



Bovine onchocercosis in Northern Cameroon: Interaction with trypanosomes, gastro-intestinal helminths and *Eimeria* sporozoa

Archile Paguem^{1,2,3}, Babette Abanda^{1,2,3}, Albert Eisenbarth^{1,2,*6}, Daniel Achukwi⁴ and Alfons Renz^{1,2}

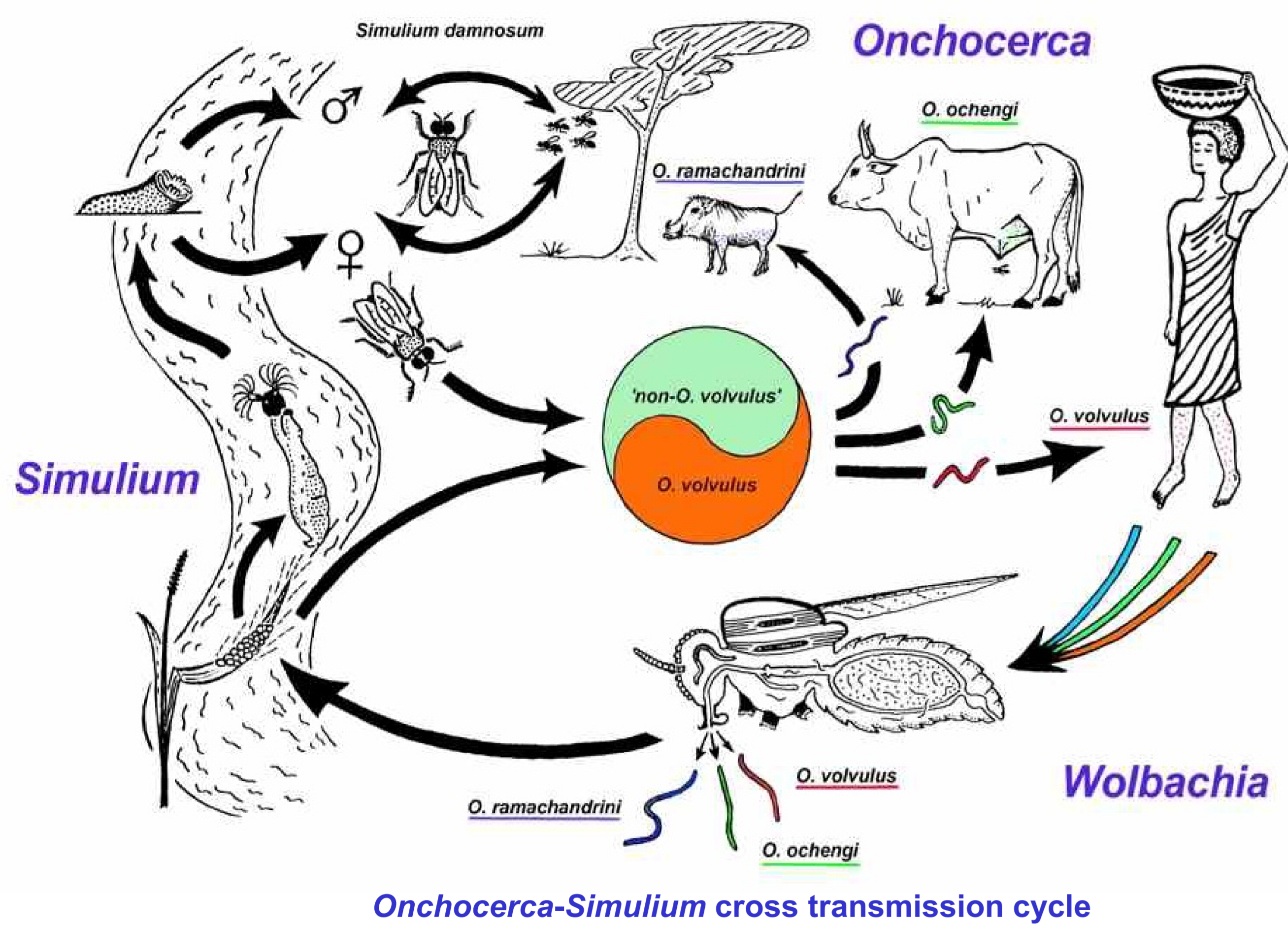
¹ Institute of Evolution and Ecology, Comparative Zoology, Tübingen, Germany; ² Programme Onchocercoses, Ngaoundere, Cameroon; ³ University of Ngaoundéré, Cameroon; ⁴ TOZARD Research Laboratory, Bamenda, Cameroon; present address: Friedrich-Löffler-Institute, Greifswald, Germany.

Background

Human onchocerciasis or “riverblindness” is a vector-borne disease. It is endemic in Northern Cameroon. The vectors are *Simulium damnosum* s.l. blackflies. Intense cattle farming in the Adamawa highland savannah confers zooprophylaxis. *Simulium* vectors are diverted to the non-human blood-hosts and co-transmitted filaria such as *O. ochengi* induce some degree of cross-reacting premunition.

Cattle farming has tremendously increased in the grass savannah areas. Therefore, zooprophylaxis is expected to increase in areas where *O. ochengi* is highly prevalent.

Savannah areas are also endemic for many tropical infectious agents. Symbiotic associations of these parasites can be mutualistic as well as antagonistic.



Objectives:

- 1 – to study the diversity of bovine *Onchocerca* filariae in taurine and Zebu cattle from the Adamawa highland and savannah areas of Cameroon
- 2 – to evaluate the diversity of symbiotic parasites in gut, blood and skin of cattle in the Northern Cameroon.

Methods

57 cattle herds surveyed (800 zebu & 500 taurine cattle)

Phenotypic parameters:

- Age
- Sex
- Body condition
- Weight
- Haematocrit

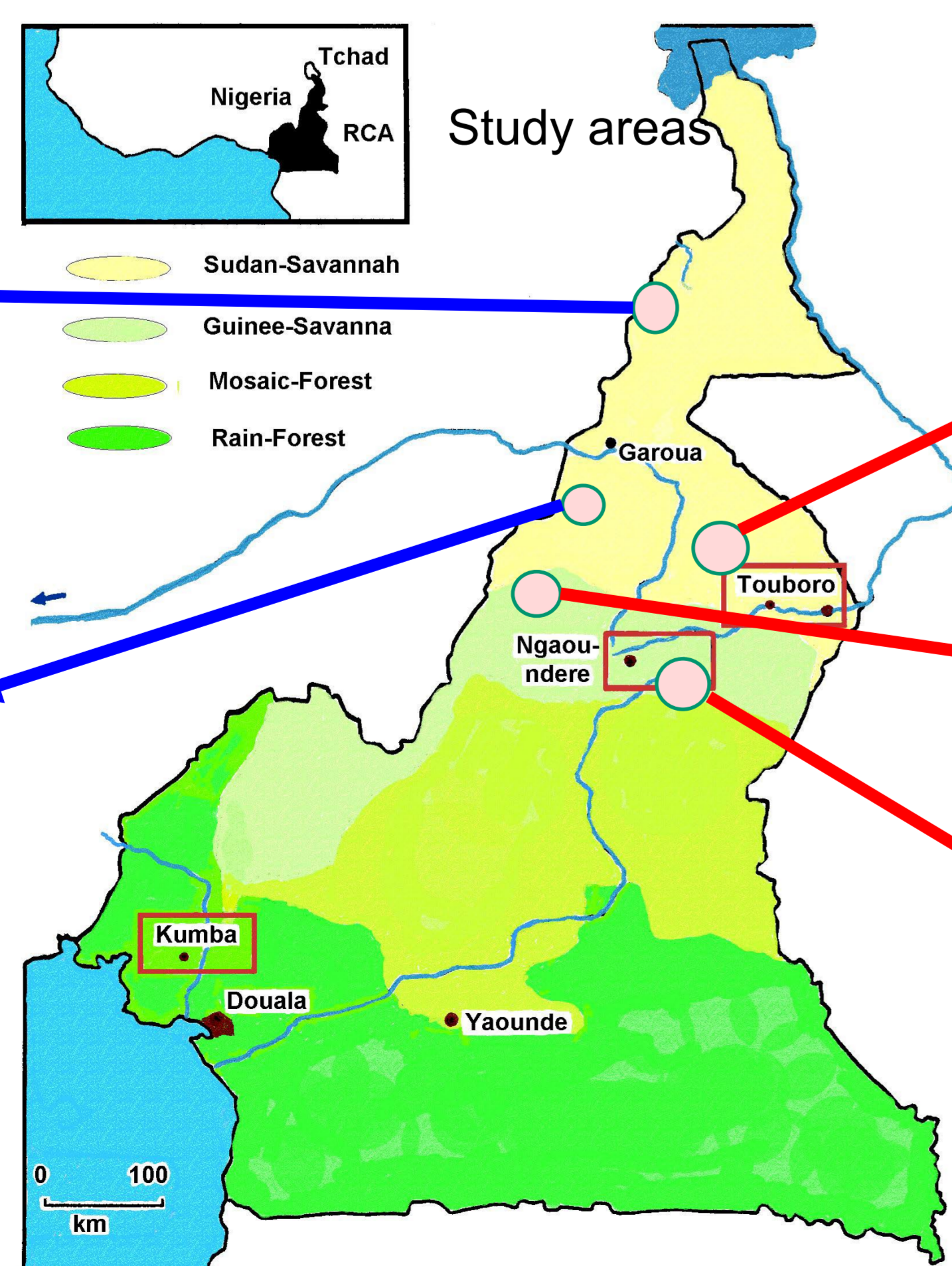
Biological samples:

- Skin snips
- Faeces
- Blood
- Nodules

Symbiotic parasite diversity by microscopy, PCR, Sanger Sequencing:

- *O. ochengi* nodule loads;
- *Onchocerca* microfilariae (skin, blood)
- Gut helminths and *Eimeria* cysts
- Trypanosomes, *Anaplasma* spp, *Piroplasmidae*, *Borrelia* spp, *Setaria* mff.

Taurine cattle



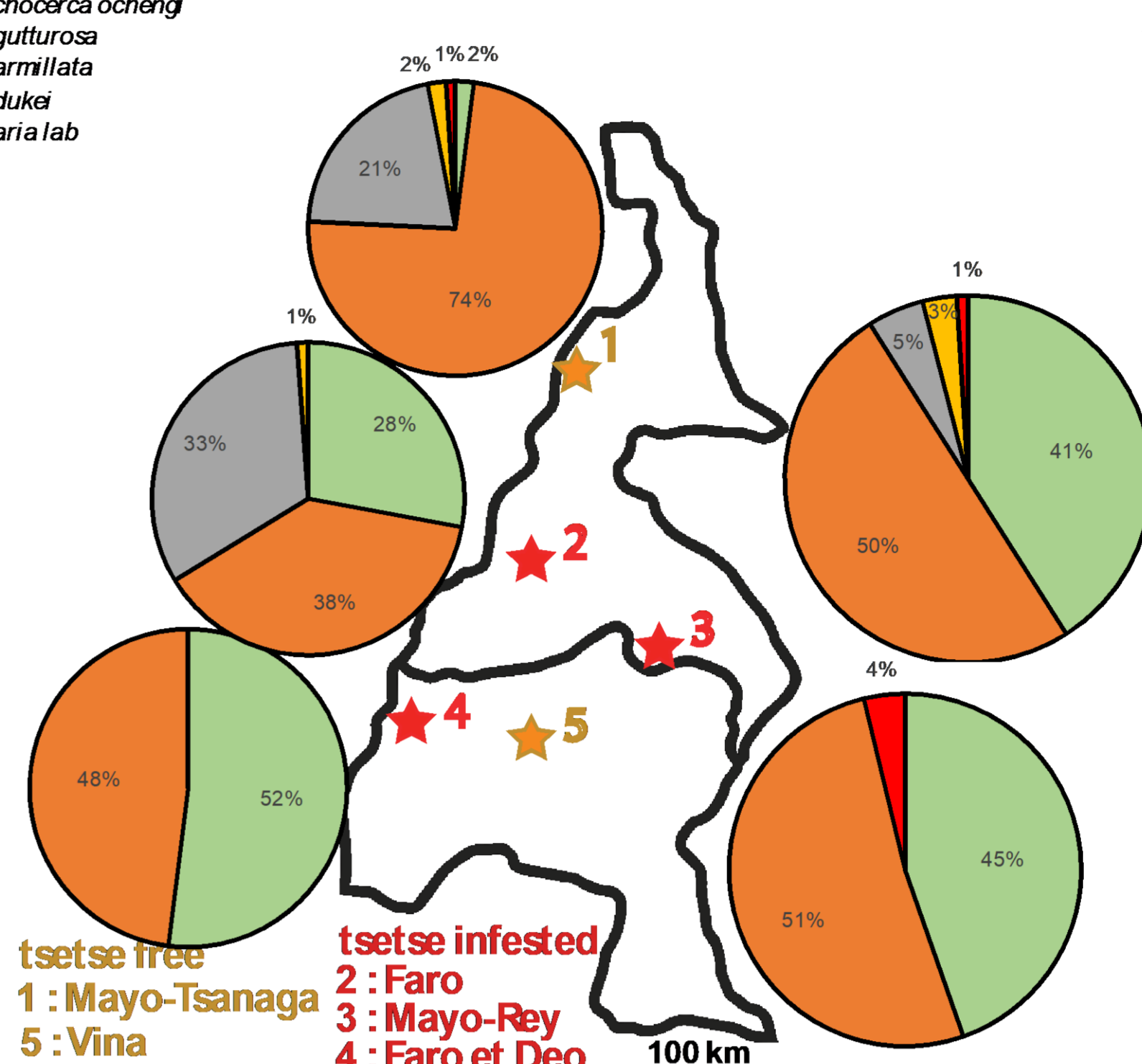
Zebu cattle



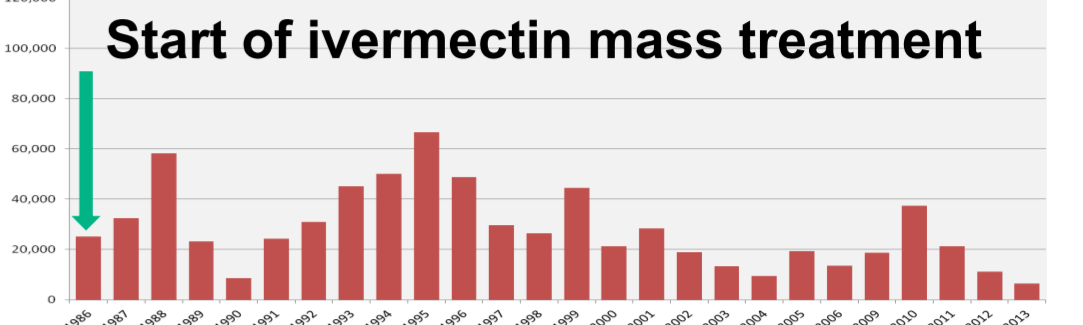
Results

Diversity of *Onchocerca* filariae

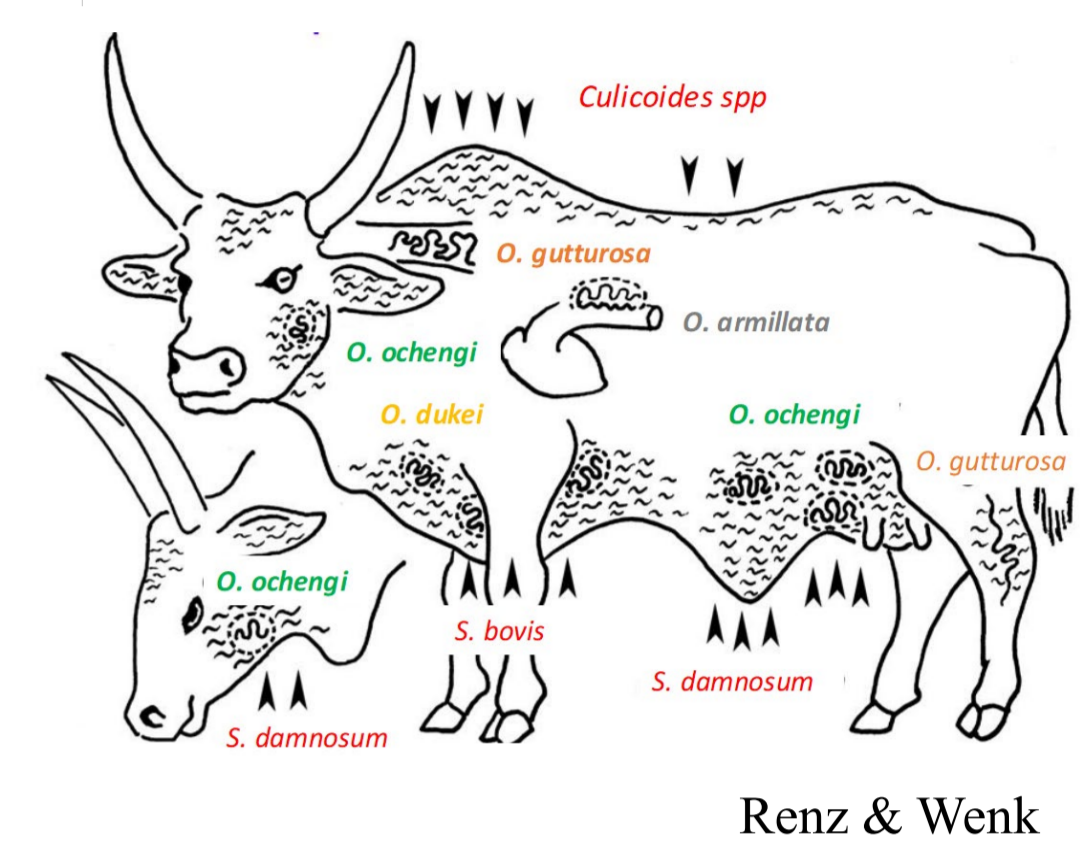
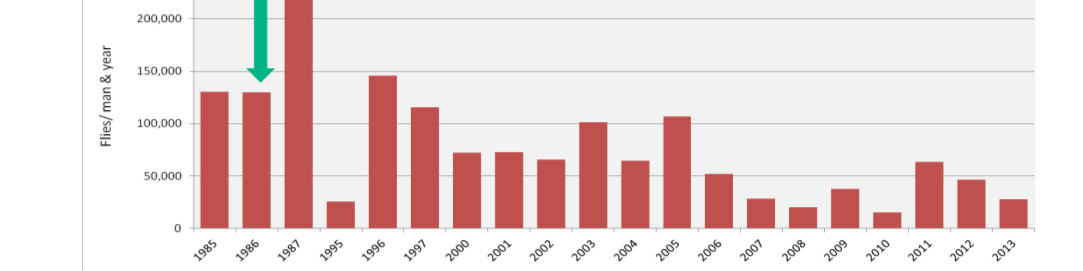
- Onchocerca ochengi*
- O. gutturosa*
- O. armillata*
- O. dukei*
- Setaria* lab



Annual Biting Rates Sudan-Savannah

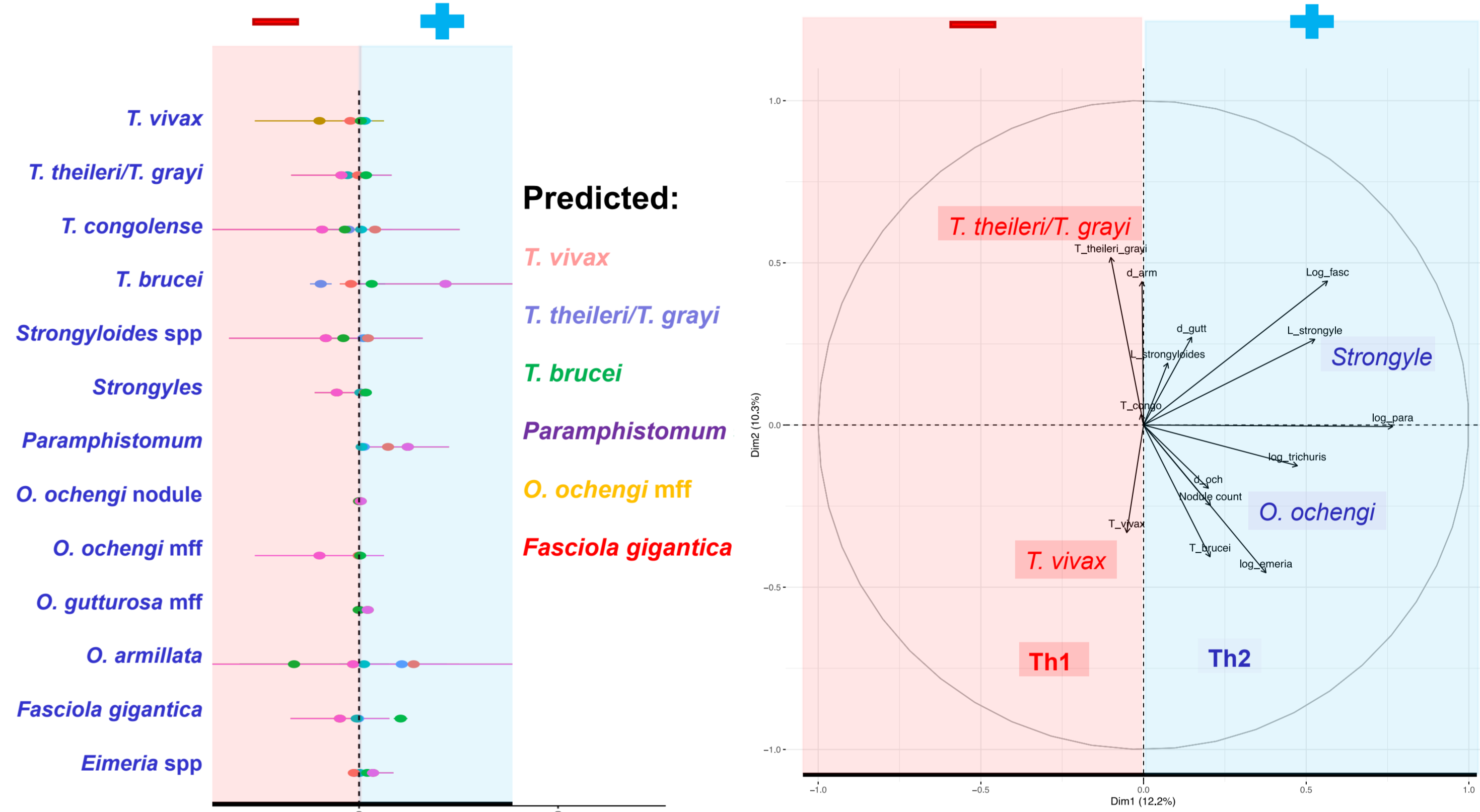


Annual Biting Adamawa plateau



Renz & Wenk

Four bovine *Onchocerca* filarial species, *Setaria* and other blood-dwelling parasites as well as gastro-intestinal helminths are highly prevalent. For *O. ochengi*, this is astonishing, because the fly vector-populations have drastically decreased over the past 43 years, see insert.



Predicted probabilities with 95% confidence intervals of parasite-parasite interactions. Symbiotic interactions are seen between trypanosomes, gut parasites and *Onchocerca* filariae. Harboring a well adapted ‘symbiotic’ parasite confers some degree of protection.

Conclusions

Zooprophylaxis is on-going in cattle grazing areas

Populations of *Simulium* vector flies are decreasing

Small populations of *Simulium* files are sufficient to maintain the endemicity of bovine onchocercosis.

High diversity of pathogenic and non-pathogenic parasites. Almost all animals were co-infected with several filarial nematodes, trypanosomes, gut-helminths and protozoa.

There were symbiotic associations between co-infecting parasites.

Mutualistic or antagonistic associations are mediated through glycoproteins secreted by those parasites, which modulate the immune system.