precision and inter-observer variation as the more carefully defined signs from colour diapositives.

While the difference of opinion on the presence or absence of these signs excluded their use in many types of population study, there was evidence that certain of these signs—namely, primary sector narrowing, distal sector narrowing, calibre variation and hypertensive retina—were observed more frequently in hypertensives than in non-hypertensives.

It seemed to the writers that there was some factor that they could not define, probably connected with diminished vasculature, that was related to hypertension.

More accurate and less biased ways of assessing this factor are required and these would probably have to be less conventional than those so far attempted. Some work in this direction has been carried out and will be reported later.

Insecticide Susceptibility and Resistance in Populations of *Anopheles gambiae, Culex fatigans* and *Aedes aegypti* in Southern Nigeria

by L. S. SELF, *Entomologist, and* C. P. PANT, *Project Leader, WHO Insecticide Testing Unit, Lagos, Nigeria*

For the susceptibility tests the results of which are reported here larvae of *Anopheles gambiae* and *Culex fatigans* were collected from Surulere, a suburb of Lagos, and larvae of *Aedes aegypti* from Igbogila, 15 miles (24 km) north-west of Lagos.

The " wild-caught " adults of *C. fatigans* and *Aedes aegypti* used in the tests were derived from the wild-caught larvae—unfed, one-day-old specimens being used. Tests on *Anopheles gambiae* adults were on unfed and gravid females collected from the Agege district, north-west of Lagos.

Comparative tests were also carried out on larvae and adults of all three species from the laboratory colonies at Yaba-Lagos.

Results with larvae

For these tests the insecticides used were DDT, dieldrin, lindane, parathion, fenthion, fenitrothion, bromophos, OMS-786 (*p-p'*(*O-O*-dimethyl thiophosphoro)diphenyl sulfide), OMS-711 (2-chloro-1-(2,5-dichlorophenyl)vinyl dimethyl phosphate), and OMS-437 (toluene-α,α-dithiol-bis(*O,O*-dimethyl phosphorodithioate).

Wild-caught and colony fourth-instar larvae were exposed for 24 hours to concentrations ranging from 0.0008 ppm to 2.5 ppm; the results are given in Table 1.

OMS-786 was easily the most effective larvicide against all three species. The next best were parathion, fenthion and bromophos against *Anopheles gambiae* and *C. fatigans*, and fenthion, fenitrothion and OMS-437 against *Aedes aegypti*.

The wild-caught larvae of all species were highly resistant to dieldrin; *Anopheles gambiae* and *C. fati-*

TABLE 1

SUSCEPTIBILITY (ppm) OF WILD CAUGHT AND COLONY[a] 4TH-INSTAR LARVAE AFTER 24-HOUR EXPOSURE TO CERTAIN INSECTICIDES IN THE WHO SUSCEPTIBILITY TEST

Insecticide	*Anopheles gambiae* from Surulere		*Culex fatigans* from Surulere		*Aedes aegypti* from Igbogila	
	LC_{50}	LC_{90}	LC_{50}	LC_{90}	LC_{50}	LC_{90}
OMS-786	0.00067 (0.00075)	0.0009 (0.0012)	0.00041 (0.00014)	0.00071 (0.00025)	0.0009 (0.00062)	0.0014 (0.00098)
Parathion	0.0064 (0.00076)	0.0083 (0.0012)	0.0040 (0.0029)	0.0071 (0.0053)	0.0063 (0.0067)	0.0081 (0.010)
Fenthion	0.0078 (0.0014)	0.010 (0.0041)	0.0052 (0.0016)	0.0085 (0.0022)	0.0038 (0.0043)	0.0049 (0.0079)
Bromophos	0.0074 (0.0033)	0.012 (0.0064)	0.0067 (0.0032)	0.016 (0.0058)	0.013 (0.012)	0.030 (0.024)
OMS-437	0.016 (0.0043)	0.028 (0.0085)	0.012 (0.0019)	0.034 (0.0026)	0.0043 (0.0068)	0.0065 (0.011)
Fenitrothion	0.023 (0.0052)	0.035 (0.0094)	0.014 (0.0068)	0.024 (0.011)	0.0042 (0.0065)	0.0057 (0.0096)
DDT	0.042 (0.0042)	0.064 (0.0075)	0.090 (0.012)	0.23 (0.024)	0.013 (0.034)	0.039 (0.10)
OMS-711	0.11 (0.016)	0.22 (0.036)	0.076 (0.025)	0.15 (0.050)	0.026 (0.017)	0.047 (0.032)
Lindane	0.25 (0.0095)	0.63 (0.026)	0.55 (0.014)	1.3 (0.035)	0.28 (0.051)	1.1 (0.095)
Dieldrin	0.55 (0.00085)	1.4 (0.0014)	0.45 (0.0070)	2.0 (0.022)	0.38 (0.0078)	2.0 (0.014)

[a] Figures in parentheses refer to colony strains.

gans showed resistance to lindane and some degree of tolerance to DDT.

Results with adult mosquitos

Wild-caught and colony adults were tested against dieldrin, DDT and malathion with the WHO susceptibility kit; the results are given in Tables 2, 3 and 4. Wild-caught adults of all three species were highly resistant to dieldrin but showed little or no evidence of resistance to DDT or malathion. All three species were considerably more susceptible to malathion than to DDT.

TABLE 2

SUSCEPTIBILITY OF WILD-CAUGHT AND COLONY [a] ADULTS AFTER ONE HOUR'S EXPOSURE TO DIELDRIN IN THE WHO SUSCEPTIBILITY TEST

Species	Percentage mortality at concentration shown							LC_{50} (%)	LC_{90} (%)
	0.05 %	0.1 %	0.2 %	0.4 %	0.8 %	1.6 %	4.0 %		
Anopheles gambiae [b]	0 (10)	0 (40)	0 (90)	0 (100)	0 (100)	4 (100)	7 (100)	— (0.11)	— (0.24)
Culex fatigans from Surulere	0 (0)	0 (0)	0 (10)	0 (60)	5 (85)	20 (95)	25 (95)	— (0.49)	— (1.2)
Aedes aegypti from Igbogila	0 (0)	0 (40)	0 (90)	0 (100)	8 (100)	20 (100)	25 (100)	— (0.12)	— (0.20)

[a] Figures in parentheses refer to colony strains.
[b] Average mortalities from Alimosho, Akinogun, Egbe and Surulere.

TABLE 3

SUSCEPTIBILITY OF WILD-CAUGHT AND COLONY [a] ADULTS AFTER ONE HOUR'S EXPOSURE TO DDT IN THE WHO SUSCEPTIBILITY TEST

Species	Percentage mortality at concentration shown					LC_{50} (%)	LC_{90} (%)
	0.25 %	0.5 %	1.0 %	2.0 %	4.0 %		
Anopheles gambiae [b] from Akinogun	0 (0)	10 (5)	57 (25)	100 (95)	100 (100)	0.85 (1.1)	1.3 (1.9)
Culex fatigans [c] from Surulere	0 (0)	0 (0)	10 (3)	15 (16)	40 (74)	— (3.1)	— (—)
Aedes aegypti [c] from Igbodila	0 (0)	0 (0)	0 (5)	20 (32)	80 (92)	3.4 2.2	— 3.8

[a] Figures in parentheses refer to colony strains.
[b] LC_{50} and LC_{90} values from Surulere were 2.2 % and 3.0 %, respectively.
[c] At 4-hour exposure, 100 % mortality obtained with wild and colony strains.

TABLE 4

SUSCEPTIBILITY OF WILD-CAUGHT AND COLONY [a] ADULTS AFTER ONE HOUR'S EXPOSURE TO MALATHION IN THE WHO SUSCEPTIBILITY TEST

Species	Percentage mortality at concentration shown				LC_{50} (%)	LC_{90} (%)
	0.4 %	0.8 %	1.6 %	3.2 %		
Anopheles gambiae [b]	38 (35)	86 (90)	100 (100)	100 (100)	0.47 (0.46)	0.90 (0.80)
Culex fatigans from Surulere	0 (0)	60 (75)	100 (100)	100 (100)	0.75 (0.68)	1.1 (0.95)
Aedes aegypti from Igbogila	20 (0)	95 (85)	100 (100)	100 (100)	0.52 (0.65)	0.74 (0.88)

[a] Figures in parentheses refer to colony strains.
[b] Average mortalities from Akinogun and Surulere.