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Eradication of *Wuchereria bancrofti* infection through vector control

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Attempts at vector control of bancroftian filariasis have generally met with little or no success, but in the Solomon Islands, where Anopheline vector control has been continued over a long period as part of the Malaria Eradication Programme, WEBBER (1977) has recently reported that a proportional decline was noted of the median microfilarial density over a period of six and a half years, projecting that zero density would be reached in December 1976. This paper reports on follow-up surveys conducted in the same area to find out what actually happened.

Material and Methods

Unfortunately the author was not able to return to the survey area in North Choiseul until October 1978, but two surveys were conducted by Rural Health Clinic staff, one in Voza in April 1977 and the other in Ogo in May 1977. Three circular thick blood films of 20 mm^3 from each person were made on glass slides and stained with Giemsa in the routine method used by the Malaria Eradication Programme for reasons described by WEBBER (1976).

Following the results of these surveys 97 people were examined in the Voza area using a membrane-filtration technique (CHULARERK & DESOWITZ, 1970) in which 1·0 ml of venous blood is haemolysed, passed through a Millipore (c) filter and the residue stained and examined. All surveys were done at night. It was considered desirable to examine all people again who had been surveyed in 1974, 1975 and 1976 (irrespective of whether they were positive or negative), so the 41 people who were still in the village were examined first, then a broad selection of the remainder sampled. Unfortunately it was not possible to do a Millipore examination in the other village of Ogo. A search was also made for any cases of elephantiasis in Voza.

Results

Vector control measures (Malaria Eradication Campaign) commenced in Choiseul in 1968. Data from surveys conducted six, seven, eight and nine years after residual DDT spraying started are shown in Table I.

No positives were found in 1977 with the standard survey technique of examining 60 mm^3 of blood. In order to verify the new absence of infection, a larger quantity of blood was examined from the Voza population using the millipore technique. 97 people were examined and everyone was found to be negative (see Table II).

Fortunately the area chosen to survey since 1974 was a well established village with little movement of people. If was therefore possible to find 41 people who had been examined in each of the four surveys, so the incidence of filariasis in this persistent group could give a truer picture of the pattern of infection (Table III).

Table I—Prevalence of filariasis in four consecutive years

Year	Area	No. examined	No. positive	% positive	No. microfilaria	Mean Density	MfD 50
1974	Voza	172	25	14·5	513	20·5	
	Ogo	128	37	29·0	293	7·9	
	Total	300	62	21·75	806	13·0	5·4
1975	Voza	262	18	6·9	87	4·8	
	Ogo	89	14	15·7	114	8·1	
	Total	351	32	9·2	201	6·3	3·0
1976	Voza	116	3	2·6	30	10·0	
	Ogo	84	8	9·5	51	6·4	
	Total	200	11	5·5	81	7·4	—
1977	Voza	85	0	0	0	0	
	Ogo	79	0	0	0	0	
	Total	164	0	0	0	0	0

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Table II—Age and sex distribution of persons examined in Voza in 1978

Sex	Age Groups							Total
	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	
Male	Nil	15	8	5	8	6	2	1	45
Female	Exam.	20	7	8	8	4	5		52
Total	—	35	15	13	16	10	7	1	97

Table III—Incidence of filariasis in 41 people from 1974 to 1978

	1974	1975	1976	1977	1978 (millipore)
No. positive	7	2	2	0	0
No. negative	34	39	39	41	41
% positive	17	4·9	4·9	0	0
No. microfilaria	186	14	26	0	0
Mean Density	27	7	13	0	0

Five people became negative between 1974 and 1975 and the same two people were also found positive in 1976. The rise in density gave slight cause for concern in 1976 (this was most likely due to the periodicity effect), but by 1977 and the 1978 millipore they were definitely negative. When the area was first surveyed in 1970 (WEBBER, 1975), five cases of elephantiasis were found. By 1978 there were only two of these cases still surviving and no new ones had occurred.

Discussion

The reduction of *Wuchereria bancrofti* infection from 22% positive in 1974 to zero by 1977 occurred as a result of using adulticides only. Diethylcarbamazine is not available in clinics in that area and no mass campaigns had been conducted. Essentially, these results were produced as an extra benefit of the Malaria Eradication Programme whose attack had been based on residual house spraying of DDT, 75% wettable powder at six-monthly intervals. No intensive larviciding campaigns were mounted but searching for larvae and instructing people to clean round their villages were practised as part of a general health education exercise. Residual spraying commenced in 1968 and finished in 1976 as the area entered consolidation but, as cases have been re-introduced from more malarious islands, occasional repeat focal spraying has been required. War-time workers surveying the whole of the Pacific (BYRD & ST. AMANT, 1959) found filarial infection in the Solomon Islands one of the highest in the whole region. Nothing was done about it as other disease problems, particularly yaws, malaria and tuberculosis were considered priorities. Even when the Malaria Programme commenced, no baseline surveys for *W. bancrofti* were carried out despite both diseases being transmitted by the same vectors, members of the *Anopheles punctulatus* group of mosquitoes. This added bonus of the Malaria Eradication Programme has therefore been most gratifying.

Vector control of *Anopheline*-borne filariasis is a very long process, requiring measures to reduce the level of the vector to be maintained for almost nine years (WEBBER, 1977). However the steady progress to zero infection has been more successful than other measures (mainly mass drug administration) used in other countries of the Pacific. The reason for this can possibly be explained by the two different kinds of relationship of the non-anopheline and anopheline vector with the parasite (limitation and facilitation) described by PICHON (1974) and PICHON *et al.* (1975), but certainly in other areas where an anopheline has been identified as the sole vector, this method becomes very valid. Further, it seems likely that the degree of vector reduction that is required in malaria eradication campaigns does not seem to be the case for filariasis (WEBBER, 1977) and possibly the irritant effect of DDT might be as important as its lethal action. Filarial infection still persists in areas of the Solomons where residual DDT spraying was started later or which have had particular problems in ensuring coverage. Hopefully a reduction will, in time, be seen in these places and then there will be little chance of re-infecting areas now free. Has eradication occurred in those areas under prolonged vector control measures? There are good indications at the moment, but assessment by an independent team will be required within the next few years.

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