

New distribution records and molecular data for species of *Macrogyrodactylus* Malmberg, 1957 (Monogenea: Gyrodactylidae) from *Clarias gariepinus* (Burchell) (Siluriformes: Clariidae) in southern Africa

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Introduction

Of the nine known species in the genus *Macrogyrodactylus* Malmberg, three species; *Macrogyrodactylus clarii* Gussev, *M. congolensis* (Prudhoe) and *M. karibae* (Douëllou et Chishawa) are predominantly known to parasitise the skin and gills of the African sharp-tooth catfish *Clarias gariepinus* (Burchell) throughout Africa (Fig. 1). These three species are also well studied with ample publications consisting of species descriptions and elaborative information on their anatomy, pathogenicity and co-occurrence with other monogeneans in various freshwater systems on the continent. Their well-studied host *C. gariepinus* occur naturally throughout Africa as well as in the northern regions of South Africa and was introduced into the Eastern and Western Cape Provinces of South Africa from the Zambezi and northern Southern Cape Ichthyofaunal regions. No studies have been conducted on their co-introduced or potential co-invasive parasitic communities in these regions.

This study presents partial data obtained from an extensive metazoan parasitological study on *C. gariepinus* in southern Africa that includes:

- A summary on the distribution of *Macrogyrodactylus* spp. in Africa;
- Novel distribution records, morphological and molecular data for the genus.

Methods

During the present study 184 individuals of *C. gariepinus* were collected from various localities in South Africa and Zambia (Fig. 2) and subjected to a parasitological screening. Monogenea found on the fins, skin and gills were cleared in glycerin ammonium picrate for morphological identification and select individuals were fixed in 96% molecular grade ethanol for molecular characterisation of the ITS1-5.8S-ITS2 region and comparison to known species. A literature search was also conducted to construct an overview of the distribution and available knowledge for species of *Macrogyrodactylus* parasitising *C. gariepinus*.

Results

Host individuals from five of the sampled localities were infected with any combination of the three species, *M. clarii*, *M. congolensis* and *M. karibae* primarily known from *C. gariepinus* (Fig. 2). Prevalence, intensity of infestation and co-occurrence of the three species varied across localities with *M. clarii* as the dominant species when in co-occurrence with *M. karibae* or *M. congolensis*.

No clinical signs such as greyish-white patches on the skin were observed when intensities of *M. congolensis* were as high as 109 parasites per individual host.

No infestation with *Macrogyrodactylus* spp. were found on *C. gariepinus* in its invasive range in South Africa.

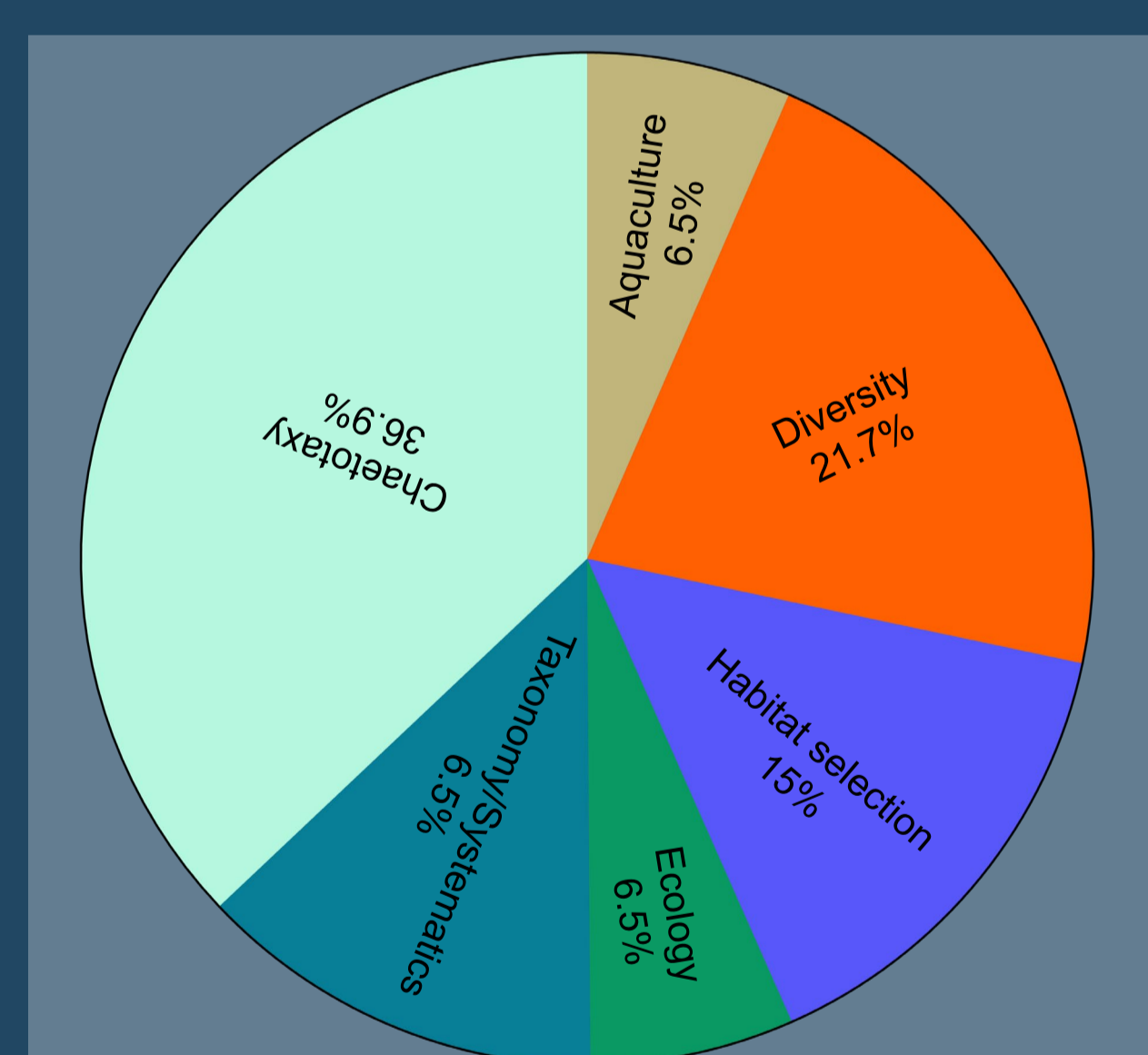


Figure 4. Focus areas of study on *Macrogyrodactylus clarii*, *M. congolensis* and *M. karibae* from *Clarias gariepinus* in Africa.

Conclusions

All records of the three species from the present study represent new distribution records. The first sequence data from South Africa and Zambia are available for the respective species

Despite the success in identification of the three species using a widely used gene region, the resolution on the interspecific relationships with basal clades are low.

Host specificity of *M. clarii*, *M. congolensis* and *M. karibae* is confirmed with 80% of all records of *Macrogyrodactylus* spp. being from *C. gariepinus*.

Disparity in knowledge on the true community composition and distribution of the species parasitising *C. gariepinus* (or even other hosts) is evident with few ecological studies in natural systems throughout the wide distribution range of the host in Africa.

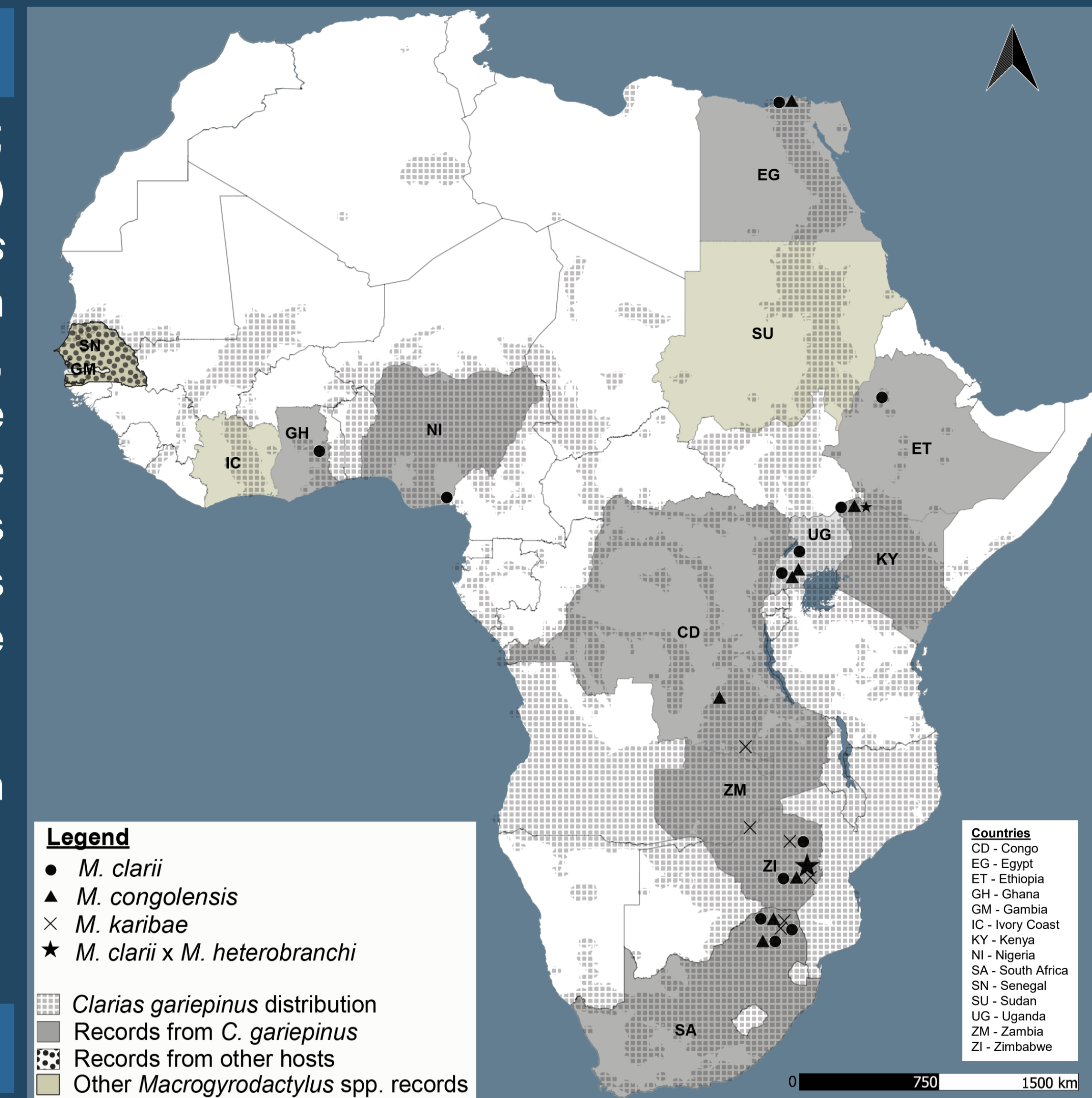


Figure 1. Distribution of *Macrogyrodactylus* spp. parasitising *Clarias gariepinus* (Burchell) throughout Africa. Light yellow countries indicate existence of other host and species records for the genus.

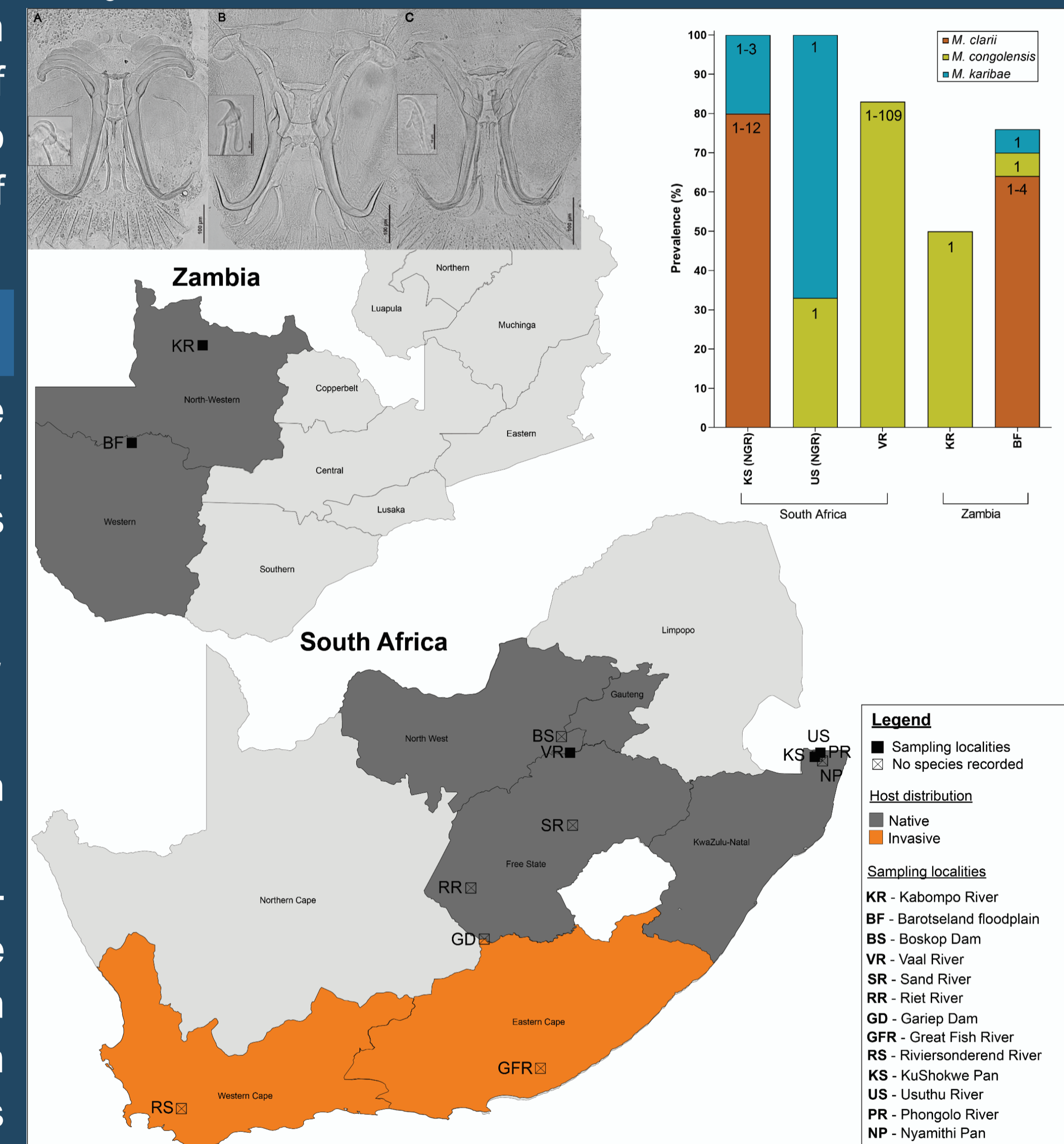


Figure 2. Map showing the sampling localities in the native and invasive distribution range of *Clarias gariepinus* (Burchell) in southern Africa. Insert top left: Micrographs of the hamuli and marginal hook of the three species *Macrogyrodactylus clarii* (A), *Macrogyrodactylus congolensis* (B) and *Macrogyrodactylus karibae* (C) found to parasitise *C. gariepinus* in the present study. Bar graph indicate species presence and prevalence (in color) with intensity (numerical values) at new localities where species of *Macrogyrodactylus* is present.

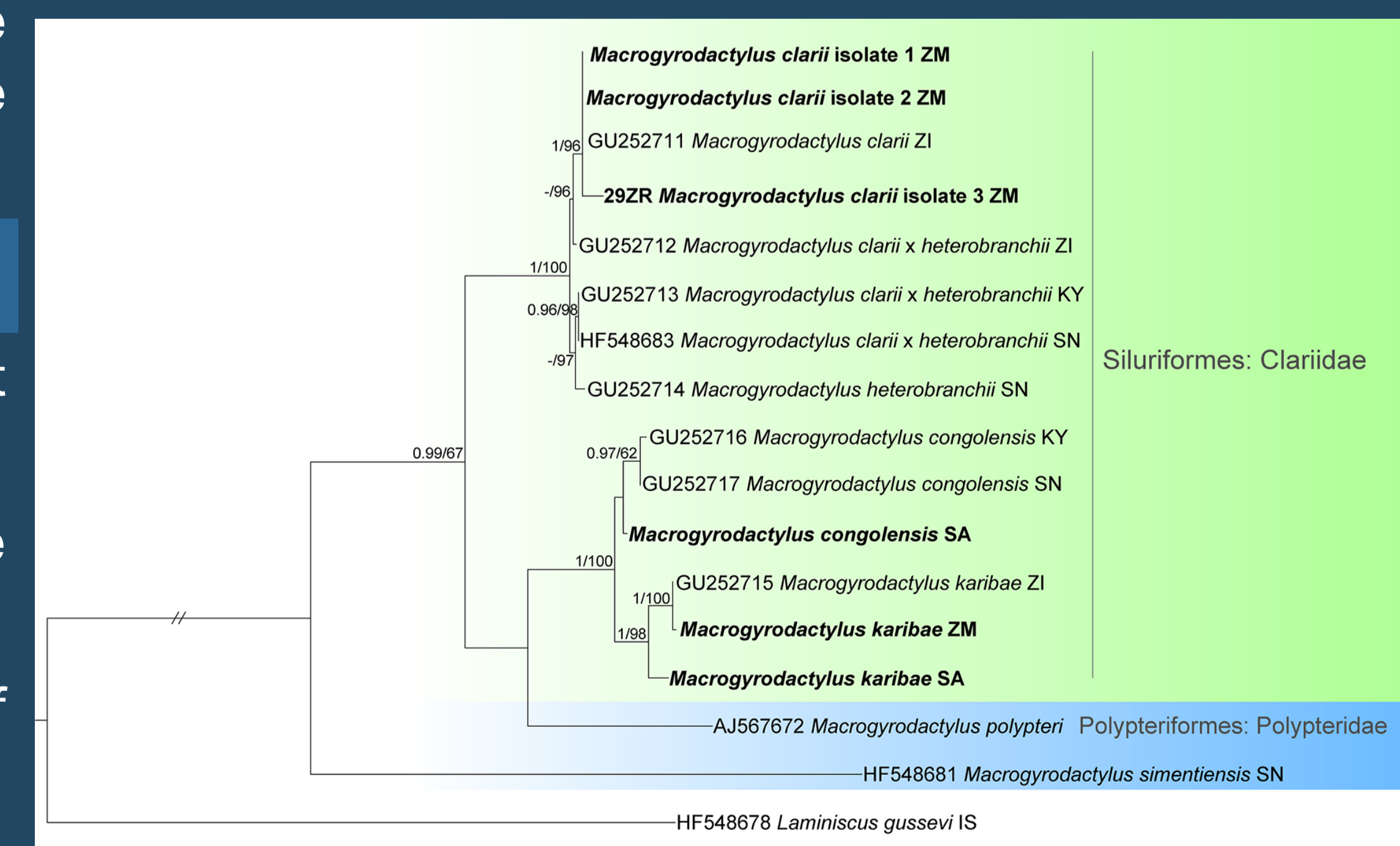


Figure 3. Maximum Likelihood phylogram of the ITS1-5.8S-ITS2 region for species of *Macrogyrodactylus* known from siluriform hosts in Africa. Posterior probabilities and bootstrap support values presented along branch nodes. Sequences obtained in the present study are presented in bold. Branch length reduced two times the scale bar.

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