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Report on a cruise of RV *Tyro* to the Seychelles in 1992 and 1993

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6.5. INTERSTITIAL AND PARASITIC PLATYHELMINTHES FROM THE COAST OF THE SEYCHELLES

E.E. Martens & G.G. De Clerck

1. Interstitial Platyhelminthes

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1.1. introduction

Information on free living Platyhelminthes is very scarce for the Western Indian Ocean. Only 17 species have been mentioned from the Somalian coast (Schockaert, 1971; 1982; Schockaert & Martens, 1985; 1987), while twelve species of Kalyptorhynchia have been reported from the Kenyan coast (Jouk & De Vocht, 1989). During the two preceding years the Kenyan coast was sampled twice. Part of our results from Kenya and from the Seychelles will be published elsewhere (De Clerck & Schockaert, in press). A new genus and species will be described in a separate volume on zootaxonomic results. In this contribution we will compare data concerning Rhabdocoela from those earlier studies with new data from the Seychelles.

1.2. material and methods

Animals were extracted from the sand by using the $MgCl_2$ decantation method (Boaden, 1963). The worms were studied alive using a light microscope, and afterwards mounted with lactophenol. If available, the remaining specimens were fixed in Bouin and/or Stieve solutions for light microscopic sections and gluteraldehyde for electron microscopy.

1.3. results

A list of the sampling stations including the types of sediment sampled, is given in the stationlist in chapter 5. Table 1 lists further characteristics of the sampling stations and the species found.
Taxonomic study of the unidentified species and description of new taxa is still ongoing. More data are needed on the species of both the Seychelles and the continent before any consideration can be formulated about biogeographic aspects.
This report gives new locality records for the freeliving Turbellaria, as well as a number of records of undescribed species (Table 1).

2. Parasitic Platyhelminthes

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2.1. introduction

Parasitic Platyhelminthes of marine fishes and echinoderms have not received much attention in the Western Indian Ocean, except for the few studies mentioned below.
For the Kenyan coast only four Monogenea of fishes were reported (Paperna, 1972; Olliver & Paperna, 1984) besides our own survey on fish parasites which started in 1991 (Martens, 1992; Martens & Moens, submitted). Fifteen species of Digenea have been reported for Mocambique (Paruchin, 1983; Reimer, 1981, 1983), eleven species for the Seychelles (Toman, 1977, 1989) and four species for Madagascar (Razarihelisoa, 1960). Some of these Digenea were also reported for Kenya (Martens, 1992; Martens & Moens, submitted). Some fish species of the Seychelles were sampled to compare the parasite species with the data on fishes from the Kenyan coast.
This study on parasitic Platyhelminthes of the Seychelles focussed mainly on Umagillidae (Turbellaria, Rhabdocoela).
The familly Umagillidae is of special interest as it forms the largest parasitic group of Turbellaria, which are essentially free-living Platyhelminthes. They form the basis for the generally accepted opinion that trematodes and cestodes stem from rhabdocoels that adopted a parasitic mode of life. Research on this family may reveal valuable information on the evolution of the parasitic habit and for phylogenetic studies of Platyhelminthes.
The majority of the Umagillidae live in either the coelom or the digestive tract of Echinodermata, while a few species occur in Sipunculida. Only four Umagillidae are known from echinoderms of Madagascar (Hyman, 1960). From our survey at the Kenyan coast, which started in 1992, one new species has been described so far (Moens & Martens, 1992; Gevaerts *et al.*, 1993).

2.2. material and methods

Echinoids and holothurians were collected by hand or by snorkeling from lagoons and reef flats, while fishes were obtained from fishermen. Collection stations are listed in chapter 5.
Sampling of parasites was done from fresh animals. Whenever possible the echinoderms were kept in aquaria for a few hours prior to dissection to allow evacuation of sand from the gut which makes searching for parasites easier. Parasites were first studied alive and than fixed and mounted with lactophenol. Some specimens were fixed in FAA for whole mounts while flattening them slightly by pressure from a cover slip. For light microscopic serial sections specimens were fixed in Steve and Bouin solution, and for electron microscopic studies in glutaraldehyde.
Just like in free-living Turbellaria, identification is mainly based on characteristics of the reproductive organs.

2.3. results and Discussion

The parasites found in echinoderms and fishes are listed in Table 3. Most of the parasites found are first records for the Seychelles.

a) Fish parasites

• *Gyliauchen papillatus* (Goto & Matsudaira, 1918) (Digenea) found in *Siganus coralinus* (Cuvier & Valenciennes, 1835) agrees well in anatomy but has smaller body sizes than the range reported so far: (all measurements in µm) body 1200-1300 x 570-680, oral sucker 160-200 x 150-200, acetabulum 280-350 x 230-300, pharynx 280-315 x 150-270, anterior testis 120-200 x 120-150, posterior testis 125-230 x 120-170, ovary 62-100 x 45-95, cirrus sac 200-270 x 130-260, eggs 50-70 x 35-41. The same species has also been reported for a siganid species from the Seychelles (Toman, 1989) and for *S. sutor* (Cuvier & Valenciennes, 1835) from the Kenyan coast (Martens, 1992; Martens & Moens, submitted). It was also found in *S. lineatus* (Cuvier & Valenciennes, 1835) of the Great Barrier Reef, Australia (Beumer *et al.*, 1982) and of New Caledonia (Durio & Manter, 1969).
G. papillatus, previously known to be a typical parasite of *Siganus* spp. of the western Pacific (Japan, Celebes, Philippines) (Velasquez, 1975), is hereby shown to extend its range well into the Indian Ocean. It represents a new host record for the Seychelles.

• *Hexangium sigani* Goto et Ozaki, 1929 (Digenea) found in *Siganus sutor* and in *S. coralinus* has also been reported for the Seychelles in a siganid species (probably *S. oramin* (Bloch & Schneider, 1801)) (Toman, 1977), in *S. sutor* from the Kenyan coast (Martens, 1992) and in *Holocentrus sammara* (Forsk.) from Madagascar (Razarihelisoa, 1960). The specimens fall well within the known variations in body sizes reported for this species: (measurements in µm) body size 2980-3750 x 560-1180, oral sucker 150-185 x 150-178, prepharynx 510-660, testes 230-385 x 220-350, ovary 150-180 x 110-170, eggs 68-72 x 40-46. *H. sigani* has also been reported for *S. argenteus* and *S. rivulatus* from the Red Sea (Diamant & Paperna, 1986) and in a siganid species from the Great Barrier Reef (Beumer *et al.*, 1982) and from New Caledonia (Durio & Manter, 1969).
Considering the various reports on this species in the Pacific (Velasquez, 1975) and the records given above, it can be concluded that *H. sigani* is predominantly an intestinal parasite of *Siganus* spp. and shows a wide distribution in the Indo-Pacific. This report represents new host records for the Seychelles.

• *Tetrancistrum sigani* Goto & Kikuchi, 1917 and *Procamallanus sigani* found in *S. sutor* represent new records for the Seychelles. The same species were also found in *Siganus* spp. from Japan (Yamaguti, 1963) and in *S. sutor* from Kenya (Martens, 1992). However, for the latter the infection prevalences and intensities were much higher (Martens & Moens, submitted).

• Other fish parasites listed, neede further identification.

b) Parasites of echinoderms

All umagillid species are new records for the Seychelles.

• *Anoplodium longiductum* Hyman, 1960 found in *Holothuria cinerascens, H. atra, H. parva* and *Actinopyga miliaris* represents new host records. The species has been reported from *Actinopyga* sp. of Madagascar (Hyman, 1960). Additions to the description by Hyman (1960) are: the hook-like extensions at the poles of the egg capsules, the sclerotised cap-like structure on the anterior end of the bursa copulatrix and its connection with the receptaculum seminis by a sclerotised duct, granular gland cells opening into the ejaculatory duct at its proximal end. A similar species was found in *H. atra* and *H. parva* of the Kenyan coast but it differs in the egg capsule structure and the non-sclerotised bursal duct to the receptaculum seminis. A detailed comparison of both species is being undertaken based on serial sections (Martens *et al.*, in prep.).

• *Cleistogamia holothuriana* Faust, 1924 found in *A. mauritiana* and in *H. leucospilota* represents a new host record for the latter host species. The same species has been reported from *A. mauritiana* of Madagascar (Hyman, 1960) and *A. echinites* of theAndaman Islands (Baer, 1938). Additions to the redescription by Baer (1938) are: the bursal valve receiving the sclerotized vaginal duct and bursal duct, is situated on the anterior lateral side of the bursa. The specimens fall well in the range of body sizes reported for this species.

• *Paranotothrix* n.sp. was found in *Thelenota ananas, H. impatiens, H. pardalis, H. atra, Stichopus variegatus* and *A. miliaris*. This species shows a wide variety of host species, similar to *P. queenslandensis* Cannon, 1982, the only other species of this genus.
The specimens show all genus characteristics for *Paranotothrix:* paired extensive follicular testes and vitellaria, paired ovaries, penis stylet and simple uterus, except for having a bursal valve. The penis stylet is shorter and has a different structure. In possessing a bursal valve it resembles *Notothrix inquilina* Hickman, 1955 which however has lobulate testes.
The species description will be given in another publication.

• *Anoplodium* sp. (sp.nov. ?) found in *S. variegatus* and *A. miliaris* resembles *Anoplodium longiductum* but shows a sclerotised penis papilla. This characteristic will be further analyzed on serial sections.

• *Cleistogamia* cfr. *loutfia* found in *Actinopyga* sp. has to be further analyzed on serial sections and compared with specimens of *C. loutfia* (Khalil-Bey & Azim, 1937) concerning the length of the stylet, the number of loops that the stylet forms, the bursal valve seen in our specimens but not described by Khalil-Bey (1938), and the number of threads of the egg capsule tail.

• *Syndesmis glandulosa* Hyman, 1960 found in *Echinothrix calamaris* agrees with the redescription by Komschlies & Vande Vusse (1980) and represents a new location record. The same species has been reported from *Diadema setosum* of Madagascar (Hyman, 1960) and from *E. calamaris* of the Philippines (Komschlies & Vande Vusse, 1980). A similar species has been found in *D. savigny* of the Kenyan coast, but differes in the length of the stylet and the lancet-like tip of the stylet (Martens *et al.*, in prep.).

discussion

The Umagillidae also showed a very low infection prevalence and infection intensity when compared to our findings in Kenya. Even for the few stations with higher abundancies of echinoderms which may allow for easier infection transmission, such as Bird Island (sta. 629, 633B, 636) and Beauvallon (sta. 641), the samples had very low numbers of parasites or none at all. Whether this may be related to seasonal effects or spatial distribution in host species cannot be concluded as too low numbers of hosts and areas were covered in this study.

The umagillids inhabiting the coelom and/or digestive tract of echinoids and holothurians were considered as classical commensals (Jennings, 1971). However, recent studies indicate that intracoelomic umagillids live from coelom fluid and coelomocytes, while gut-associated species may feed on contents of the digestive tract and intestinal tissues (Cannon, 1982; Jangoux, 1987). The species that we found in the anterior to mid gut, had the same yellow to red pigmentation as the epithelium of that part of the intestine, while the ones found in the posterior gut had the same creamy colour as the gut epithelium. The pigment appears to derive from the gut epithelium to which the worms are sometimes firmly attached by means of their pharynx. This clearly indicates that Umagillidae feed on the gut tissues and are thus parasitic.

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Table 6.5.1. Sampling stations and preliminary results for free-living Turbellaria

Sta.	Locality	Sediment	Characteristics of station	Species of Turbellaria
625A	Mahé, Islette	coarse	middle eulittoral	–
625B	„	coarse	m-h, seepage with detritus	*Promesostoma* sp.
625C	„	medium	high eulittoral, current	Provorticidae sp. A *Carcharodorhynchus* cfr. *multidentatus*
625D	„	medium	h, yellow water	Proseriata sp. A
625E	„	fine	shallow pool in seagrass bed	Proseriata sp. –
625F	„	coarse	high eulittoral	–
625G	„	silt	underwater sandflat	–
625H	„	medium	high eulittoral	–
626A	Mahé, Grande Anse	fine	middle eulittoral, *Avicennia*, withdetritus	*Gyratrix hermaphroditus* *Cheliplana asica* Koinocystidae sp. *Gaziella* n.sp. Proseriata sp. juveniles
626B	„	coarse	low eulittoral, sandflat	*Rogneda* sp. Proseriata sp. B
626C	„	medium	middle eulittoral, on riverside	*Gyratrix hermaphroditus* Koinocystidae n.sp. Provorticidae sp.A Proseriata sp. C Proseriata sp. D
626D	„	fine	low eulittoral, sandflat (under B)	Polycystididae sp.A *Phonorhynchoides* n.sp. A Proseriata sp. C Provorticidae sp.A
627	Mahé, Anse Marie Louise	fine	30 cm below low eulittoral	Nematoplanidae (juvenile) *Cheliplana asica* Proseriata spp.E/F/G
628	Bird Island-S. West	coarse	high eulittoral	Proseriata sp.B
629	Bird Island-West	fine	high eulittoral	–
630	Bird Island-N. East	fine	h, beach rim	Proseriata sp.H
631	Bird Island-N.point	medium	high eulittoral	–
632	Bird Island-N. West	medium	middle eulittoral	–
633	Bird Island-S. West	green algae	reef flat	–
634	Bird Island-S. West	coarse	pool reef front	*Unicorhynchus* cf. *hamatus* *Polycystis* sp.A (n.sp.?) *Polycystis felis* *Austrorhynchus* sp. (n.sp.?) Proseriata sp.I
635	Bird Island-S. East	medium	h, dead seagrass	–
636	Bird Island-S point	coarse	–1.5m below l	–
637	Bird Island-S point	fine	m-l	–
638A	B-Anse aux Pins	fine	surge channels behind reeffront	Proseriata juveniles *Cheliplana asica*
638B	Mahé, Anse aux Pins	m-c	between beach and reeffront, 50 cm below l	*Gyratrix hermaphroditus* Polycystididae juvenile Proseriata sp. J
639A	Mahé, Anse Nord d'Este	coarse	m, strong surf	Proseriata sp H

Table 6.5.1. Continued.

Sta.	Locality	Sediment	Characteristics of station	Species of Turbellaria
639B	Mahé, Anse Nord d'Eeste	coarse	h, between boulders	–
640A	Mahé, N West	medium	m, sheltered bay	Proseriata juveniles
640B	Mahé, N West	fine	h, near riverbed	Proseriata juveniles
641A	Mahé, Beau Vallon	coarse	h, between boulders	Proseriata spec K *Gyratrix hermaphroditus*
641B	Mahé, Beau Vallon	fine	high eulittoral, in small pool in seagrassbed	Promesostomidae n.gen. n.sp. *Gyratrix hermaphroditus* Schizorhynchidae sp. A Prolecitophora sp. Proseriata spec L
641C	Mahé, Beau Vallon	fine	h, near riverbed, colder water	–
642A	Mahé, Ferry port	fine	mangrove, *Avicennia*, with garbage	–
643	Fish samples for parasites			
644A	Mahé, Port Launay NMP northern part bay	coarse	high eulittoral, seepage area	*Cheliplana asica* Proseriata spec D(?)
644B	Mahé, Port Launay NMP	coarse	m, no seepage	Proseriata juveniles
645	Mahé, Port Launay National Marine Park	medium	h, more southern part of the bay	Proseriata sp.M Proseriata sp.K
646A	Mahé, Port Launay National Marine Park	very fine	beyond reeffront close to N.Y.C.	Promesostomidae n.gen. n.sp. *Unicorhynchus hamatus*
646B	Mahé, Port Launay NMP	fine	between beach/reef	Proseriata sp.L
647	Mahé, Police Bay	coarse	m-h, strong surf	Proseriata juveniles
648	Mahé, Takamaka	oarse	m-l	Proseriata juveniles
649	Mahé, Baie Lazare	very fine	30 cm below l	–
650	Praslin, Grande Anse	silty	20 cm below l much detritus	Coelogynoporidae sp.A
651	Praslin, Anse Petite Kerlan	fine	50 cm below low eulittoral	Coelogynoporidae sp.A *Schizochilus* sp. A Schizorhynchidae sp.B
652A	Praslin, Anse Kerlan	fine	2m below low eulittoral in *Sargassum* field	Schizorhynchidae sp.B Coelogynoporidae sp.A Proseriata juveniles
652B	Praslin, Anse Kerlan	coarse	middle eulittoral	–
653	Praslin, Grande Anse	medium	sandflat, 3m below l	Proseriata sp.L
654A	La Digue, Port	coarse	m-h	Proseriata sp.K
654B	La Digue, Port	fine	50cm below low eulittoral	*Cheliplana asica* Proseriata sp.L Nematoplanidae juveniles Coelogynoporidae sp. A
655	La Digue, Anse Fourmis	medium	m-h	Proseriata sp. H
656	La Digue, Anse Grosse Roche	fine	m, pool (never dry)	*Cheliplana asica* Proseriata sp. N
657	La Digue, Anse Severe	coarse	m-h, strong surf	*Cheliplana asica* Nematoplanidae juveniles
658	La Digue, Grande Anse	fine	m, very strong surf	–
659	fish samples for parasites			
660	Mahé, l'Ilot	coarse	22,5 m, with detritus	–
661	Mahé, Beau Vallon	fine	10 m depth	*Schizochilus* sp. A Proseriata juveniles

Table 6.5.1. Continued.

Sta.	Locality	Sediment	Characteristics of station	Species of Turbellaria
662	fish samples for parasites			
663A	Desroches, SW	fine	h, with coraldebris	Proseriata juveniles
663B	Desroches, SW	fine	–2m, with detritus	Polycystididae sp. B *Unicorhynchus hamatus* *Carcharodorhynchus* cfr. *ambronensis*
663C	Desroches, SW	less fine	–4m, with detritus	Nematoplanidae juveniles *Carcharodorhynchus* juveniles *Cheliplana* juveniles Macrostomida sp.
664	Desroches, Slope 'Circus'	coarse	–24m, on rocks layer of 5cm sand	Typhlopolycystidinae sp. *Polycystis* sp. *Carcharodorhynchus* cfr. *ambronensis*
665A	Desroches, W snorkling point	coarse	4m depth, 60m away from shore	Polycystididae sp. C Proseriata spec O *Phonorhynchoides* n.sp. B
665B	Desroches, W	fine	-2m, with detritus	*Promesostoma* sp. B *Unicorhynchus* cfr. *hamatus* Proseriata sp. O Polycycstididae sp.C *Gyratrix* sp.
666	Desroches, S.East	medium	low eulittoral	Proseriata sp. K
667	Desroches, S Point	medium	l, shallow pool	–
668	Silhouette	medium	low eulittoral	Proseriata sp. L

Legend: l = low eulittoral; m = middle eulittoral; h = high eulittoral

Table 6.5.2. Rhabdocoelan species found on the Seychelles compared with their records from the African continent.

Taxon	Seychelles	Continent
EUKALYPTORHYNCHIA		
Gyratrix hermaphroditus	*	*
Polycystis subcontorta	*	*
Polycystis felis	*	*
Polycystididae sp. A	* Desroches	
Polycycstididae sp. B	* Desroches	
Phonorhynchoides n.sp. A	*	*
Phonorhynchoides n.sp. B	* Desroches	
Polycystididarum n.gen. n.sp.	* Desroches	
Unicorhynchus hamatus	*	*
Unicorhynchus cfr. *proporus*	*	
Koinocystididae n.sp. (n.gen.?)	*	*
SCHIZORHYNCHIA		
Carcharodorhynchus multidentatus	*	
Carcharodorhynchus cfr. *ambronensis*	* Desroches	
Cheliplana asica	*	*
Schizochilus sp. A	*	*
Schizochilus sp. B	*	*
Schizorhynchidae sp.	*	
DALYELLOIDA		
Provorticidae sp.	*	*
TYPHLOPLANOIDA		
Promesostomidae n.gen. n.sp.	*	*
Gaziella lacertosa	*	*
Promesostoma n.sp.	*	

Table 6.5.3. Parasites of echinoderms and fishes

sta.	host species and common name	n	n infected	parasites found	location	max. intensity
627	*Abudefduf saxatilis* Sergeant-major	4	2	*Hatschekia* sp.	gills	4
				Hysterolecitha sp.	stomach	3
	Lethrinus mahsena Emperor	3	0	–		
	Carangoides malabaricus Emperor	2	0	–		
	Lutjanus sebae Emperor	2	0	–		
	Diadema savignyi echinoid	2	0	–		
	Toxopneustes pileolus echinoid	1	0	–		
	Tripneustes gratilla echinoid	3	0	–		
	Holothuria atra holothurian	5	0	–		
	Stichopus chloronotus holothurian	3	0	–		
629	*Balistapus undulatus* Red-lined Triggerfish	2	0	–		
	Lethrinus mahsena Emperor	3	0	–		
	Tripneustes gratilla echinoid	13	0	–		
	Diadema savigny echinoid	2	0	–		
	Holothuria atra holothurian	5	0	–		
	Stichopus chloronotus holothurian	4	0	–		
	Actinopyga mauritiana holothurian	5	0	–		
633B	*Holothuria atra* holothurian	3	0	–		
	Bohadschia marmorata holothurian	2	0	–		
	Actinopyga mauritiana holothurian	5	0	–		
636	*Holothuria atra* holothurian	3	0	–		
	Stichopus chloronotus holothurian	2	0	–		
638	*Stomopneustes variolaris* echinoid	2	0	–		
639	*Holothuria cinerascens* holothurian	3	1	*Anoplodium longiductum*	intestine	5
	Holothuria atra holothurian	8	1	*Anoplodium longiductum*	intestine	4
	Stichopus chloronotus holothurian	4	0	–		
	Holothuria parva holothurian	3	1	*Anoplodium longiductum*	intestine	1
	Actinopyga mauritiana holothurian	3	1	*Cleistogamia holothuriana*	intestine	12
641	*Holothuria arenicola* holothurian	3	0	–		
	Holothuria leucospilota holothurian	1	0	–		
	Actinopyga mauritiana holothurian	5	4	*Cleistogamia holothuriana*	intestine	22
	Thelenota ananas holothurian	1	1	*Paranotothrix* n.sp.	intestine	12
	Bohadschia marmorata holothurian	2	0	–		
	Actinopyga miliaris holothurian	3	0	–		
643	*Siganus sutor* Common Rabbitfish	5	5	*Tetrancistrum sigani*	gills	7
				Tetrancistrum sp.	gills	5
				Microcotyle sp.	gills	3
				Hexangium sigani	intestine	6
				Procamallanus sigani	intestine	5
	Siganus coralinus Orange Spinefoot	3	1	*Gyliauchen papillatus*	intestine	39
				Hexangium sigani	intestine	5
				Procamallanus cfr *lonis*	intestine	4
	Siganus stellatus Spiny Rabbitfish	2	0	–		

Table 6.5.3. Continued

sta.	host species and common name	n	n infected	parasites found	location	max. intensity
646	*Actinopyga miliaris* holothurian	3	1	*Anoplodium longiductum*	intestine	1
	Holothuria impatiens holothurian	3	1	*Paranotothrix* n.sp.	intestine	1
	Actinopyga mauritiana holothurian	3	1	*Cleistogamia holothuriana*	intestine	11
	Stichopus chloronotus holothurian	4	0	–		
	Holothuria atra holothurian	5	0	–		
	Holothuria pardalis holothurian	2	0	–		
650	*Holothuria atra* holothurian	8	0	–		
651	*Stichopus variegatus* holothurian	3	1	*Paranotothrix* n.sp.	intestine	2
				Anoplodium sp.	intestine	1
	Actinopyga miliaris holothurian	1	1	*Paranotothrix* n.sp.	intestine	5
				Anoplodium sp.	intestine	1
	Actinopyga mauritiana holothurian	2	1	*Cleistogamia holothuriana*	intestine	20
659	*Holothuria pardalis* holothurian	1	1	*Paranotothrix* n.sp.	intestine	4
	Holothuria nobilis holothurian	2	0	–		
660	*Holothuria leucospilota* holothurian	1	1	*Cleistogamia holothuriana*	intestine	15
	Actinopyga sp. holothurian	1	1	*Cleistogamia* cfr. *loutfia*	intestine	49
661	*Holothuria hilla* holothurian	1	0	–		
662	*Rastrelliger kanagurta* Mackerel	3	1	Digenea sp.1	stomach	6
				Digenea sp. 2	intestine	9
	Lutjanus bohar Snapper	3	0	–		
665	*Stichopus chloronotus* holothurian	3	0	–		
	Stichopus variegatus holothurian	1	0	–		
	Holothuria atra holothurian	4	2	*Anoplodium longiductum*	coelom	2
				Paranotothrix n.sp.	intestine	9
744	*Echinothrix calamaris* echinoid	3	1	*Syndesmis glandulosa*	intestine	4