

# A new species of *Prohatschekia* Nunes-Ruivo, 1954 (Copepoda: Hatschekiidae) parasitic on *Scorpaena elongata* (Cadenat) off Algeria

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**Abstract** A new species of parasitic copepod, *Prohatschekia mediterranea* n. sp. (Siphonostomatoidea: Hatschekiidae), is described from a scorpaenid fish, *Scorpaena elongata*, collected off Algeria. This is the seventh species of *Prohatschekia* Nunes-Ruivo, 1954 to be described and the first record of the genus from the Mediterranean Sea. The new species is most closely related to *P. cremouxi* Nunes-Ruivo, 1954, known from a congeneric host collected in Senegal. A key is provided to distinguish the new species from other members of the genus.

## Introduction

The copepod parasite fauna of Algerian coastal fishes is poorly known. The only general survey, by Rose & Vaissière (1952a, b), reported 30 species belonging to 15 genera, but this represents

only a small proportion of the total number of 226 species of parasitic copepods belonging to 88 genera and 20 families reported from the entire Mediterranean Sea by Raibaut et al. (1998) and is considerably less than half of the number of species reported from fishes of neighbouring Tunisia (Benmansour & Ben Hassine, 1997; Essafi et al., 1984; Raibaut & Essafi, 1979). During a survey of parasitic copepods from marine fishes off Algeria conducted by the first author, a species of hatschekiid was recovered regularly from the gills of the slender rockfish *Scorpaena elongata* (Cadenat). The family Hatschekiidae Kabata, 1979 is currently represented in the Mediterranean by eight species of *Hatschekia* Poche, 1902 and by a single species of *Congericola* van Beneden, 1854. The parasite found on *S. elongata* belongs to *Prohatschekia* Nunes-Ruivo, 1954 and is described below as a new species. This is the tenth hatschekiid to be reported from the Mediterranean and the first record of *Prohatschekia* from the region.

## Material and methods

Fishes were purchased in the local fish market at Tamentefoust situated on the Algerian coast about 30 km to the east of Algiers (36°47'N, 3°12'E) and transported to the laboratory for immediate examination. *Scorpaena elongata* is a

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near bottom species, living on a mixed diet of fish and shellfish, and occurs in the eastern Atlantic (Morocco to Namibia) and Mediterranean area (Froese & Pauly, 2006). The fishes examined were caught locally in Algerian waters. Parasites were removed from the gills under a dissection microscope and preserved in 70% ethanol. They were cleared in a drop of lactic acid or in lactophenol and dissected using electrolytically-sharpened tungsten needles. Whole animals and dissected appendages were examined using a Leitz Diaplan microscope equipped with differential interference contrast and drawings were made using a camera lucida. The morphological terminology follows Huys and Boxshall (1991).

### Family Hatschekiidae Kabata, 1979

#### Genus *Prohatschekia* Nunes-Ruivo, 1954

#### *Prohatschekia mediterranea* n. sp.

*Type-host*: *Scorpaena elongata* (Cadenat).

*Type-locality*: Off Tamentefoust, 30 km to the east of Algiers (36°47'N, 3°12'E).

*Site*: Gills.

*Type-material*: The holotype female and three female paratypes are deposited in the collections of the Natural History Museum, London, Registration numbers 2006.615 (holotype) and 2006.616–618 (paratypes). The remaining material is in the collection of the first author.

#### Description (Figs.1–2)

Adult female body comprises distinct cephalothoracic head, short neck region consisting of second and third pedigerous somites, and broad trunk (Fig.1A). Cephalothorax incorporates first pedigerous somite, 1.3 times wider than long; dorsal cephalothoracic shield with frontal margin produced, slightly concave in mid-line, rounded laterally and well defined posteriorly; shield with conspicuous cuticular strengthening bars visible externally. Parabasal papillae anteriorly-directed, visible in dorsal view (Fig.1A). Neck region formed by narrow second and third pedigerous somites, merges into broad, slightly dorsoventrally flattened trunk. Trunk with isolated marginal seta located on each side, just posterior to level of

greatest width, representing vestigial fourth legs. Post-genital abdomen small, about as long as wide, unsegmented, bears paired caudal rami posteriorly. Caudal rami (Fig.1B) well defined, *c.*2.66 times longer than wide, bears 6 setal elements in distal half: 3 larger setae ornamented with lateral row of pinnules; 3 smaller setae naked. Maximum body length of female 1.11 (0.80–1.11) mm; maximum width 0.45 (0.33–0.45) mm based on measurements of 50 specimens. Egg-sacs uniseriate, containing *c.*10 to 15 eggs.

Antennule (Fig. 1C) indistinctly 7-segmented, with only proximal-most articulation well defined by surface suture line; segmental setal formula 10, 6, 4, 2, 1, 3 + aesthetasc, 9 + aesthetasc: distal seta on second segment short; 1 seta on third segment located near posterior margin and directed posteriorly.

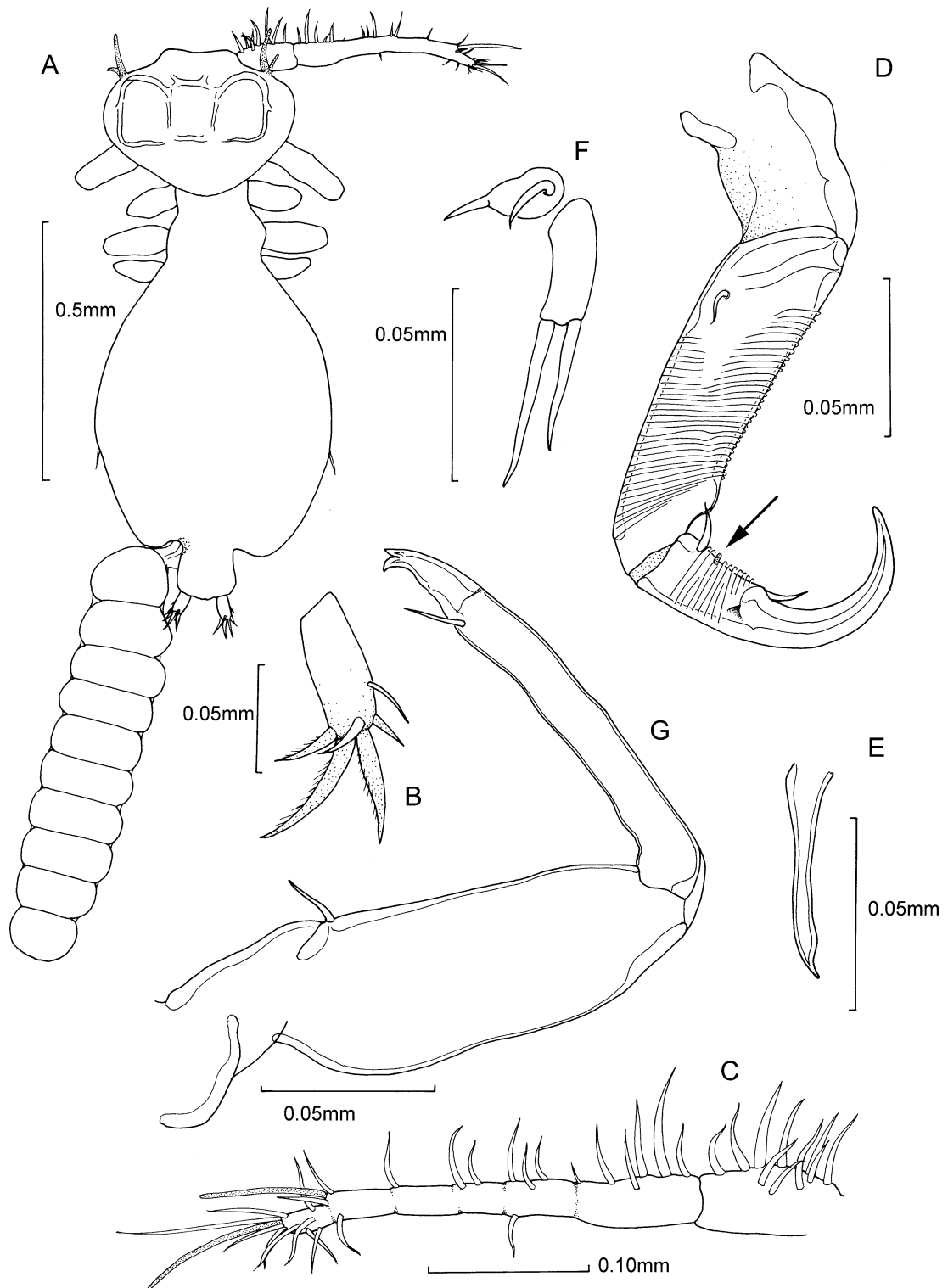
Antenna (Fig.1D) well developed, 3-segmented: basal segment unarmed; middle segment elongate, armed with single seta proximally and ornamented with covering of fine, transverse cuticular ridges; distal segment drawn out into powerful curved subchela armed with stout seta proximally on inner margin and similar seta located on inner margin at base of curved distal claw. Proximal part of distal segment ornamented with transverse cuticular ridges and small knob-like sensory process (arrowed) located on inner margin between setae. Parabasal papillae bifid (Fig.1A), with longer branch anteriorly directed and shorter branch ventrally directed.

Mandible (Fig.1E) forms tapering stylet with pointed tip, lacks marginal teeth. Maxillule (Fig.1F) bilobate; antero-lateral lobe with 2 short setae; posterior lobe longer, with 2 long distal margin setae.

Maxilla (Fig.1G) comprises robust proximal segment (syncoxa) armed with naked, inner margin seta and distal subchela (basis). Subchela long, slender, with bifid claw-like tip, and with thickened cuticle distally; armed with single inner seta proximal to claw-like tip. Maxilliped absent.

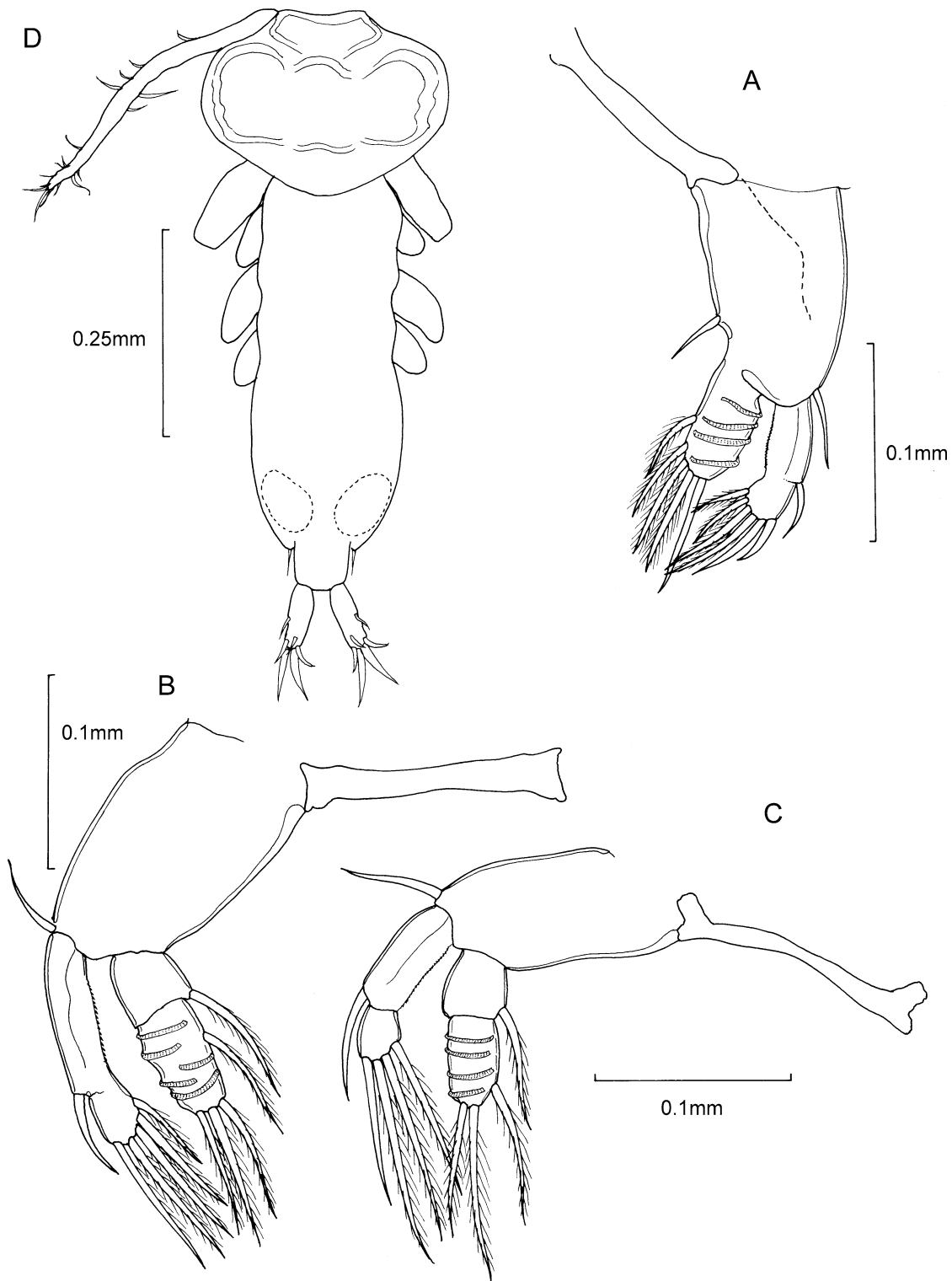
Legs 1–3 biramous; each joined by slender bar-like intercoxal sclerite. Spine and seta formula as follows:

	Coxa-Basis	Exopod	Endopod
Leg 1	1–1	I-0; 6	5
Leg 2	1–0	I-0; 5	0–1; 4
Leg 3	1–0	I-0; 4	0–1; 3



**Fig. 1** *Prohatschekia mediterranea* n. sp., adult female. A, habitus, dorsal view with antennule omitted on left side; B, left caudal ramus, dorsal view; C, right antennule, ventral

view; D, antenna, anterior view with minute sensory process indicated by arrow; E, mandible; F, maxillule *in situ*, ventral view; G, maxilla posterior view. Scale-bars as indicated



**Fig. 2** *Prohatschekia mediterranea* n. sp. A, leg 1 and intercoxal sclerite, antero-ventral view; B, leg 2 and intercoxal sclerite, antero-ventral view; C, leg 3 and intercoxal

sclerite antero-ventral view; D, adult male, dorsal view with right antennule omitted. Scale-bars as indicated

Leg 1 (Fig.2A) with coxa and basis largely fused to form sympod, retaining trace of suture dorsally. Sympod with inner and outer basal setae. Exopod indistinctly 2-segmented; endopod unsegmented and ornamented with 4 transverse cuticular ridges on anterior surface. Leg 2 (Fig.2B) with coxa and basis fused to form sympod bearing outer basal seta. Exopod indistinctly 2-segmented; endopod 2-segmented and ornamented with 5 incomplete transverse cuticular ridges on surface of distal segment. Leg 3 (Fig.2C) with coxa and basis fused to form sympod. Exopod distinctly 2-segmented; endopod 2-segmented and ornamented with 4 transverse cuticular ridges on anterior surface of distal segment.

Leg 4 represented by isolated seta on lateral margin of trunk. Leg 5 absent.

Adult male body (Fig.2D) comprises broad cephalothoracic head and slender trunk. Head covered by dorsal cephalothoracic shield similar in shape to that of female, 1.37 times wider than long. Trunk of similar width along its length but with sinuous margin showing trace of original segmental boundaries. Post-genital abdomen small, about as wide as long, not distinctly delimited from anterior trunk, bears paired caudal rami. Caudal rami relatively large (Fig.2D), armed with 6 setal elements as in female. Maximum body length of male 0.77 (0.55–0.77) mm; maximum width 0.16 (0.11–0.16) mm based on measurements of 5 specimens.

Appendages as for female except leg 4 apparently absent and leg 5 represented by slender seta on papilla located adjacent to paired genital openings.

## Discussion

*Prohatschekia* was established by Nunes-Ruivo (1954) to accommodate hatschekiids with three pairs of biramous swimming legs. It was treated as a valid genus by Kabata (1979) and by Boxshall and Halsey (2004). There are currently six described species and the new species is the seventh. The new species is most closely related to *P. cremouxi* Nunes-Ruivo, 1954, described from another species of the same host genus, *Scorpaena normani* (Cadenat) in Senegalese

waters (Table 1). It differs in having longer antennules than in *P. cremouxi*, a shorter and more strongly curved antennal claw, and in the form of the parabasal papilla. The species can be distinguished from all congeners with the aid of the following key based on adult females:

1. Leg 2 with massive endopod, nearly twice as long as exopod and forming tapering conical ramus ..... *P. laguncula* Shiino, 1957
  - Leg 2 with endopod similar in size to exopod, indistinctly 2-segmented and with parallel sides ..... 2
2. Post-cephalothoracic trunk of female with irregularly parallel sides and distinct posterolateral lobes ..... *P. stocki* Kabata, 1990
  - Post-cephalothoracic trunk with distinctly rounded, convex margins; lacking posterolateral lobes ..... 3
3. Neck region separating cephalothorax from trunk markedly narrower than cephalothorax ..... 4
  - Neck region separating cephalothorax from trunk equal to cephalothorax in width ..... *P. awatati* (Yamaguti, 1939)
4. Antennule longer than or shorter than width of cephalothorax; exopod of leg 3 with setal formula I-0; 4 ..... 5
  - Antennule shorter than width of cephalothorax; exopod of leg 3 with setal formula I-0; 3 ..... *P. sebastisci* (Yamaguti, 1939)
5. Middle segment of antenna about twice as long as wide, lacking conspicuous transverse cuticular ridges; endopod of leg 3 with only 2 apical setae .....
  - Middle segment of antenna slender, at least three times longer than wide, ornamented with conspicuous transverse cuticular ridges; endopod of leg 3 with 2 apical and 1 inner setae on distal segment ..... 6
6. Antennule shorter than width of cephalothorax; parabasal papillae simple, forming short process on frontal margin of dorsal cephalothoracic

**Table 1** Species of *Prohatschekia*, their hosts and known geographical distributions

Copepod species	Host species	Geographical locality	Reference
<i>P. antennalis</i>	<i>Lophiomus setigerus</i> (Vahl)	off Japan	Avdeev and Kazatchenko (1986)
<i>P. awatati</i>	<i>Neobythites macrops</i> Günther	Maisaka, Japan	Yamaguti (1939)
<i>P. cremouxi</i>	<i>Scorpaena normani</i> (Cadenat)	coast of Senegal	Nunes-Ruivo (1954)
<i>P. laguncula</i>	<i>Doederleinia berycoides</i> (Hilgendorf)	Japan	Shiino (1957)
<i>P. mediterranea</i> n. sp.	<i>Scorpaena elongata</i> (Cadenat)	coast of Algeria	Present account
<i>P. sebastisci</i>	<i>Sebastiscus marmoratus</i> Cuvier & Valenciennes	off Obama, Japan	Yamaguti (1939)
<i>P. stocki</i>	<i>Hoplichthys haswelli</i> (McCulloch)	off New South Wales, Australia	Kabata (1990)

shield .....  
..... *P. cremouxi* Nunes-Ruivo, 1954

- Antennule much longer than width of cephalothorax; parbasal papillae bifid ..... *P. mediterranea* n. sp.

The geographical distribution of *Prohatschekia* species (Table 1) indicates a concentration of species in the Northern Pacific, with four species reported from Japanese waters. One species is known from Australia, one from western Africa and one from the Mediterranean coast of North Africa. This is the first record of *Prohatschekia* from the Mediterranean Sea.

*Prohatschekia* species occur on five different host families (Table 1): the dominant host family is the Scorpaenidae, which serves as host for three species (*P. cremouxi*, *P. sebastisci* and the new species, *P. mediterranea*). The remaining host families serve as hosts for a single species each: *P. antennalis* is found on a goosfish (Lophiidae), *P. awatati* on a cusk eel (Ophidiidae), *P. laguncula* on a lanternbelly (Acropomatidae) and *P. stocki* on a ghost flathead (Hoplichthyidae).

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