

Unidentified monogeneans spread like wildfire in an aquarium at the University of Johannesburg

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Introduction

Clarias gariepinus (Burchell, 1822) is an actively cultured freshwater fish in Africa and is also of great economic importance in South Africa. This catfish hosts three species of *Macrogyrodactylus* Malmberg, 1957; *M. congolensis* (Prudhoe, 1957), *M. karibae* Douëllou & Chishawa, 1995 and *M. clarii* Gussev, 1961. These flatworms are protogynous and viviparous, which enables it to spread like wildfire, reaching remarkable numbers in a short period of time. This study was aimed at identifying *Macrogyrodactylus* infecting the skin of *C. gariepinus* introduced into the Research Aquarium at the University of Johannesburg where it proliferated. Both traditional and modern techniques were used to identify the parasites and examine haptor sclerites in more detail.

Materials & Methods

Fish were captured using hand nets and parasites collected by skin scrapes with a glass slide. Fresh worms were mounted in glycerine ammonium picrate (GAP) (Malmberg 1957) for light microscopy (LM) study. Haptor sclerites were isolated and studied using scanning electron microscopy (SEM) (Dos Santos & Avenant-Oldewage 2015). Genomic DNA was extracted from fresh material using standard protocols, and 18S and ITS rDNA fragments amplified using appropriate primers and PCR protocols. Obtained sequences were compared to published data from GenBank using BLAST.



Fig. 1: Fish host *Clarias gariepinus*.

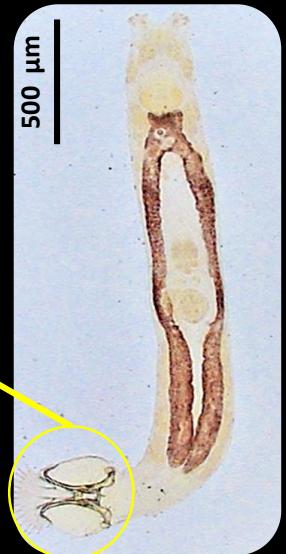


Fig. 2: Whole mounted specimen (GAP; LM).

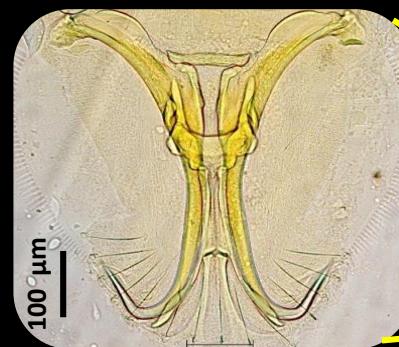


Fig. 3: Light micrograph (GAP stain) of haptor.

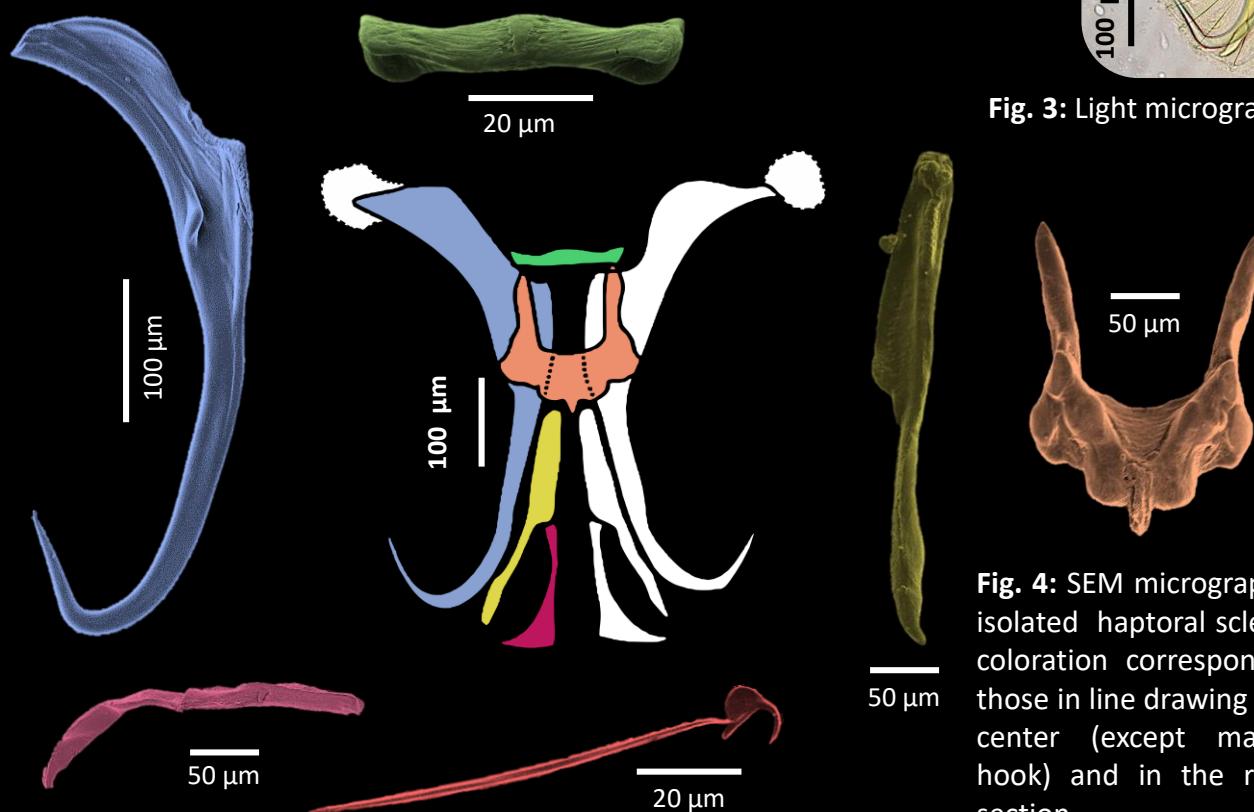


Fig. 4: SEM micrographs of isolated haptor sclerites, coloration corresponds to those in line drawing in the center (except marginal hook) and in the results section.

Results

The parasites are limited to the skin of the host and based on the morphology and DNA characterization were identified as *M. congolensis*. The haptor comprises of six different sclerites; hamulus, dorsal bar, ventral bar, short rod, long rod and marginal hook. SEM of the sclerites revealed detailed information of the individual structure, including surface topology and three-dimensional morphology.

Discussion

Molecular data supported morphometry as there was no difference between the morphology or sequences in the current study and those for *M. congolensis* from previous studies or downloaded from GenBank. This study is the first to examine isolated sclerites of any *Macrogyrodactylus* species. The technique allowed for more detailed and accurate examination of the respective sclerites. This information contributes to the limited data for species of the genus and in particular from Africa. It can, furthermore, be used to better interpret the morphology and functionality of these specialized attachment structures in future. This will support future histopathological studies and possible mechanical control of this devastating monogenean parasite in aquaculture.

References

- Dos Santos, Q.M., Avenant-Oldewage, A. (2013). Soft tissue digestion of *Paradiplozoon vaalense* for SEM of sclerites and simultaneous molecular analysis. *Journal of Parasitology*, 101: 94-97.
Malmberg, G (1957). On the new genus of viviparous monogenetic trematodes. *Arkiv for Zoologi*, 10: 317-329.