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Fish parasitology

HATSCHEKIA REINHARDTII SP. NOV. (COPEPODA, HATSCHEKIDAE), A PARASITE OF GREENLAND HALIBUT, *REINHARDTIUS HIPPOGLOSSOIDES* (WALBAUM, 1792)

HATSCHEKIA REINHARDTII SP. NOV. (COPEPODA, HATSCHEKIIDAE) PASOŻYT HALIBUTA NIEBIESKIEGO, *REINHARDTIUS HIPPOGLOSSOIDES* (WALBAUM, 1792)

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A detailed description of morphology of males and females of *Hatschekia reinhardtii* sp. nov.„ a hitherto unknown crustacean species, is given. The parasites were found on gills of the Greenland halibut. *Reinhardtius hippoglossoides*. The fish were caught in the eastern Bering Sea (North Pacific). Data on infection intensity and incidence are given as well.

INTRODUCTION

When studying the parasitic fauna of the Greenland halibut, *Reinhardtius hippoglossoides* (Walbaum, 1792) from the North Atlantic and Pacific, I came across certain crustaceans belonging to the genus *Hatschekia* Poche, 1902. Comparisons with two, borrowed from the Berlin Museum collection, females of *H. hippoglossi* (Cuvier, 1803), a gill parasite of the Atlantic halibut, *Hippoglossus hippoglossus* (L.) have convinced me that the crustaceans found in the Greenland halibut differ morphologically from other, already described, species of the genus (Jones, 1985; Kabata, 1979, 1981).

MATERIALS AND METHODS

The North Atlantic fishing grounds off Labrador and in the Barents Sea yielded a total of 261 individuals (155 and 106, respectively) of the Greenland halibut, *Reinhardtius hippoglossoides* (Walbaum, 1792). The Labrador and Barents Sea individuals were caught on 26 June 1976 and 6 May 1977, respectively. The total length and weight of the fish examined was found to range within 24.2–77.5 cm and 75–5140 g, respectively.

The North Pacific sample obtained in spring 1981 from the eastern Bering Sea consisted of 7 Greenland halibut individuals 55.5–82.5 cm long (total length) and weighing 1530–6200 g.

The fish to be examined were frozen on board to below –20°C and delivered frozen to the laboratory. Skin, fins, nostrils, and mouth cavity were scrutinized; all the gill arches were examined under the stereomicroscope. The crustaceans found were preserved in 5% formalin.

RESULTS

Description of *Hatschekia reinhardtii sp. nov.*

Host: Greenland halibut, *Reinhardtius hippoglossoides* (Walbaum, 1792).

Location on host: mostly gills, a single parasite found on the ventral fin.

Geographical location: Bering Sea

Extent of infection: females were found on 4 individuals of the Greenland halibut (57.1% infection incidence); infection intensity ranged from 1 to 36 crustaceans on fish. Additionally, two males were found on one fish individual.

Female morphology

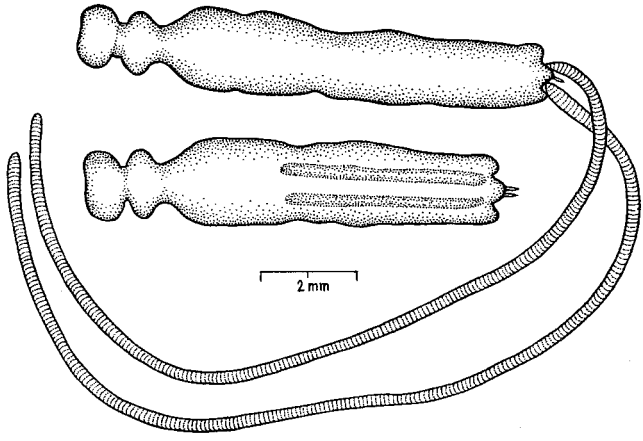

Fig. 1. *Hatschekia reinhardtii sp. nov.*, a female (dorsal view)

Throughout the following description, the nomenclature introduced by Kabata (1979) is used.

I have observed the body segmentation of this strongly elongated parasite to be obliterated (Fig. 1). The cephalothoracic dorsal shield is slightly rounded and displays a characteristic longitudinal pattern of ridges (Fig. 2a). The lateral margins of the shield are somewhat curved ventrally. Small constrictions separate the second pedigerour segment from the cephalothorax and the genital trunk (Fig. 1). The genital trunk is elongated and flattened, its sides being almost parallel. In adults, it is almost 6–9 times longer than the cephalothorax. The genital trunk terminates posterolaterally with rounded lobes which usually do not protrude beyond the posterior margin of the abdomen. The abdomen is one-segmented, not clearly delimited from the trunk, small, and has well developed uropods (Fig. 1). Fine cuticular teeth are observed to cover the entire body surface except the cephalothoracic dorsal shield.

The females found measured 6.0–11.5 mm in length and 1.5–2.1 mm in width. The ovigerous females were 8.0–11.5 mm long; egg sacs measured up to 22 mm in length.

The cephalothorax bears 5 pairs of appendages: first antennae, second antennae, mandibles, first maxillae, and second maxillae.

The first antenna is uniramous, slightly tapered terminally, and indistinctly 6-segmented (Fig. 3). The basal segment, making up almost one third of the whole appendage, has 2 subequal setae on its dorsal side and 7 broad setae of different length on the anterior margin. The second segment bears 6 similar setae on its anterior margin. The third segment shows 2 setae of different length on its anterior margin and a single smaller seta on the posterior margin. The aterior margin of the fourth, usually porly delimited, segment bears 2 setae. The fifth segment is provided with a single slender seta on its posterior margin; the distal edge bears the longest, rather broad seta protruding beyond the tip of the appendage, and 2 smaller setae the longer of which grows at the junction with the terminal segment (Fig. 4a). The tip of the latter has 3 broad and rather long setae, 5 thin long setae, 2 short spine-like setae, and a single, rather short seta on the very tip, between the two broad ones. There are altgether 15 different setae on the terminal part (fifth and sixth segments) of the first antenna (Fig. 4a).

The second antenna is uniramous and 3-segmented. The basal segment is short; the next one is relatively long and slightly tapering distally, while the terminal segment is shaped like a long, curved, and sharply ending claw (Fig. 4b). A well developed parabasal papilla (omitted from the drawing) is located near the base of the appendage. The papilla is made up by a broad base with 2 rather inconspicuous tubercles and a conical mid-part.

The mandible is unsegmented, flat, and armed with 3 triangular teeth (Fig. 5a).

The first maxilla is biramous (Fig. 5b). The endopod is short, rather broad, with 3 processes: one is rounded on the top, while the other two – lateral and middle – taper gradually to form thin, sharp apices. The middle process is much longer. The expod is more slender and longer than the endopod. It displays two gradually tapering processes; the inner process is about three times as long as the lateral one.

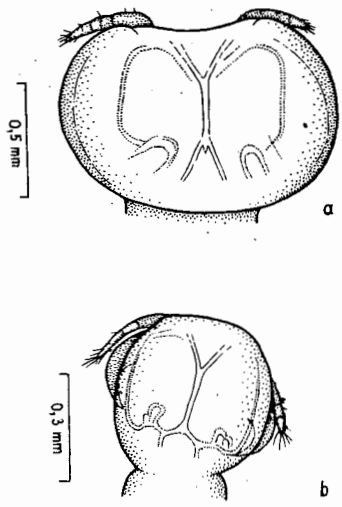

Fig. 2. Cephalothorax of *H. reinhardtii* sp.nov.: a, female; b, male (dorsal view)

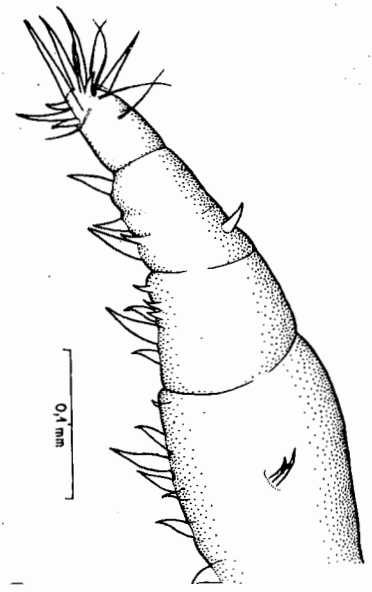

Fig. 3. First antenna of female *H. reinhardtii sp. nov.*, (dorsal view)

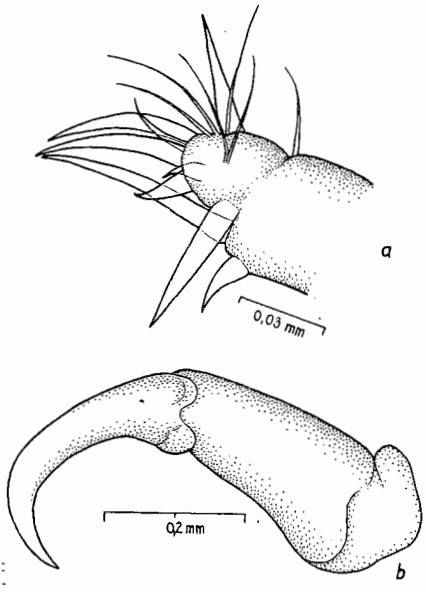

Fig. 4. *Hatchekia reinhardtii sp. nov.*, a female: a, ending of first antenna (ventrolateral view); b, second antenna (dorsal view)

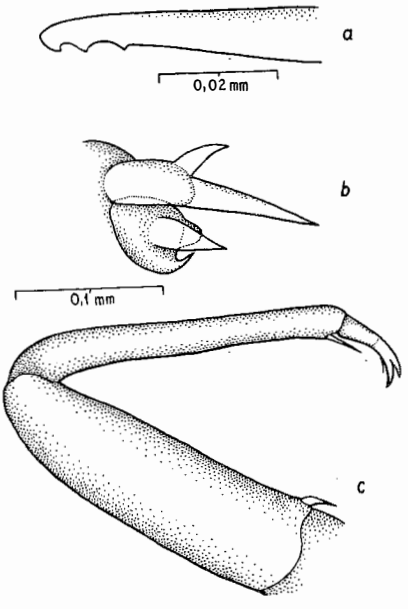

Fig. 5. *Hatschekia reinhardtii sp. nov.*, a female; a, mandible (lateral view); b, first maxilla, c, second maxilla (ventral view)

The second maxilla is uniramous, 3-segmented, and brachiform with a short basal segment (Fig. 5c). The second segment (*lacertus*) is strongly elongated, broad, and has a small setiform spine on its inner margin near the base. The next (third) segment (*brachium*) is slender and elongated, its inner margin bearing a short seta at the distal end. The tip of the segment is provided with a relatively small, bifid, slightly curved claw with a delicate seta (not always visible) on the inner margin.

The first two pairs of thoracic legs are biramous (Fig. 6). The bases of their sympods are flattened and form large ventrolateral swellings, that on the second leg (not shown in the drawing) much larger than on the first. Sympods of the first pair are provided with fairly broad processes located near the base of the endopod proximal segment. Additionally, sympods of the first and second legs have one seta each, the setae growing at the exopod base (Fig. 6a, b). The exo- and endopods of the first and second legs are 2-segmented and provided with hairless setae. The tip of the first leg's endopod shows 3 longer setae, while the exopod bears 4 similar setae on its tip, a single seta growing on the proximal segment at its junction with the terminal segment (Fig. 6a). The second leg's endopod shows 4 setae on the tip (lateral setae are very short) and a single seta on the proximal segment (Fig. 6b). The exopod is equipped with 4 longer setae and a single short one on the tip as well as a single short seta on the proximal segment. The surface of both the endo- and exopods of the two legs display transverse somewhat arched cuticular ridges; additionally, small groups of fine teeth are observed on the ventral side of the proximal segment (Fig. 6).

The third thoracic leg is reduced to 2 small setae (Fig. 7a). These are located just behind the constriction at the genital trunk margin. The fourth leg is similar to the third and may be altogether absent in some individuals.

The iripods are cylindrical, slightly tapered, ended with a broad, conical process with two short processes on the sides (Fig. 7b). The terminal part and lateral processes are covered with thin hairs. Besides, each uropod has a single, rather long dorsal seta and two subequal setae located on the lateral margin.

Male morphology

Males are morphologically similar to females, but are considerably smaller (Fig. 8). Their body is flattened, rather strongly elongated, with indistinct segmentation. The male cephalothoracic dorsal shield is more rounded and transparent than that of a female. The male shield, too, displays the characteristic pattern of ridges (Fig. 2b). The cephalothorax makes up about 1/4 of the total length. Slight constrictions separate the second pedigerous segment from the cephalothorax and the genital trunk. The latter is about twice as long as the thorax. The genital trunk slightly tapers terminally and expands into a 1-segmented, rather well formed small abdomen with well developed uropods (Fig. 8). Numerous fine cuticular teeth are observed on the surface of the genital trunk.

The males gound measured 1.8–1.9 mm in length and 0.40–0.45 mm in width.

Similarly to the female, the male cephalothorax bears 5 pairs of appendages: first antennae, second antennae, mandibles, first maxillae, and second maxillae.

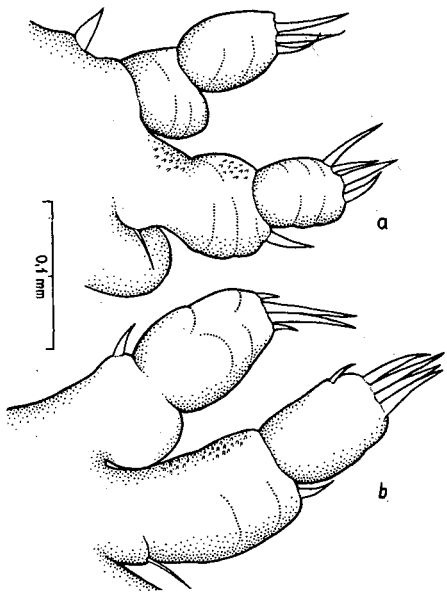

Fig. 6. Thoracic appendages of female *H. reinhardtii sp. nov.*, a, first leg; b, second leg (ventral view)

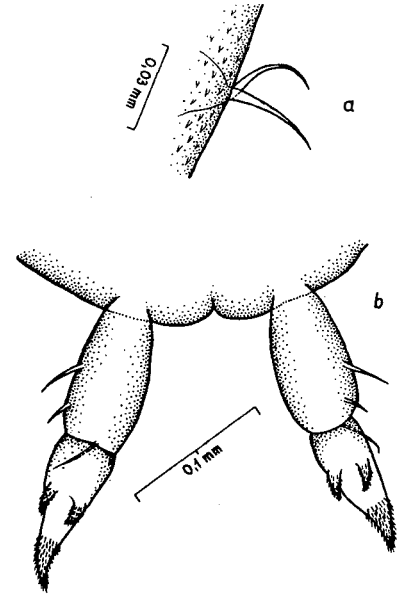

Fig. 7. *Hatschekia reinhardtii sp. nov.*, a female: a, third leg; b, uropods (ventral view)

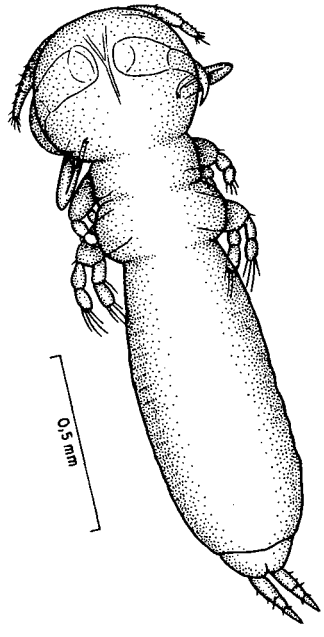

Fig. 8. *Hatschekia reinhardtii sp. nov.*, a male (dorsal view)

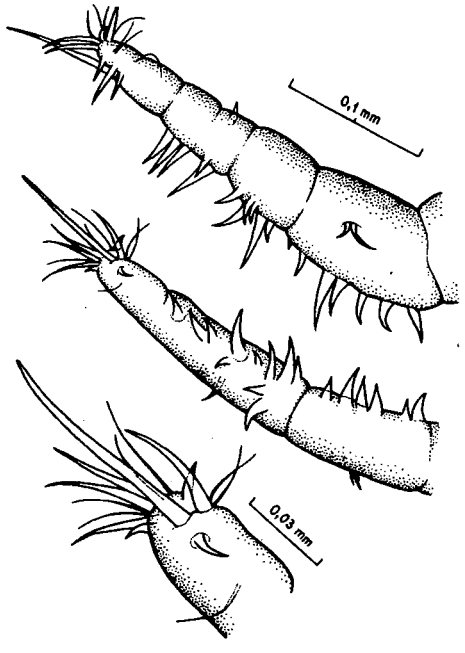

Fig. 9. First antenna of male *H. reinhardtii sp. nov.*, (various aspects)

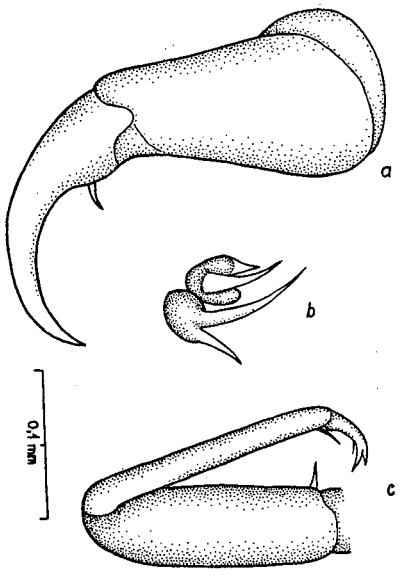

Fig. 10. *Hatschekia reinhardtii sp. nov.*, a male: a, second antenna, b) first maxilla; c, second maxilla (ventral view)

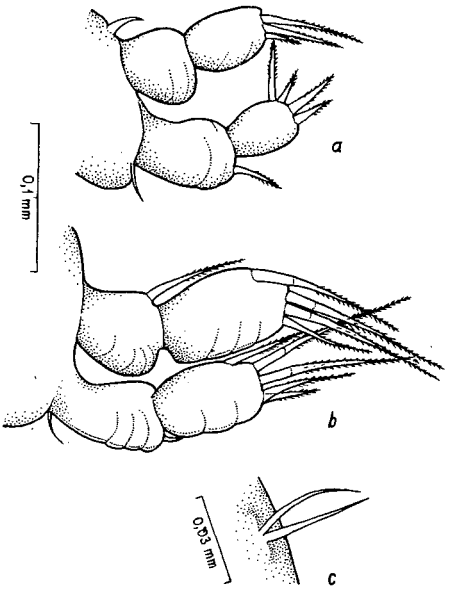

Fig. 11. Thoracic appendages of male *H. reinhardtii sp. nov.*; a, first leg; b, second leg; c, third leg (ventral view)

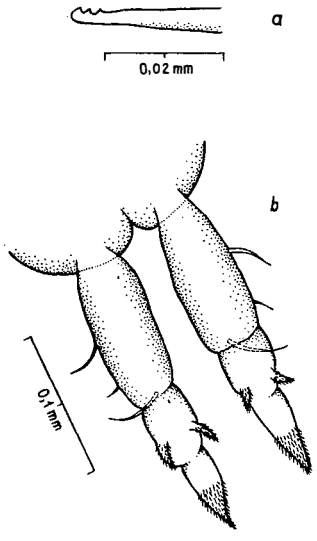

Fig. 12. *Hatschekia reinhardtii* sp. nov., a, mendible (lateral view); b, uropods (ventral view)

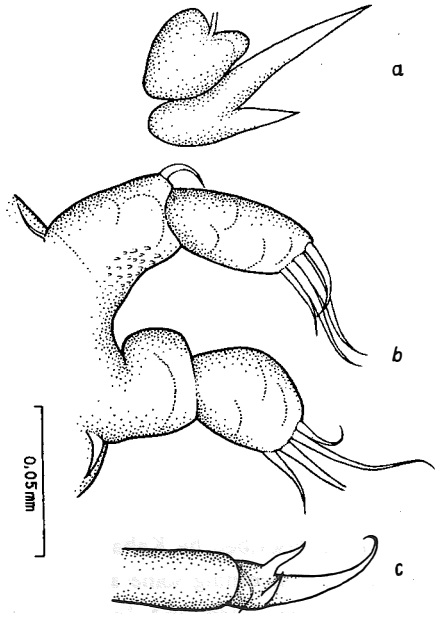

Fig. 13. *Hatschekia hippoglossi* (Cuvier, 1830), a female (original drawing): a, first maxilla; b, first leg; c, uropod (ventral view)

Morphology of the first and second antennae is almost identical with that in females, the differences observed being very slight only. The first antenna in males shows 3 rather large setae on the anterior margin of the fourth segment (Fig. 9), the corresponding female segment showing 2 setae only. The male second antenna is armed with a small spine located at the base of the terminal segment (Fig. 10a), the spine being absent in females. Males and females have morphologically identical mandibles (Fig. 12a), first maxilla (Fig. 10b), and second maxilla (Fig. 10c), all the appendages being smaller in males.

The first and second thoracic legs in males are very similar to those in females. The only difference is in thin hairs growing on exo- and endopod setae of the two pairs of legs in males (Fig. 11a,b). Besides, the setae on the exo- and endopods of the second leg in males are much longer than those in females. Similarly to females, the fird and fourth legs reduced to 2 small setae (Fig. 11c). The fourth leg is either missing or may be represented by a single seta only. The male uropods (Fig. 12b) are morphologically identical with those of a female.

DISCUSSION

Kabata (1979) gave a detailed description, illustrated with numerous drawings, of female *Hatschekia hippoglossi* (Cuvier, 1830). His studies show the parasite to be species-specific for the Atlantic halibut and to occur in the North Atlantic only. In the work quoted, Kabata published also a sketchy drawing and a very brief description of a male, following. Scott and Scott (1919). In spite of having examined a great many fish (697 individuals, 186 of which were infected with females), Kabata was unable to find males of the species.

Materials described by Zubchenko (1980) were obtained from the North-West Atlantic, too. He observed the copepods mostly on the Atlantic halibut and only once on the Greenland halibut. Zubchenko, however, gave no description of the parasites he found.

The crustaceans I am describing in this paper were found on the Greenland halibut caught in the Bering Sea (Pacific). The parasittes were absent from the North Atlantic Greenland halibut: 261 individuals from two different fishing grounds were free of them. Neither Reimer (1981) nor Rokicki (1982) were able to detect the parasites discussed in the fish caught in the Davis Strait and off Labrador, respectively; the latter author examined as many as 922 individuals of the Greenland halibut.

Morphology of the females found in the Greenland halibut is close to that of *H. hippoglossi* described by Kabata (1979). However, certain very important differences were observed concerning some appendages. In Kabata's description, the terminal part of the first antenna (fifth and terminal segments) bears 12 different setae, while the Greenland halibut parasites I examined had 15 different setae (Fig. 4a). Kabata (1979) observed the first maxilla endopod in females to have a single, delicate, centrally located

setiform process between two tubercles. In my materials, the central process is much longer and broader. Besides, another lateral, broad, sharply ended process is present on the paracentral part of the endopod (Fig. 5b), the process missing from Kabata's description. In his materials, the first thoracic leg has 4 longer setae on the terminal part of the endopod, 3 sets only bein, present on my specimens (Fig. 6a). The Greenland halibut parasites show their uropod endings and lateral processes to be broad and conical, the corresponding elements in the Atlantic halibut parasites being slender and setiform. Besides, in the Greenland halibut crustaceans they are covered with clearly visible thin hairs (Fig. 7b) not mentioned by Kabata and absent in his drawings. It should be added that morphological differences between the Greenland and Atlantic halibut female parasites are discernible in male appendages, too (Figs. 9, 10b, 11a, 12b). Most of these differences could be seen on *H. hippoglossi* females borrowed from the Berlin Museum and obtained from the Atlantic halibut. The drawings of the frirst maxilla, first leg, and urpods (Fig. 13) from those specimens, first published in this paper, conform to Kabata's descriptions and confirm the existence of the differences discussed.

The morphological differences observed as well as the occurrence of the parasites on different hosts and in different localities warrant the conclusion that the crustaceans described in this paper belong to a new, hitherto non-described species. Moreover, the description of males fills the gap in data on morphology of these parasites as most description of *Hatschekia* species are based on females only (Jones, 1985; Kabata, 1979, 1981).

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HATSCHEKIA REINHARDTI SP. NOV. (*COPEPODA, HATSCHEKIIDAE*) PASOŻYT HALIBUTA NIEBIESKIEGO, *REINHARDTIUS HIPPOGLOSSOIDES* (Walbum, 1792)

STRESZCZENIE

W wodach północnego Pacyfiku (Morze Beringa) znalazłam nowy gatunek pasożytniczego widłonoga *Hatschekia reinhardti sp. nov.* Pasożyty występowały głównie na skrzelach halibuta niebieskiego, *Reinhardtius hippoglossoides* (Walbum, 1792). W jednym przypadku zaobserwowano je również na płetwie brzusznej tego żywiciela. W próbie z Morza Bałtyckiego zbadano 7 osobników halibuta niebieskiego. Samice opisywanego skorupiaka stwierdzono na czterech rybach (57,1% zarażenia), intensywność zarażenia wahała się od 1 do 36 osobników. Na skrzelach jednego halibuta niebieskiego wykryto także obecność dwu samców. Podano szczegółowy opis morfologiczny znalezionych samic i samców.

Ponadto zbadano ogółem 261 osobników halibuta niebieskiego z dwóch odległych od siebie rejonów północnego Atlantyku (okolice Labradoru i Morze Barentsa). Pasożytów z rodzaju *Hatschekia* nie stwierdzono na tym żywicielu w północnym Atlantyku.

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