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First records of the thalassinids *Callianassa acanthura* CAROLI, 1946 and *Upogebia mediterranea* NOËL, 1992 and of the hermit crab *Paguristes streaensis* PASTORE, 1984 in the Adriatic Sea

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Abstract

Several specimens of *Callianassa acanthura* are reported from the Kornati Archipelago and Veštar Bay near Rovinj, Croatia, where they were collected in water depths between 3 and 6 m in fine sand. One specimen of *Upogebia mediterranea* is reported from Piran, Slovenia, collected in muddy sand in 3 m depth. Several specimens of *Paguristes streaensis* are reported from Faborsa Bay near Rovinj, where they were collected in a *Cymodocea* meadow in 3 to 6 m depth. These are the first records of the species for the Adriatic Sea.

Key words: *Callianassa acanthura*, *Upogebia mediterranea*, *Paguristes streaensis*, Adriatic Sea, Decapoda, Crustacea

Zusammenfassung

Mehrere Exemplare des grabenden Krebses *Callianassa acanthura* wurden bei den Kornaten und in der Nähe von Rovinj in Feinsandböden in Wassertiefen zwischen 3 und 6 m gefangen. Ein Exemplar von *Upogebia mediterranea* wurde bei Piran in schlammigen Sand gefangen. Mehrere Exemplare des Einsiedlers *Paguristes streaensis* wurden in einer *Cymodocea* Seegraswiese bei Rovinj aufgesammelt. Dies sind die ersten Funde der drei Arten in der Adria.

Introduction

Callianassa acanthura is a rare Mediterranean callianassid species. It was first described from the coast of Posillipo in the Gulf of Naples, where it was collected (together with *C. truncata*) from a mixture of sand and mud in 2-3 m water depth (CAROLI 1946). Only 10 specimens were collected between 1924 and 1946 (CAROLI 1946, SAINT LAURENT & BOŽIĆ 1976, MONCHARMANT 1981). A single specimen was found by TÜRKAY (1982) in the Aegean Sea (Island of Peristera) in 0.5 m in pure sand; it was listed later in the faunistic surveys of that region (TÜRKAY & al. 1987, KOUKOURAS & al. 1992). Recently, D'UDEKEM D'ACQZ (1997) reported 1 specimen from Epireus (Ionian Sea) in 1-1.5 m in very fine sand (together with *C. truncata*) and 2 females from Lesbos (Aegean Sea) in 1.2 m water depth in coarse sand with *Zostera* (together with *Upogebia pusilla*). Our faunistic survey of sublittoral sandy bottoms of the Kornati Archipelago and near Rovinj revealed this species to be abundant.

Upogebia mediterranea is a quite common species in the Mediterranean with a complicated taxonomic history. For a long time it has been confused with its congener *U.*

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deltaura. Michèle de Saint Laurent (1979 in an unpublished key) was the first to recognise the difference. Subsequently, this species - different from *U. deltaura* - was reported from several localities (see DWORSCHAK 1992). A survey of the thalassinid fauna near Piran revealed one specimen of this species.

Paguristes streaensis was first described from specimens collected in the Ionian Sea in 1.2 to 2 m water depth in *Cymodocea* meadows and on detritic bottoms (PASTORE 1984). ATEŠ (1981) gave a brief summary of the colour patterns of the three species of *Paguristes*: *P. eremita* (LINNAEUS, 1767) = *P. oculus* (FABRICIUS, 1775), *P. syrtenensis* DE SAINT LAURENT, 1971 and *P. streaensis* PASTORE, 1984, occurring in the Mediterranean and reported the latter from the Ionian and Aegean Sea. D'UDEKEM D'ACÓZ (1997) found *P. streaensis* to occur mainly in shallow waters in the Aegean Sea, while on deeper bottoms only *P. eremita* was found. Recently, FALCIAI (1997) found both *P. syrtenensis* and *P. streaensis* on sand, mud and among *Posidonia* in 40-65 m water depth near the island of Lampedusa. During the summer courses of the University of Vienna in 1997 and 1998, several specimens were collected in Faborsa Bay near Rovinj.

These are the first records of the three species for the Adriatic Sea, adding a second and third thalassinid to the first record of *Callianassa truncata* for this biogeographic region (ABED-NAVANDI & DWORSCHAK 1997).

Material and Methods

The sampling site of the *C. acanthura* specimens is situated in the Kornati Archipelago (central Adriatic) in Stupica Bay on the coast of Žirje Island (Croatia). In a depth between 3 and 6 m the bottom consists of a well sorted fine sand, and the burrows of the thalassinids were evident on the sediment surface by funnels and mounds. Conspicuous associated macrofaunal elements were the fish *Trachinus* sp. and *Bothus* sp. A yabby pump was used as a sampling device while snorkeling in September 1997. In July 1998, another specimen was collected in Veštar Bay, 5 km S of Rovinj. The bottom in 4 m consists of medium sand.

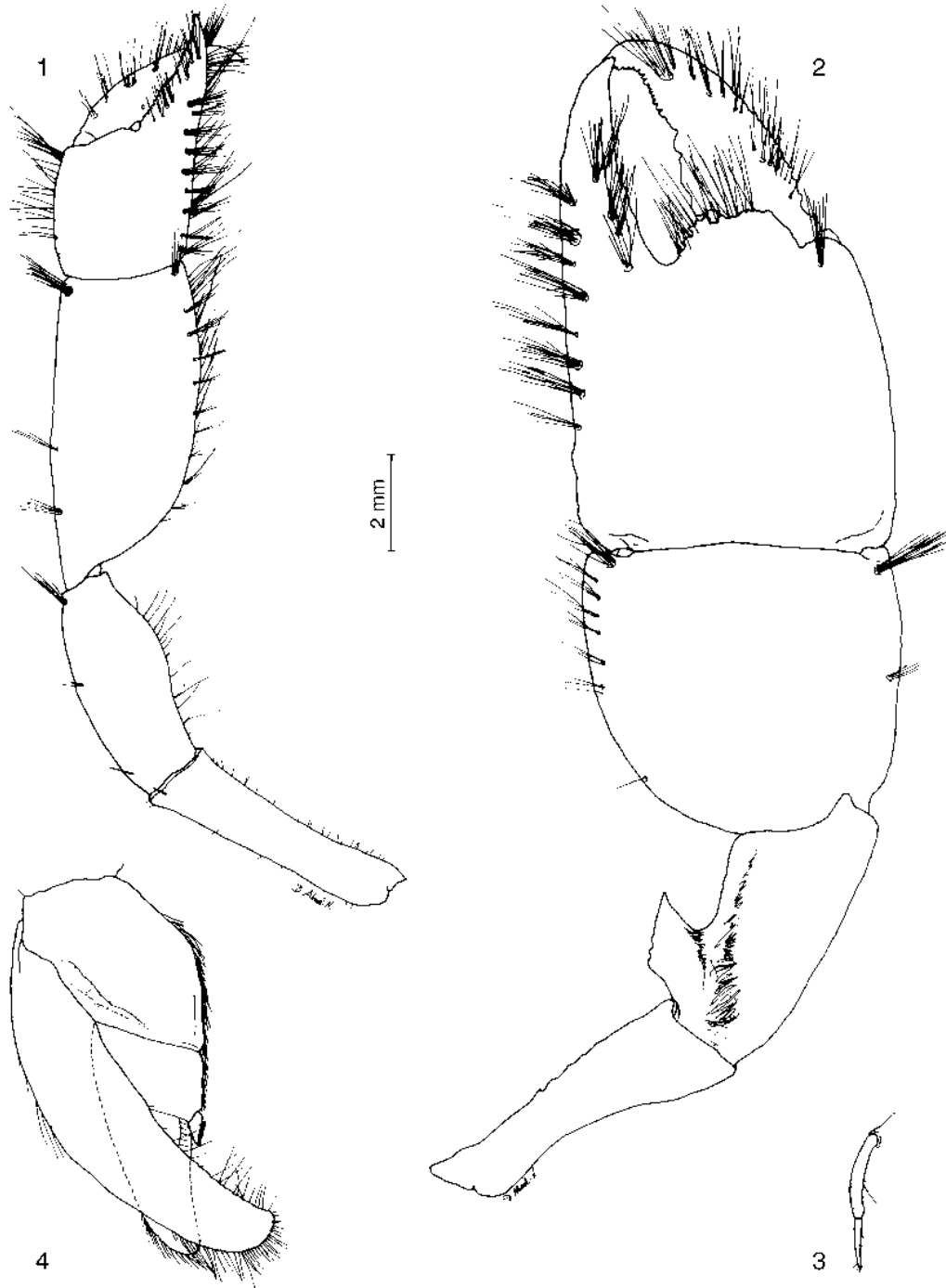
The sampling site of *U. mediterranea* is the east coast of the Gulf of Trieste (northern Adriatic Sea) near the town of Piran (Slovenia) in front of the Marine Biological Station. Seaward of a concrete wall in a depth of 3 m the bottom consists of a poorly sorted sandy mud with abundant shell debris. Associated thalassinids were *Upogebia pusilla* and *Callianassa candida*. The animals were collected with a yabby pump in September 1997.

Specimens of *Paguristes streaensis* were collected on the west coast of the peninsula Istria (northern Adriatic Sea) north of the town Rovinj (Croatia). In Faborsa Bay the bottom in 3 to 6 m is sand with a *Cymodocea* meadow. The animals were collected by hand during the summer courses of the University of Vienna in July 1997 and 1998.

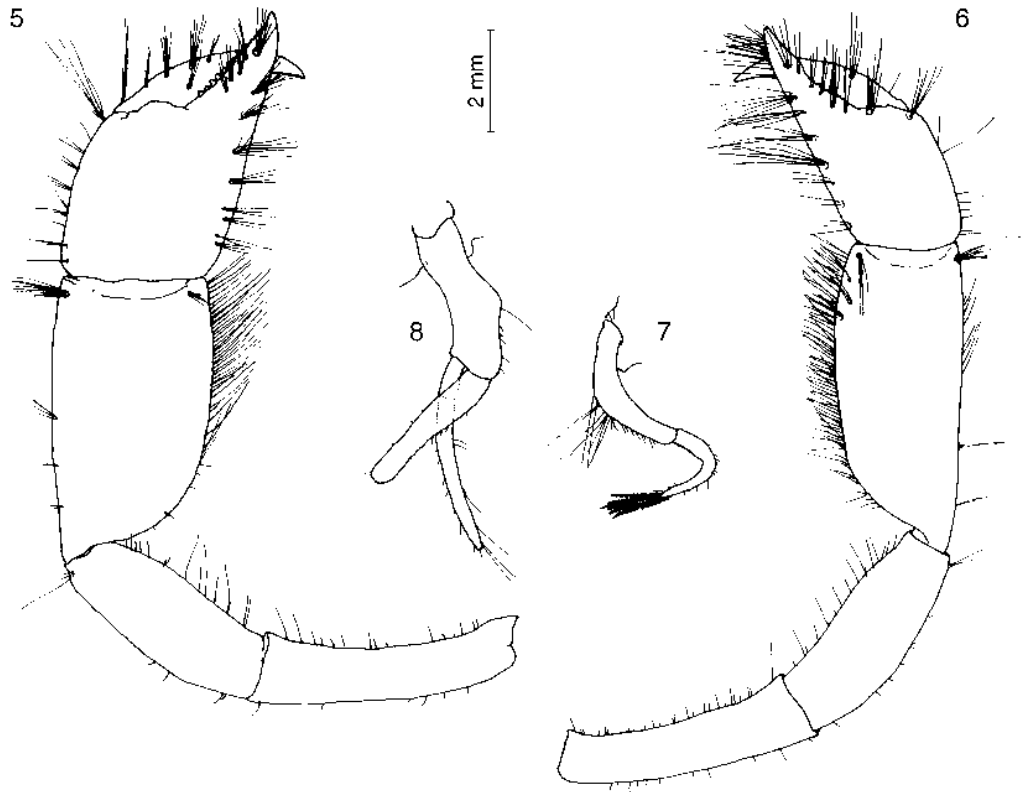
Animals were fixed in buffered seawater-formaldehyde and later transferred into 70% ethanol. The material is deposited in the Museum of Natural History in Vienna. Measurements are given as carapace length (CL) or shield length (SL) from the tip of the rostrum to the midpoint of the posterior margin in mm.

Abbreviations

NHMW	Naturhistorisches Museum in Wien	SMF	Forschungsinstitut Senckenberg,
RMNH	Nationaal Natuurhistorisch Museum, Leiden		Frankfurt a. M.



Figs 1-4: *Callianassa acanthura*. Outer view of minor (1) and major (2) chelipeds, and right Plp1 (3) of a male (CL 9.8); (4) Plp3 in frontal view.



Figs 5 - 8: *Callianassa acanthura*. Outer views of major (5) and minor (6) chelipeds, Plp1 (7) and Plp2 (8) of a female (CL 10.0).

Callianassa acanthura CAROLI, 1946

Callianassa acanthura CAROLI, 1946: 66, figs. 1a, 2; ZARIQUIEY-ALVAREZ, 1968: 229; SAINT LAURENT & BOŽIĆ, 1976: 21, figs. 3, 11, 19, 25, 30; MONCHARMANT, 1981: 71; TÜRKAY, 1982, 225; TÜRKAY & al., 1987: 92[[list]; KOUKOURAS & al., 1992: 223; NOËL, 1992: 81(key), D'UDEKEM D'ACQZ, 1997: 54, 56.

Material: NHMW 15372, 2 males, 3 females, Adriatic Sea, Croatia, "Bucht im Süden (U. Stupica) der Insel Žirje im Kornaten-Archipel", D. Abed-Navandi coll. with yabby pump "17. September 1997, vormittags, Sandboden, gut sortierter Feinsand mit Plattfischen (Butte) und aggressiven *Trachinus*, 3 m Tiefe. Kegel und Trichter des Baues sichtbar". NHMW 18311, 1 female, Adriatic Sea, Veštar, 4 m, D. Abed-Navandi coll. with yabby pump 4 July 1998.

Additional material investigated: SMF 8821, 1 male, Aegean Sea, N-Sporades, Peristera, Ornoma Peristeri (39°10'N 23°58'E), 0.5m deep, pure sand, M. Türkay coll. with yabby pump 11 July 1978.

RMNH 15212, 2 males, Syntypes, Napels, Italië, coll. E. Caroli, Zool. Stat. Napels, unt v.mei 1959 [Data given in FRANSEN & al. 1997: Italy, Naples, Posillipo, depth 2-3 m, sand and mud, 1924-1945, received May 1959, don. Zoological Station Naples]

This species can easily be identified by the characteristic spinulation of the telson and the inner uropods (see CAROLI 1946: fig. 2 and DE SAINT LAURENT & BOŽIĆ 1976: fig. 30).

Table 1. Measurements (in mm) of *Callianassa acanthura* specimens. Sex: f: female, m: male; TL: total length, CL: carapace length; si: side of major cheliped, r: right, l: left; maPL: propodus length of major cheliped, maPW propodus width of major cheliped; miPL: propodus length of minor cheliped; miPW: propodus width of minor cheliped; na: not available.

Inv.Nr.	sex	TL	CL	si	maPL	maPW	miPL	miPW
RMNH 15212	m	42	11	r	7.0	8.0	2.2	2.6
RMNH 15212	m	36	8.4	l	4.6	5.0	2.2	2.0
SMF 8821	m	41	11.0	na	na	na	na	na
NHMW 15372/1	m	24	5.8	l	2.2	2.0	na	na
NHMW 15372/2	f	36	9.8	l	2.8	2.6	2.0	2.0
NHMW 15372/3	f	38	10.0	r	2.8	2.8	na	na
NHMW 15372/4	f	38	10.0	r	2.4	2.4	2.0	2.0
NHMW 15372/5	m	36	9.8	l	4.8	5.2	2.2	2.2
NHMW 18311	f	40	10.6	r	3.2	2.8	2.6	2.2

As earlier descriptions are very detailed we only provide some drawings of characters which show variation due to sex and/or size (Figs 1, 2, 5, 6) or have not been figured previously (Figs 2, 5-8).

In the major P1 of the small male (CL 5.8) there is no incision between fixed and movable finger, the meral hook is a single simple spine. This incision seems to develop with increasing size as it is more pronounced in the larger of the syntypic males (CL 11.0) (see also CAROLI 1946: fig. 1a) than in the largest male we collected (CL 9.8) (Fig. 2).

Major and minor chelipeds in females are of nearly the same size, the major cheliped lacks the meral hook and the serration on the ventral border of the merus (Fig. 5). The carpus of the minor cheliped is slightly longer than in the major cheliped (Fig. 6). There is no incision between the dactylus and the fixed finger. Measurements of the animals are summarized in Table 1.

All specimens showed numerous glands under the transparent integument on the side of tergite of abdominal somite 2, in the uropods and the telson. Both P1 have long setae with mucus adhering to these setae.

Callianassa acanthura is certainly a rare species. Up to now less than 20 animals have been collected in the whole Mediterranean Sea within more than 50 years. In this case it is difficult to conclude whether this species has just not been found up to now in the Adriatic Sea or if a colonisation is taking place.

Upogebia mediterranea Noël, 1992

[*Upogebia*] *mediterranea* SAINT LAURENT 1979 [name not available, unpublished key distributed at the 2nd Colloquium Crustacea Decapoda Mediterranea, Ancona, Italy]

Upogebia cf. *deltaura* KOCATAŞ 1981: 162; DWORSCHAK 1992: 223

Upogebia] *mediterranea* DWORSCHAK 1983: 40 (appendix) [nomen nudum]

Upogebia n. sp. "*mediterranea*" NOËL, 1992: 82 (key)

Upogebia mediterranea FROGLIA 1995: 8 (list)

Upogebia nitida mediterranea D'UDEKEM D'ACCOZ 1997: 59, 60 (key), 61, fig. 2

Material: NHMW 17934, 1 female (CL 14.6), Adria, Piran, 3 m, Schlamm, D. Abed-Navandi coll. 8 September 1997.

This species is characterised by a rounded pleuron of the first abdominal somite and the absence of a spine at the penultimate segment of the antennal peduncle. In its congener, *U. deltaura*, the pleuron is acute and a spine is present at the penultimate segment of the antennal peduncle.

Whereas *U. mediterranea* can be found exclusively in the Mediterranean, preferably in dead rhizomes of *Posidonia* (DWORSCHAK 1992), *U. deltaura* occurs on deeper muddy bottoms and is widely distributed also in the northeast Atlantic.

Its absence in previous faunal lists of the Adriatic compiled by ŠTEVČIĆ (1990, 1995) is certainly due to the confusion with its congener. This report adds a third species of the Upogebiidae to the infauna of sublittoral bottoms offshore Piran. *Upogebia tipica* is common in muddy bottoms below 11 m just in front of hotel Emona in Piran (P. Dworschak pers. obs.); *U. mediterranea* was collected only 200 m east in front of the Marine Biological Station, with *U. pusilla* occurring nearby.

***Paguristes streaensis* PASTORE, 1984**

Paguristes streaensis PASTORE 1984: 17, figs.1, 2c-e, 4a, d, pl. 1 figs 1-2; ATEs 1991: 44, fig. on p. 43 [as *Paguristes* sp.]; D'UDEKEM D'ACoZ 1997: 67; FALCIAI 1997: 242 (list), 246.

Material: NHMW 18209, 4 males (SL 6.2, 6.6, 7.0, 7.6), Rovinj, Faborsa, 3 m, *Cymodocea* meadow, Kurs Inst. Zool. Univ. Wien coll. 7 July 1997, 3 specimens in shells of *Cerithium vulgatum* BRUGIÈRE, 1792 and 1 in *Natica stercusmuscarum* (GMELIN, 1791)(= *Natica millepunctata* LAMARCK, 1822). NHMW 18312, 1 male (SL 4.0), Rovinj, Faborsa, D. Abed-Navandi coll. 6 July 1998, in shell of *Cerithium vulgatum*.

This species can be recognised by its distinctive colour pattern. The legs are greenish-brown and have white tips followed by dark brown rings proximally, the eystalks are greenish-blue, the cornea yellow, and the antennae and antennules brown to red. The closely related *P. eremita* (LINNAEUS, 1767) [= *P. oculatus* (FABRICIUS, 1775)] is generally more brownish red and has blue corneae. Instead of the obvious violet spots surrounded by a white ring on the inner side of the merus of the chelipeds - typical (-> *oculatus*) for *P. eremita* - in *P. streaensis* only barely visible brownish spots are present.

We compared the specimens from Faborsa Bay with material published by PESTA (1918) (i.e. from Valdibora Bay, 15 m) under the name *P. oculatus* and with material of *P. eremita* (e.g. NHMW 18313) collected by us in July 1998 in Faborsa Bay on bottoms in 6 m. In the latter case, specimens always had the brown colour and blue corneae characteristic for *P. eremita* (for a colour photograph see STACHOWITSCH 1980: figs 5 and 7). However, spinulation patterns on the ocular scales, on the pereopods 2 and 3, and on maxilliped 3, which are stated as specific differences (PASTORE 1984) between the two hermit crabs, did not serve as clear diagnostic features for the material examined by us.

It seems that in the vicinity of Rovinj *P. streaensis* is usually distributed in more shallow water than *P. eremita*. PASTORE (1984) described it from around 2 m. D'UDEKEM D'ACoZ (1997) reported *P. streaensis* to occur mainly in the shallow sublittoral of the Aegean Sea, while on deeper bottoms only *P. eremita* could be found. However, FALCIAI (1997) reported only *P. syrtensis* and *P. streaensis* from 40-65 m near the island of Lampedusa.

The fact that the only macroscopic difference between the two species is the colour pattern (see also PIPITONE, 1996) probably explains why this species has been overlooked pre-

viously. This difference was either not considered as species specific in freshly collected specimens or not recognised in preserved specimens, as the colour fades away. ŠTEVČIĆ (1986) did a brief population study on *Paguristes eremita* (as *P. oculatus*) in Saline Bay (the next bay north of Faborsa Bay), where the hermit crabs were collected between 1 and 4 m in a *Zostera* meadow and inhabited mainly *Cerithium* shells. He did not mention any colour difference but discussed that the species usually occurred in deeper waters and inhabits shells of Muricidae as reported by STACHOWITSCH (1980).

The problem whether *P. streaensis* is identical with *P. eremita* or only a colour morph of the latter requires further studies.

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