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Cestode parasites from the elasmobranchs *Heptranchias perlo* and *Deania* from the Great Meteor Bank, central East Atlantic

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Abstract − A total of ten *Heptranchias perlo*, eight *Deania histricosa*, two *D. calcea*, and two *D. profundorum* from the Great Meteor Bank, central East Atlantic, were studied for cestodes. The elasmobranchs were caught using bottom trawl or long-lines during September 1998 in 298–1075 m water depth. Seven different cestode species were found: *Tentacularia coryphaenae*, *Deanicola minor*, *D. protentus*, *Grillotia meteori* sp. nov., *Grillotia* cf. *microthrix* (Trypanorhyncha), *Crossobothrium dohrnii*, and *Crossobothrium* sp. (Tetraphyllidea). *T. coryphaenae* occurred encapsulated in the stomach wall and all other species were found within the host intestine. *G. meteori* sp. nov. and *G.* cf. *microthrix* additionally infested the musculature as well as the stomach and intestinal wall. *D. profundorum* harboured five different cestode species and *D. histricosa*, *H. perlo*, and *D. calcea* were infested with four, three and two species, respectively. With 332 and 181 specimens, *D. minor* and *G.* cf. *microthrix* were the most abundant cestodes. *Grillotia meteori* sp. nov., *Crossobothrium* sp., and *C. dohrnii* were host specific for *Deania profundorum, D. histricosa* and *H. perlo*, respectively. The other species were found in more than one elasmobranch, with *Deanicola minor* and *D. protentus* restricted to *Deania* sp. Most parasites are recorded for the first time from the central East Atlantic around the Great Meteor Bank.
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sharks / parasites / *Crossobothrium dohrnii* / *Deania calcea* / *D. histricosa* / *D. profundorum* / *Deanicola* spp. / *Grillotia meteori* sp. nov. / *Heptranchias perlo* / *Tentacularia coryphaenae* / zoogeography / Meteor Bank / Atlantic Ocean

Résumé − Cestodes parasites d'élasmobranches *Heptranchias perlo* et *Deania* du banc Meteor, Atlantique centre-est. Un total de 10 *Heptranchias perlo*, 8 *Deania histricosa*, 2 *D. calcea*, et 2 *D. profundorum* du banc Meteor, Atlantique centre-est, ont été étudiés pour les cestodes. Les élasmobranches ont été capturés en utilisant un chalut de fond en septembre 1998, entre 298 et 1 075 m de profondeur. Sept espèces différentes de cestodes ont été trouvées : *Tentacularia coryphaenae*, *Deanicola minor*, *D. protentus*, *Grillotia meteori* sp. nov., *Grillotia* cf. *microthrix* (Trypanorhyncha), *Crossobothrium dohrnii*, et *Crossobothrium* sp. (Tetraphyllidea). *T. coryphaenae* se trouve enfermé dans une capsule dans la paroi de l'estomac et toutes les autres espèces ont été trouvées dans l'intestin de l'hôte. *G. meteori* sp. nov. et *G.* cf. *microthrix* infestent la musculature en plus de l'estomac et de la paroi intestinale. *D. profundorum* abrite 5 espèces différentes de cestodes et *D. histricosa*, *H. perlo*, et *D. calcea* étaient infestés par 4, 3 et 2 espèces respectivement. Avec 332 et 181 individus, *D. minor* et *G.* cf. *microthrix* étaient les cestodes les plus abondants. *Grillotia meteori* sp. nov., *Crossobothrium* sp., et *C. dohrnii* étaient des hôtes spécifiques pour *Deania profundorum, D. histricosa* et *H. perlo*, respectivement. Les autres espèces ont été trouvées chez plus d'un élasmobranche, avec *Deanicola minor* et *D. protentus*, restreint à *Deania* sp. La plupart des parasites sont répertoriés pour la première fois en Atlantique centre-est autour du banc Meteor. © 2001 Ifremer/CNRS/Inra/IRD/Cemagref/Éditions scientifiques et médicales Elsevier SAS

requins / parasites / *Crossobothrium dohrnii* / *Deania calcea* / *D. histricosa* / *D. profundorum* / *Deanicola* spp. / *Grillotia meteori* sp. nov. / *Heptranchias perlo* / *Tentacularia coryphaenae* / zoogéographie / banc Meteor / océan Atlantique

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1. INTRODUCTION

Seamounts play an important role for the distribution of various pelagic fish species, such as tuna and other commercially important scombrids. These fish use seamounts as feeding grounds during their long transoceanic migrations (Fonteneau, 1991). Within the central Atlantic, such mountains nearly reach the water surface, and are known for a rich biomass, with a productivity distinctly higher than in the surrounding neritic ecosystem (Koslow, 1997). This underlines their ecological importance.

Parasites can be used as biological indicators for fish stock separation (MacKenzie, 1983; Humphreys et al., 1993), as well as for the feeding ecology of their fish hosts (Campbell et al., 1980; Williams et al., 1992; Palm, 1999). They are helpful tools within fisheries biology, supporting various other methods to identify and manage marine fish stocks. For example, studies on the stomach content of wild fish provide a detailed image of trophic interactions at a specific date and locality, while the interpretation of trophic interactions on basis of parasites allows more general statements to be made on long-term interactions. They do integrate over the short-term variability within the food web. Parasitic helminths with different developmental stages in various hosts are especially useful as biological indicators (MacKenzie, 1983).

Investigations on the parasite fauna related to seamounts are scarce. Around the Great Meteor Bank, Ehrich (1971) noted nematodes, trematodes and cestodes in different fish species. However, he did not further identify them, and Gaevskaya and Kovaleva (1985) examined only a single species, *Trachurus p. picturatus*. The authors recorded 24 different parasite species, belonging to the Myxozoa (1), Digenea (10), Monogenea (5), Cestoda (4), Acanthocephala (1), Nematoda (2), and Copepoda (1). Jarling and Kapp (1985) studied the parasite fauna of chaetognaths around the Great Meteor Bank, and detected several hemiurid trematode metacercariae. In general, seamounts might be of importance for widely distributed marine fish parasites, such as the transoceanically distributed trypanorhynch species *Otobothrium cysticum* (Palm and Overstreet, 2000) and *Callitetrarhynchus gracilis* (Palm et al., 1994; Palm, 1997a,) in the Atlantic Ocean.

The present study was carried out to identify potential final host elasmobranchs for parasitic cestodes around the seamount Great Meteor Bank within the central East Atlantic lat. 30°N, long. 28°W. Special account is given to the order Trypanorhyncha, which is known for a large species diversity within the tropical and subtropical Atlantic Ocean (Dollfus, 1960; Palm et al., 1994; Palm, 1997a; Palm and Overstreet, 2000). The parasite composition is used to reveal information on the feeding ecology of the hosts as well as the life cycles and zoogeographical distribution of the parasites detected. The parasite fauna and diversity is compared with that of other elasmobranchs, and the potential to use them as biological indicators is discussed.

2. MATERIAL AND METHODS

A total of 22 elasmobranchs belonging to *Heptranchias perlo* (7 males and 3 females weighing 455–4574 g), *Deania calcea* (2 females weighing 1798–2842 g), *D. histricosa* (3 males and 5 females weighing 2020–3936 g), and *D. profundorum* (2 females weighing 2696–2740 g) were collected on board of the research vessel *Meteor* during cruise M42/3 on the Great Meteor Bank (30°N, 28°W; 275–4600 m). The fish were collected on the 10th and 17th of September, 1998 in a water depth between 298–1075 m using bottom trawl or long-lines, and frozen to –40°C directly on board. The fish were dissected in the laboratory in Kiel for the presence of metazoan parasites within all organs. The parasites were isolated and fixed in 4% formol or 70% alcohol. The cestodes collected were stained in acetic carmin, dehydrated in a series of alcohols and mounted in Canada balsam.

To study the tentacular armature and surface ultrastructure by scanning electron microscopy, some specimens were dehydrated in a graded ethanol series. They then were critical point dried and mounted with a double-sided adhesive tape onto SEM stubs. The stubs were coated with gold in an argon atmosphere and examined under a ZEISS DSM 940 scanning electron microscope at 14–25 kV.

The following measurements were made: Scolex length (*SL*), scolex width at *pars bothridialis* (*SW*), *pars bothridialis* (*pbo*), *pars vaginalis* (*pv*), *pars bulbosa* (*pb*), *pars postbulbosa* (*ppb*), *appendix* (*app*), *velum* (*vel*), bulb length (*BL*), bulb width (*BW*), bulb ratio (*BR*), and scolex proportions (*SP*), with *pbo*:*pv*:*pb*, width of tentacle sheaths (*TSW*), tentacle width (*TW*), hook length (*L*), basal hook length (*B*). All measurements are given in micrometers unless otherwise indicated. The range is given in parentheses. The elasmobranchs were identified using Compagno (1984). The cestode parasites were identified using Ruhnke (1996) (Tetraphyllidea), Beveridge (1990), and Dollfus (1942, 1969) (Trypanorhyncha). For comparison, the type material of *Grillotia microthrix* Dollfus (1969) was borrowed from the '*Muséum National d'Histoire Naturelle*', Paris. The classification follows Palm (1997b).

3. RESULTS

A total of seven different cestode species belonging to the orders Trypanorhyncha (5 species) and Tetraphyllidea (2 species) was found (*table I*). *Deanicola minor* and *Grillotia* cf. *microthrix* were the dominant species, having maximum prevalences of 100% and maximum intensities of 152 and 108, respectively.

Table I. Prevalences and intensities of cestodes found in 4 species of fish.

Fish species (*n*)	*H. perlo* (10)	*D. histricosa* (8)	*D. calcea* (2)	*D. profundorum* (2)
Size range (cm)	48–108	81–104	80–90	89–97
Trypanorhyncha				
Tentacularia coryphaenae (L)	10 (4)	–	100 (1–2)	50 (3)
Deanicola minor (A)	–	50 (1–8)	100 (132–152)	100 (12–14)
Deanicola protentus (A)	–	38 (1–6)	–	50 (2)
Grillotia meteori (L)	–	–	–	50 (13)
Grillotia cf. *microthrix* (L)	40 (1–12)	63 (1–108)	–	100 (1–11)
Tetraphyllidea				
Crossobothrium dohrnii (A)	100 (1–71)	–	–	–
Crossobothrium sp. (A)	–	25 (1–2)	–	–

Intensities are in brackets; *n*: number of hosts examined, A: adult, L: larvae.

Deania profundorum was the most heavily infested elasmobranch (*table I*), harbouring five different cestode species. With the exception of *Tentacularia coryphaenae*, all cestodes represent new locality records.

3.1. *Heptranchias perlo* (Bonnaterre, 1788)

Three different cestodes were isolated from *H. perlo* (*table I*): four postlarvae of *Tentacularia coryphaenae* Bosc, 1797 were found encapsulated within the stomach wall of a single *H. perlo*. The *SL* varied between 2750–3780, and the characteristic tentacular armature consisting of tridentate basal hooks (*L* = 7–14, *B* = 10–16) and rose-thorn shaped metabasal hooks (*L* = 26–33, *B* = 24–28) was present. The specimens were identified using Dollfus (1942) and Palm (1995).

Plerocerci of *Grillotia* cf. *microthrix* Dollfus, 1969 were isolated from the intestinal contents as well as from the stomach and intestinal wall and musculature, with a prevalence of 40% and a maximum intensity of 12. All specimens had invaginated tentacles, causing difficulties in identification (*plates I* and *II*). However, comparison with the type material revealed a similar basal armature and a similar scolex morphology. The following measurements were made: *SL* = 920 (583–1378) (*n* = 12), *pbo* = 355 (212–435) (*n* = 11), *pv* = 313 (148–477) (*n* = 2), *pb* = 161 (130–217) (*n* = 3), *BL* = 215 (207–223) (*n* = 2), BW = 67 (53–80) (*n* = 2), *BR* = 3.2:1, *SP* = 2.2:1.9:1, *TSW* = 24 (20-26) (n = 8). The basal armature consists of a field of small hooks (*L* = 2–3, *B* = 1–2) on the external tentacular surface, followed by a band of hooks along the tentacle. The first three basal hooks measured *L* = 14–21, *B* = 11–13 (type: *L* = 14–17), and the following large hooks on the internal tentacle surface *L* = 35–45, *B* = 16–18 (type: *L* = 45–52). The present specimens were smaller than indicated by Dollfus (1969), however, a high variability in scolex length was evident. As shown by scanning electron microscopy, there are trifid and palmate (*plate I.2*), as well as bifid (*plate I.3*) microtriches on the bothridial surface of *G.* cf. *microthrix.*

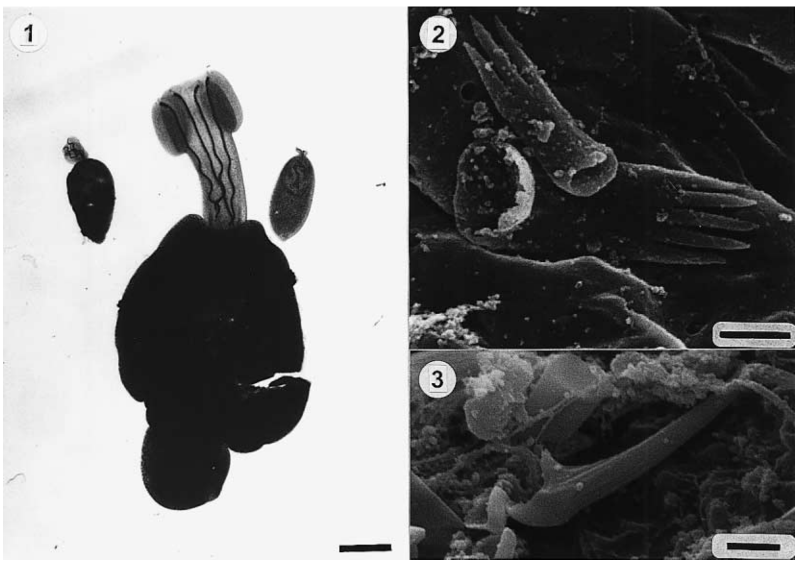

Plate I. 1. Blastocysts obtained from *D. profundorum* with protruding scolex of *G.* cf. *microthrix* (left and right) and *G. meteori* sp. nov. (middle). Bar 800 µm. **2.** Tridigitate and palmate microtriche on the bothridial surface of *G.* cf. *microthrix*. Bar 1 µm. **3.** Bifid microtriche from the bothridial border of *G.* cf. *microthrix*. Bar 1 µm.

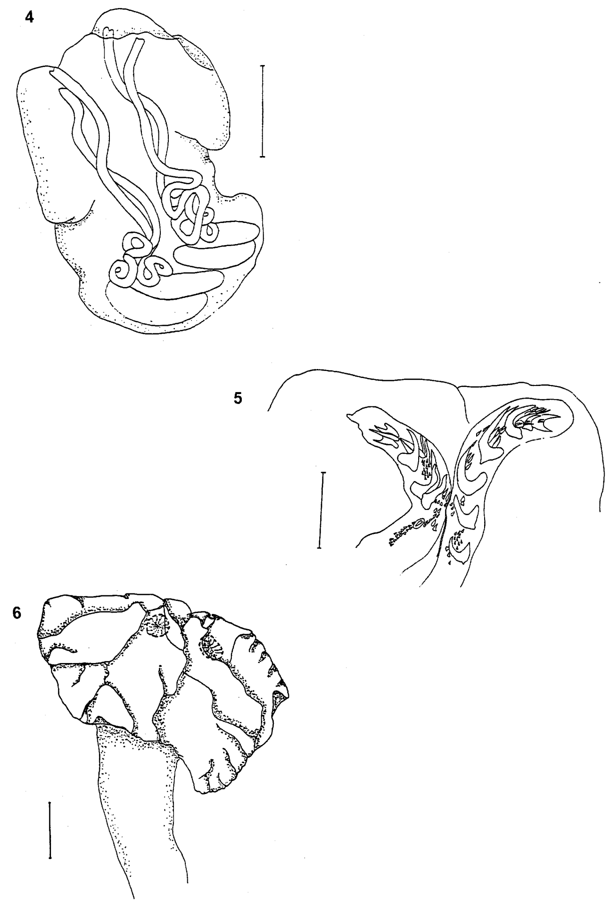

Plate II. 4. Habitus of *Grillotia* cf. *microthrix* from *Deania histricosa*. Bar 300 µm. **5.** Basal armature of *Grillotia* cf. *microthrix*, inverted tentacle. Bar 40 µm. **6.** Scolex of *Crossobothrium* sp. from *Deania histricosa*. Bar 1000 µm.

Adults of *Crossobothrium dohrnii* (Oerley, 1885) were the predominant cestodes, with a prevalence of 100% and a maximum intensity of 71. The specimens were isolated from the spiral valve and corresponded, with their four bothridia (each having a single accessory sucker), the short neck and the characteristic craspedote proglottids with four elongated posterior extensions, with the description of *C. dohrnii* given by Ruhnke (1996).

While *C. dohrnii* has been recorded previously from *H. perlo* (see Joyeux and Baer, 1936; Robinson, 1965; and Ruhnke, 1996), *G.* cf. *microthrix* and *T. coryphaenae* represent new host records.

3.2. *Deania histricosa* Garman, 1906

Four different cestodes were found in these elasmobranchs (*table I*). *Deanicola minor* Beveridge, 1990 (*plate III.7*) with a prevalence of 50% and a maximum intensity of eight was found in the spiral valve. The following measurements were made ($n = 4$): *SL* = 1040 (920–1170), *pbo* = 236 (212–325), *pv* = 807 (731–923), *pb* = 219 (153–260), *BL* = 219 (153–260), *BW* = 55 (42–65), *vel* = 51 (39–69), *BR* = 4:1, *SP* = 1.1:3.7:1, *TSW* = 19 (16–23) ($n = 8$). The morphological measurements corresponded with the description of *D. minor* from *D. calcea* by Beveridge (1990).

Deanicola protentus Beveridge, 1990 (*plate III.8*) was found in the spiral valve at a prevalence of 38% and a maximum intensity of six. The following measurements were made ($n = 4$): *SL* = 27.46 mm (20.35-37.40), *pbo* = 1 050 (910–1 220), *pv* = 7 150 (6 620–8 160), *pb* = 2 390 (2 050–2 690), *BL* = 2 330 (1 950–2 560), *BW* = 447 (416–480), *ppb* = 17.71 mm (10.4–26.8), *vel* = 1 730 (1 020–2 140), *BR* = 5.2:1, *SP* = 1:6.8:2.3, tentacle sheaths sinuous, *TSW* = 86 (78–85). The tentacular armature was heteroacanthous typica (*plate III.9–11*), with eight principal hooks, increasing in length towards the external tentacle surface: 1 (1'), *L* = 45–50, *B* = 29–35; 2 (2'), *L* = 33–39, *B* = 24–29; 3 (3'), *L* = 33–46, *B* = 20–33; 4 (4'), *L* = 49–55, *B* = 13–23; 5 (5'), *L* = 36–42, *B* = 11–16; 6 (6'), *L* = 46–52, *B* = 10–13; 7 (7'), *L* = 42–48, *B* = 10–13; 8 (8'), *L* = 39–45, *B* = 7–10. *TW* = 72–94, a basal tentacular swelling was present. The strobila was craspedote. The morphological measurements correspond with the description of *D. protentus* from *D. calcea* by Beveridge (1990).

Plerocerci of *Grillotia* cf. *microthrix* Dollfus, 1969 (*plate II*) were isolated from the intestinal content as well as from the stomach, intestinal wall and musculature at a prevalence of 63% and a maximum intensity of 108.

Scoleces of *Crossobothrium* sp. were found in the spiral valve of two *D. histricosa*. The massive scolex (2100–3900 length, 429–1500 width) had four bothridia, each with a single anterior sucker (*plate II*). As no strobila were found, the specimens could not be identified to the species level.

The findings of all four recorded parasites, *D. minor, D. protentus, G.* cf. *microthrix* and *Crossobothrium* sp. in *D. histricosa* represent new host records.

3.3. *Deania calcea* (Lowe, 1839)

Two different cestode species, postlarvae of *Tentacularia coryphaenae* and adults of *Deanicola minor*, were found in *D. calcea* (*table I*), both with a prevalence of 100% ($n = 2$). *D. minor* reached a maximum intensity of 152. *T. coryphaenae* is a new host record, while *D. minor* has been recorded earlier from this elasmobranch by Beveridge (1990).

3.4. *D. profundorum* (Smith and Radcliffe, 1912)

With five different cestode species, *D. profundorum* had the highest cestode diversity during the present study. Beside the occurrence of *Tentacularia coryphaenae*, *Deanicola minor*, *D. protentus* and *Grillotia* cf. *microthrix* (*table I*), *Grillotia meteori* sp. nov. (*plate IV.12*), which is described thereafter, was isolated from the stomach and intestinal wall, the liver

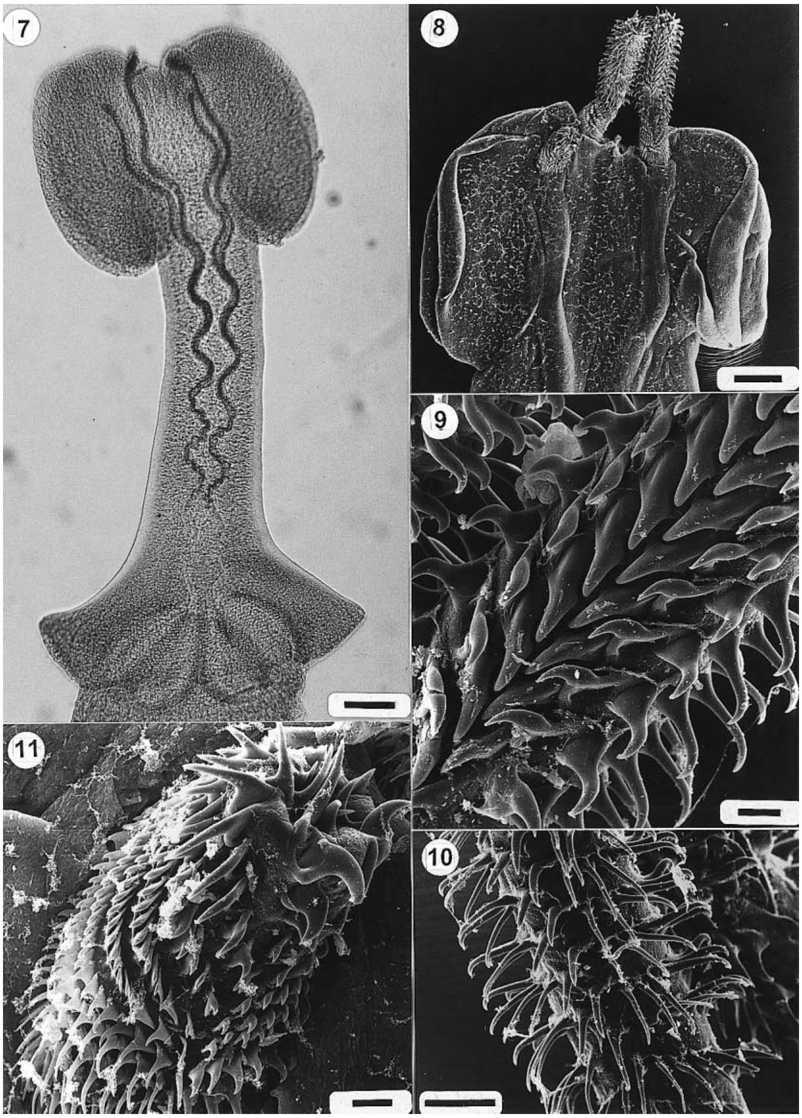

Plate III. 7. *Deanicola minor* from *Deania histricosa*. Bar 90 µm. **8.** *Deania protentus* from *Deania histricosa.* Bar 200 µm. **9.** Metabasal armature, internal tentacle surface, of *D. protentus*. Bar 20 µm. **10.** Metabasal armature, external tentacle surface, of *D. protentus*. Bar 50 µm. **11.** Basal armature, external tentacle surface, of *D. protentus*. Bar 20 µm.

and the musculature of one *D. profundorum*. All findings represent new host records.

The genus *Grillotia* (Lacistorhynchidae, Guiart, 1927) comprises many species with two bothridia, an acraspedote scolex and a heteroacanthous atypica tentacular armature consisting of principal and intercalary rows of hooks together with a band of hooks along the external tentacle surface. The different species can be distinguished by the number of principal hooks (4–10) and a different kind of basal armature (Sakanari, 1989). *Grillotia meteori* sp. nov. has seven principal hooks and a basal armature consisting of a field of microhooks and additional slender spiniform hooks (*plate IV*). There are only two congeners with seven principal hooks, *G. amblyrhynchos* Campbell and Beveridge, 1993 and *G. kovalevae* Palm, 1995. While the latter species has no intercalary hooks and no characteristic basal armature, the former species clearly differs from *G. meteori* by having only a single row of intercalary hooks and a different size and shape of basal principal hooks. Additionally, all seven principal hooks of *G. amblyrhynchos* stand in line while hook 7 (7') in *G. meteori* sp. nov. is distinct and deviate posteriorly. Thus, we consider the present specimens obtained from *Deania profundorum* as belonging to a new species, *Grillotia meteori* sp. nov.

The following measurements for *G. meteori* sp. nov. were made: scolex isolated from blastocyst (*plates I* and *IV.12*) acraspedote, *SL* = 4900 (4340–5460) (*n* = 4), *SW* = 1340 (1200–1680)(*n* = 7), *pbo* = 1274 (1200–1400) (*n* = 6), *pv* = 2410 (1880–3220) (*n* = 4), *pb* = 1300 (*n* = 1), *BL* = 1110 (1070–1170) (*n* = 4), *BW* = 297 (287–300) (*n* = 5), *ppb* = 468 (*n* = 1), *BR* = 3.7:1, *SP* = 1:1.9:1, tentacle sheaths straight to sinuous, *TSW* = 79 (67–85) (*n* = 7), retractor muscles attach in basal part of bulbs. Tentacular armature

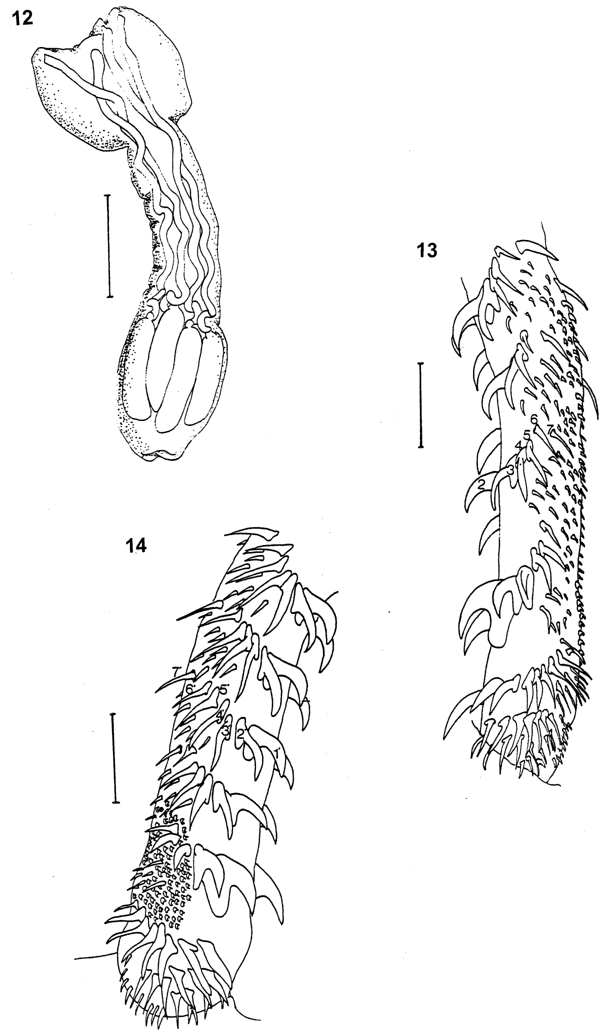

Plate IV. 12. Scolex of *Grillotia meteori* sp. nov. from *Deania profundorum*. Bar 1000 µm. **13.** Basal and metabasal armature of the bothridial tentacle surface of *G. meteori* sp. nov. The external surface can be seen in part. The type material does not allow other view of the external surface. Bar 100 µm. **14.** Basal and metabasal armature of the antibothridial tentacle surface of *G. meteori* sp. nov. Bar 100 µm.

heteroacanthous atypica, with band of small hooks in metabasal region; seven hollow principal hooks (*plate IV*): 1 (1') rose-thorn shaped, *L* = 59–78, *B* = 36–39; 2 (2') slender rose-thorn shaped, *L* = 59–88, *B* = 33–48; hooks 3 (3') to 7 (7') slender falciform to spinous, 3 (3'), *L* = 57–67, *B* = 28–33; 4 (4'), *L* = 56–67, *B* = 24; 5(5'), *L* = 42–65, *B* = 18–24; 6 (6'), *L* = 35–49, *B* = 8–14; 7 (7'), *L* = 37–51, *B* = 7; hook 7 (7') not in same line with other principal hooks 1–6 (1–6'). 2–3 rows of intercalary hooks present (*L* = 12–19, *B* = 3–5), placed between hooks 4 (4') and 7 (7') of principal rows; intercalary rows merge with irregularly arranged band of microhooks (*L*= 7–12) on external surface, about 3–4 hooks across external surface. Basal tentacular swelling absent, characteristic basal armature present (*plate IV*), a field (40 × 120) of numerous microhooks (*L* = 6–7, *B* = 3–4) on external face between hooks of the 4th principal row, continuous with the band of hooks on the external metabasal tentacle surface; slender to spiniform hooks of different size (*L* = 33–66) arranged within 3rd principal row of about eight hooks along the bothridial and antibothridial tentacle surfaces. Between this row and the entrance to the tentacle sheath, about 2 rows of spiniform hooks are present (*L* = 25–40). The new species was named after the locality, Great Meteor Bank.

3.5. Other parasites found

Within the present study, further metazoan parasites were collected from the examined sharks. A hemiurid digenean was found in the stomach and intestine of *Heptranchias perlo*, and two different hexabothriid monogeneans were collected from the gills of *H. perlo* and *Deania histricosa*, respectively. Following the description of Koyama et al. (1969), two kinds of anisakid larvae, *Anisakis* sp. (type I and II, distinguished by different size and forms of ventricle and tail) were found. While *Anisakis* sp. (type I) infested only *D. histricosa*, *Anisakis* sp. (type II) was present in all four elasmobranch species. A further nematode belonging to the Schistorophinae was isolated from *D. histricosa* and *D. profundorum*, and a single crustacean, the isopod *Flabellifera* sp., was found on the gills of *D. histricosa*.

4. DISCUSSION

The present study is the first detailed study on the cestode fauna of *Heptranchias perlo* and *Deania* spp. from the central East Atlantic. Beside the establishment of new host and /or new locality records for *Tentacularia coryphaenae, Grillotia* cf. *microthrix*, *Deanicola minor*, and *D. protentus*, a new trypanorhynch species, *Grillotia meteori* sp. nov., is described. With a maximum diversity of nine metazoans and five cestode species within *Deania histricosa* and *D. profundorum* respectively, the detected parasite diversity is comparable to that of other elasmobranch hosts, such as *Squalus acanthias* (13 species, Orlowska, 1979; eight species, Wierzbicka and Langowska, 1984; seven species, Hewitt and Hine, 1972), and *Scyliorhinus canicula* (three species, Baylis, 1939; two species, Williams, 1959).

With a total of five different species, most cestodes found belonged to the Trypanorhyncha. Elasmobranchs are known to harbour a wide variety of different trypanorhynchs within their digestive tract, as recently illustrated by Campbell and Beveridge (1994). Interestingly, only three cestode species (*Crossobothrium dohrnii*, *Deanicola minor* and *D. protentus)* were recorded as adults in the spiral valve while *Tentacularia coryphaenae, Grillotia* cf. *mirothrix* and *G. meteori* sp. nov. occurred as plerocercoids mainly within the viscera and musculature. Dollfus (1942) already illustrated that trypanorhynch cestodes can infest elasmobranchs as intermediate or paratenic hosts, as evident in the present finding.

On the research cruise M42/3 on the Great Meteor Bank, the above elasmobranchs were the predominant shark species collected. Two *Centroscymnus coelolepi* and one *Pseudotriakis microdon* were also caught. All elasmobranchs investigated, *Deania* spp. and *Heptranchias perlo*, harboured trypanorhynch larvae in the muscle, suggesting a role also as intermediate hosts for these cestodes. It seems to be likely that these sharks serve as food resource for other larger, possibly migrating sharks in the surrounding ocean.

The present study extends the zoogeographical distribution of *Deanicola minor* and *D. protentus* from the Southern Ocean and the North Atlantic to the central East Atlantic (Beveridge, 1990; Campbell and Beveridge, 1994). Though not fully identified, a range extension of *Grillotia* cf. *microthrix* from the Mediterranean Sea to the Great Meteor Bank might be easily explained by the current circulation from the Mediterranean into the Atlantic Ocean, which connects both water masses. Similarly, *Tentacularia coryphaenae* as well as the tetraphyllidean *Crossobothrium dohrnii* are known to have cosmopolitan distribution. Thus, the elasmobranchs examined are characterised by a cestode fauna with a wide distribution, corresponding with their own distribution pattern.

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