CONCLUSION

As more results from our ongoing studies in Cameroon and Nigeria become available, modifications and better adjustments of our model will be made. Rapid socio-economic, ecological and cultural changes in rural areas of Africa influence the epidemiology of the major parasitic diseases in various ways. Some conclusions and recommendations may already be drawn from our work on onchocerciasis :

- In the Cameroon Sudan savanna, where severe blinding onchocerciasis is hyperendemic, nomadic Bororo herdsmen nowadays increasingly come with their cattle into the riverine areas during the dry season, when the contrast between human and fly-population is closest, thus introducing a considerable effect of zooprophylaxis.
- Keeping cattle throughout the year at strategic site between the village and the *Simulium* breeding river should afford the highest degree of protection.
- The proportion of bloodmeals on the human population is very low at present (10 to 30 %). Individual protection from the bites of the flies must therefore not necessarily increase the risk for the non-protected part of the population, but on the other hand, the vectorial capacity of the local flies could increase considerably, if the availability of animal bloodhosts decreases or if the density of the human population increases.
- The reservoir of *O. ochengi* in cattle could possibly be affected by anthelmintic treatment of cattle. Acaricide treatments (pour-on) repel biting *Simulium* flies thus increasing the proportion of bloodmeals on the human population and reducing the vaccination effect.
- Mass distribution of ivermectin for treatment of human onchocerciasis will enhance the protective effects of *O. ochengi* L3 by reducing the proportion of *O. volvulus* L3 in the flies.

Our present field-studies concentrate on the influence of cattle on the epidemiology of human onchocerciasis, but the way in which domestic animals influence other parasitoses should also be considered. Investigations on the epidemiological links between onchocerciasis, schistosomiasis and malaria are therefore suggested.

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ONCHOCERCIASIS IN GUINEA BISSAU, WEST AFRICA

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KEY WORDS : onchocerciasis. simuliidae. Guinea Bissau

INTRODUCTION

Guinea Bissau is a small country in West Africa with a population of about one million (130,000 in villages along the Geba river and 120,000 along the Corubal river). The country is divided into coastal lowlands of mangrove swamps, a high (200 m) plateau and hilly area in the south east and a lowland plateau area below 100 m altitude in the north east. The country is drained by four main rivers : the Geba, Corubal, Mansoa and Cacheu. The climate is characterised by a hot and rainy season from June to October and a dry season from November to May with annual rainfall varying between 1200 to 2750 mm and temperatures from 26° to 29° C. The vegetation in the north east of the country is a mosaic of woodland and Sudan-Guinea savanna.

Human onchocerciasis in Guinea Bissau was first recorded in 1956 by Lecuona at Paina Lenguer-Piche (close to the Corubal river). Later word (Lecuona, 1959) showed a prevalence rate of 14.8 % in 2,585 persons examined at villages along the Corubal and Geba rivers and *Simulium damnosum* s.l. was found naturally infected with filariae at two localities on the Corubal river. In 1960 Lecuona presented a review of onchocerciasis and new data for the Sonaco region (Geba river) where he found *Simulium damnosum* s.l. Later, Tendeiro (1963) carried out an entomological survey and found ten species of blackflies in the Geba and Corubal rivers : *Simulium damnosum* s.l., *S. alcocki*, *S. garmsi* (= *S. occidentale*), *S. diallonense*, *S. cervicornutum*, *S. unicornutum*, *S. ruficorne*, *S. adersi* and *S. bargreavesi*. Most recently Abreu (1964) examined 482 persons and found 61.2 % positive for onchocerciasis in the Gabú region near the Corubal river and in 1965 found the same species of simuliids in the Corubal river as Tendeiro (1963).

PARASITE PREVALENCE RATES

Using weighed skin snips the prevalence of onchocerciasis in Guinea Bissau was recorded between 1989 and 1993. Villages along the rivers Geba and Corubal were

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mainly investigated, although other parts of the country were visited to a lesser extent. Onchocerciasis was found only in villages along the former two rivers. No infected individuals were recorded from 987 people sampled at thirty-five localities in the regions of Cacheu, Oio and Tombali outside the known foci.

Of 516 people examined in six villages along the Geba river 102 (19 %) were infected with the disease. The data show that the disease was more prevalent in the older age groups. Skin densities were relatively low with the majority of infected individuals having less than 15 mff/mg.

Investigations in villages along the Corubal river showed that 316 (37 %) of 833 individuals examined were infected. An analysis of the disease in relation to age and sex shows that although larger numbers of older people were infected the disease was also significant in younger males. Skin densities were also higher than for individuals from villages along the Geba river.

Typical symptoms of onchocerciasis were seen in infected individuals and 48 of the infected people were blind (31 males and 17 females). In most cases this was due to the presence of microfilariae in the eye.

The data presented indicate that the more important of the two foci is that of the Corubal river. Irrigation schemes along the upper reaches of the Geba river have drastically reduced water flow and transmission is believed to be only sporadic or even absent because of the paucity of *S. damnosum* s.l. in this area.

SIMULIIDAE

The distribution of Simuliidae in Guinea Bissau was investigated (Grácio *et al.*, in press) and identification of the cytospecies of the *Simulium damnosum* complex made at localities within and adjacent to the Corubal focus (Charalambous *et al.*, in press).

Only *S. sirbanum* and *S. konkoureense* were found along the Corubal river between March 1990 and November 1992. The former species predominated at localities along the upper reaches and the largely zoophilic *S. konkoureense* was the main cytoform along the lower reaches of the river. Morphometric analysis of cytotyped larvae showed these two cytota of *S. damnosum* could be separated using the number of rows of hooks in the posterior circlet and the number of hypostomial setae. Unfortunately, this differentiation of the two cytotypes contained a large percentage of overlap so that unequivocal identifications could only be made for specimens in the extremes of the combined range (Lowry *et al.*, in prep.).

Entomological surveys showed the presence of the following simuliid species associated with the Geba and Corubal river basins: *Simulium alcocki*, *S. garmsi*, *S. djallonense*, *S. cervicornutum*, *S. unicornutum*, *S. ruficornis*, *S. adersi*, *S. tridens* and *S. bargreavesi*.

BITING BEHAVIOUR AND HOST CAPACITIES

Adult *S. sirbanum* and *S. konkoureense* were collected biting man and large numbers of the former cytospecies were experimentally infected with *O. volvulus* to com-

pare filarial development in the two cytospecies. Insufficient numbers of *S. konkoureense* precluded the completion of the experiment.

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TRANSMISSION OF *ONCHOCERCA VOLVULUS*, *O. OCHENGI* AND TYPE D FILARIAE BY *SIMULIUM DAMNOSUM* S.L. IN NORTH CAMEROON AND ITS INFLUENCE ON THE EPIDEMIOLOGY OF HUMAN ONCHOCERCIASIS

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KEY WORDS : *Onchocerca volvulus*. *Onchocerca ochengi*. *Simulium damnosum*. North Cameroon.

INTRODUCTION

Earlier studies in North-Cameroon showed that the proportion of non- *Onchocerca volvulus* filarial larvae in the onchocerciasis vectors (*Simulium damnosum* s.l.) was

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