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Monogenoidean parasites of fishes associated with coral reefs in the Ras Mohammed National Park, Egypt: preliminary results

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Summary

A parasitological survey of the monogenoids of 14 species of common fishes associated with the local coral reefs of the Ras Mohammed National Park, National Parks of Egypt South Sinai Sector, Egypt, was carried out from May 2003 to May 2005. The monogenoids collected during the survey included 17 species: 8 previously described species, 7 new species in established genera, and 2 new species belonging to new genera.

Key words: Monogenoidea; Ras Mohammed National Park; Red Sea; Egypt

Introduction

The Red Sea is one of the major centres of global marine biodiversity and supports 1,248 species of fishes, representing 157 families (Goren & Dor, 1994). A high rate of endemism involving an overall 17 % of the fish species is present in the area (Sheppard *et al.*, 1992). Moreover, reef fishes, serving as a traditional and fundamental component of the Egyptian diet (Froese & Pauly, 2005), represent an important resource for the area's economy (Sheppard *et al.*, 1992). Rohde (1993) stressed the commercial and economic importance of the marine fish resource, indicating that marine fish parasites are a potential threat to fish abundance. One of the main groups of fish ectoparasites includes flatworms of the Class Monogenoidea, which primarily parasitize the body surfaces (gills, skin and fins) of their hosts. Monogenoids are considered to be highly host-specific, although some evidence suggests that a lower host specificity in some species exists (Chisholm & Whittington, 1996, 1997).

In the Red Sea, monogenoids have been studied principally by Paperna (1965, 1972a,b,c), Paperna *et al.* (1984), Diamant and Paperna (1986), and Diamant (1989), and more recently by Kritsky *et al.* (2007a,b). However, these studies all considered relatively few fish species compared to the diversity occurring in the area, and it is clear that additional research is needed to determine total diversity in the region.

A parasitological survey of the monogenoids of 14 fish species belonging to the ichthyofauna of the Ras Mohammed National Park, Egypt, was carried out during May 2003 to May 2005. The study, sponsored by CEMT (Center for Ecology of Marine Tropical environments, Italy), aimed to improve the existing data on the monogenoids of fish from the Red Sea and to provide a preliminary estimate of monogenoidean diversity in the area.

Material and Methods

Fish were collected from May 2003 to May 2005 in the Ras Mohammed National Park (27° 45.150'N; 34° 15.590'E) and transported in water to the laboratory where the gills were immediately screened for monogenoids. Scientific names of hosts are those provided in Fishbase (Froese & Pauly, 2005). Live specimens were fixed with AFA (alcohol-formalin-acetic acid) and mounted in glycerol gelatin (Malmberg, 1970). Phase contrast microscopy was used to study the hard parts of the haptor and reproductive system.

Voucher specimens were deposited in the parasitological collection of the Museo di Storia Naturale di Milano, Italy (*Glyphidohaptor plectocirra*, MSNM Pi 3873 – 3891; *Diplectanum bauchotae,* MSNM Pi 4602 – 4610; *Diplectanum cazauxi*, MSNM Pi 4611 – 4649; *Haliotrema* (sensu lato) sp. n. 1, MSNM Pi 4650 – 4718; *Haliotrema* (sensu lato) sp. n. 2, MSNM Pi 4719 – 4720; *Haliotrema* (sensu lato) sp. n. 3, MSNM Pi 4721 – 4726; *Haliotrema* (sensu lato) sp. n. 4, MSNM Pi 4824 – 4840; *Haliotrema curvipenis*, MSNM Pi 4727 – 4771; new species, new genus 1, MSNM Pi 4772 – 4782; new species, new genus 2, MSNM Pi 4783 – 4797; *Protogyrodactylus* sp. n. 1, MSNM Pi 4798 – 4819; *Protogyrodactylus* sp. n. 2, MSNM Pi 4820 –

Table 1. Monogenoids found on the 14 examined host species

Hosts	Number of examinated hosts	Parasites
Apogon cyanosoma Bleeker, 1853,	6	*Haliotrema* (sensu lato) sp. n. 1
Crenimugil crenilabis (Forsskål, 1775)	1	New genus, new species 1
		Haliotrema (sensu lato) sp. n. 2
Epinephelus fasciatus (Forsskål, 1775)	2	*Pseudorhabdosynochus melanesiensis* (Laird, 1958) Kritsky & Beverley-Burton, 1986
		Syn. *Diplectanum cupatum* Young, I969
		Cyclopectanum cupatum (Young, 1969) Beverley-Burton & Suriano, 1981
		Pseudorhabdosynochus cupatum (Young, 1969) Kritsky & Beverley-Burton, 1986
Gerres longirostris (Lacepéde, 1801)	10	*Protogyrodactylus* sp. n. 1
		Protogyrodactylus sp. n. 2
		Protogyrodactylus sp. n. 3
		New genus, new species 2
Lethrinus borbonicus Valenciennes, 1830	1	Negative
Lethrinus nebulosus (Forsskål, 1775)	2	*Haliotrema* (sensu lato) sp. n. 4
Lethrinus variegatus Valenciennes, 1830	4	*Haliotrema* (sensu lato) sp. n. 3
Mulloidichthys flavolineatus (Lacépède, 1801)	1	*Haliotrema curvipenis* Paperna 1972
Mulloidichthys vanicolensis (Valenciennes, 1831)	1	*Haliotrema curvipenis* Paperna 1972
Plectorhinchus schotaf (Forsskål, 1775)	1	Negative
Sphyraena flavicauda Rüppel, 1838,	2	*Diplectanum bauchotae* Oliver & Paperna, 1984
		Diplectanum cazauxi Oliver & Paperna, 1984
Siganus luridus	5	*Tetrancistrum polymorphus* (Paperna, 1972) Kritsky, Galli & Yang, 2007
		Syn. *Pseudohaliotrematoides polymorphus eilaticus* Paperna, 1972;
		Pseudohaliotrematodides polymorphus eilaticus of Ktari and Ktari (1974) (misspelling)
		Glyphidohaptor plectocirra (Paperna, 1972) Kritsky, Galli & Yang, 2007
		Syn. *Pseudohaliotrema plectocirra* Paperna, 1972
		Tetrancistrum plectocirra (Paperna, 1972) Lim, 2002
Siganus rivulatus Forsskål, 1775	3	*Tetrancistrum polymorphus* (Paperna, 1972) Kritsky, Galli & Yang, 2007
		Syn. *Pseudohaliotrematoides polymorphus eilaticus* Paperna, 1972
		Pseudohaliotrematodides polymorphus eilaticus of Ktari & Ktari (1974) (misspelling)
		Tetrancistrum strophosolenum Kritsky, Galli & Yang, 2007
		Syn. *Pseudohaliotrematoides nagatyi* Diamant, 1985 (*nomen nudum*)
		Pseudohaliotrematoides polymorphus spp. of Diamant & Paperna (1986)
		Pseudohaliotrematoides nagatyi of Diamant (1989) (*nomen nudum*)
		Pseudohaliotrematoides polymorphus "nagatyi" of Diamant *et al.* (1999)
		Tetrancistrum suezicus (Paperna, 1972) Kritsky, Galli & Yang, 2007
		Syn. *Pseudohaliotrematoides polymorphus suezicus* Paperna, 1972
		Pseudohaliotrematodides polymorphus suezicus of Ktari and Ktari (1974) (misspelling)
		Pseudohaliotrematoides suezicus Paperna, 1972
		Glyphidohaptor plectocirra (Paperna, 1972) Kritsky Galli & Yang, 2007
		Syn. *Pseudohaliotrema plectocirra* Paperna, 1972
		Tetrancistrum plectocirra (Paperna, 1972) Lim, 2002
Tylosurus choram (Rüppell, 1837)	1	Negative

4823; Protogyrodactylus sp. n. 3, MSNM Pi 4851 – 4852; *Pseudorhabdosynochus melanesiensis*, MSNM Pi 4841 – 4844; *Tetrancistrum polymorphus*, MSNM Pi 4845 – 4846; *Tetrancistrum suezicus*, MSNM Pi 4847 – 4848; *Tetrancistrum strophosolenum*, MSNM Pi 4849 – 4850).

Results

The monogenoids collected from the examined fish comprised 17 species: 8 previously described species, 7 new species belonging to known genera, and 2 new species belonging to new genera (Table 1). *Lethrinus borbonicus*, *Plectorhinchus schotaf* and *Tylosurus choram* were all negative for species of Monogenoidea. All of the other fish species examined during the survey presented a minimum of one monogenoidean species each, with a maximum of 4 species found on *Siganus rivulatus*. Given the variable and comparatively small numbers (1 to 10) of hosts examined

during the survey, an underestimation of the number of species of monogenoids per host is likely.

Discussion and Conclusion

Whittington (1998) provided an estimate of world diversity of monogenoidean species based on the assumption of the putative high host-specificity among these parasites. He quotes the total number of valid (described) fish species at 24,614 and estimates that a total of 24,000 to 25,000 (described and undescribed) monogneoids could exist worldwide, given the assumption that each fish species is parasitized by an average of 1 monogenoidean species. Our data (with an average of 1.2 monogenoidean species per host species) confirm this supposition. Therefore, we estimate that a total of approximately 1,250 monogenoidean species may be found on the fishes of the Red Sea. Moreover, previously published works (Post & Millest, 1991; Cribb *et al.,* 1994) indicate that a 95 % confidence of collecting a parasite species with a prevalence of 28 % or more from an individual host species requires a minimum of 9 specimens of the host be surveyed. This threshold of 9 hosts was not attained for most of the fish species examined in this study. Consequently, our estimations of 1.2 monogenoidean species per fish host species and a total of 1,250 species in the Red Sea are likely significant underestimations of the actual biodiversity existing in the region. In addition, the present survey did not include screening for parasitic species occurring on the fins and skin of the examined hosts. Thus, study of monogenoids of fish from the Red Sea deserves additional effort both in terms of parasite diversity and of host-specificity.

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