

Two new records of Ghost shrimps (Crustacea:Decapoda:Axiidea) from Bushehr, Persian Gulf, Iran

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The ghost shrimps comprise decapod crustaceans that are adapted to a burrowing life-style (Poore, 1994). These are usually known as mud lobster, mud shrimp, ghost shrimp, burrowing shrimp and thalassinidean shrimp. These are significant in several features (see Dworschak et al, 2012). Such as bioturbation, role in food chains, symbioses and economics (used as pests, Importance at fisheries). Ghost shrimps of the Persian Gulf have been subject of several studies, including: Nobili (1906), Sakai and Türkay(1995), Dworschak (2009), Sepahvand & Sari (2010) and Sepahvand et al. (2012).The littoral areas of the Bushehr province present a variety of habitats , including muddy, sandy, boulder and mangrove forest. All of these habitats are not suitable for presence of these shrimps. *Neocallichirus Jousseau mei* (Nobili, 1904) and *N. calmani* (Nobili, 1904) prefer boulder or limestone rocks (Carbonat rock) and sandy-muddy habitats, respectively (Sepahvand et al., 2012). Taxonomy of the mud shrimp has been not stable and in recent decade have a dynamics status (see Tudge et al, 2000; Felder & Robles, 2009; Sakai, 2011; Dworschak et al., 2012). The main purpose of the present study was to present two new records of ghost shrimps of the Bushehr province, Persian Gulf. Notes on habitat preferences and commensals as well as symbiotic animals for these two shrimps are provided. Prior to present study *N. calmani* was recorded in coastal area of Gulf of Oman and *N. jousseau mei* from Qeshm Island and Gulf of Oman (Sepahvand et al., 2012).

Sampling was carried out north of Eli village in the Bushehr Province (27° 50' 14.62" N and 51° 53' 24.85" E) (Fig.1) Due to the nature of substrate type of the habitat, a lever was used for lifting boulders for collecting *N. jousseau mei* specimens, *N. calmani* was collected in sandy-muddy habitat using a spade. Collected specimens were transferred to 80% ethanol. Some material from the Zoological Museum, University of Tehran (ZUTC) was compared with specimens of the present study. The size is expressed as total length (TL in mm) from the tip of the rostrum to the end of the telson and as carapace length (CL in mm) from the tip of the rostrum to the posterior median edge of the carapace. Species synonymy is given only for original descriptions and recent studies.

As the morphological characters seem to be well agreed to original description, here a brief description on live coloration of each species, habitat type, Symbiotic animals, and burrowing shape are presented.

SYSTEMATICS

Family Callianassidea Dana, 1852

Subfamily Callichirinae Manning & Felder, 1991

Genus *Neocallichirus* Sakai, 1988

***Neocallichirus jousseau mei* (Nobili, 1904)**

Figure (2-A)

Callichirus(*Cheramus*) *Jousseau mei* Nobili,1904:236

Neocallichirus indicus Sepahvand &Sari., 2010:46

Neocallichirus jousseau mei Dworschak, 2011:2



FIGURE 3. Sampling locality at Bushehr Province, Persian Gulf

Material Examined: ZUTC Tha.1001 (2♂, 3♀), 1002(1♂, 1♀), 1015 (2♂, 4♀), 1016 (3♂, 5♀), 1017 (1♂, 1♀), 1035 (5♀, 3♂)

Habitat: Muddy-sand with boulders.

Color: The color of live animal was whitish beige. In adult females orange colored ovaries were visible through the transparent cuticle with pink chelipeds and two ovigerous females were found (Figure 2-A).

Commensals: Many specimens had numerous *Clausidium* copepods on carapace and inner surface of chelipeds.

Symbiotic Animals: Pinnotherid and Grapsid crabs, Alpheidae Shrimps and caprellid Amphipods

Burrowing shape: The burrow of *N. jousseaumei* consists of multiple U shaped parts in which ex-current openings lack mounds. These openings were not easily detectable. In some burrow male and female lived together and in two cases a juvenile was also found (fig. 2 B).

Size: TL: males from 56.1 to 59.8 mm, and CL: 18.8 to 20 mm, TL: females (ovigerous) from 53 to 71.2mm, and CL: 18 to 23.8mm

Note: specimens belong to this species were the largest among reported Axeiid and Gebeiid from the Persian Gulf and Gulf of Oman

***Neocallichirus calmani* (Nobili, 1904)**

Figure (2-C)

Callianassa(*Cheramus*) *calmani* Nobili,1904:237

Neocallichirus calmani Sakai, 2011: 455

Material Examined: ZUTC Tha.1011 (1♂, 2♀), 1005 (1♂, 1♀), 1027 (2♂, 3♀), 1034 (1♂, 2♀), 1049 (3♀, 2♂).

Habitat: Muddy-sand with bivalve shell fragments (Figure 2 D).

Color: The body color is white, chelipeds with a touch of pink dorsally; Ovary is visible through the translucent cuticle of females (Figure 2 C).

Symbiotic Animals: Myidae Calms, Polynoidae Scale worms and Grabsidae Crabs

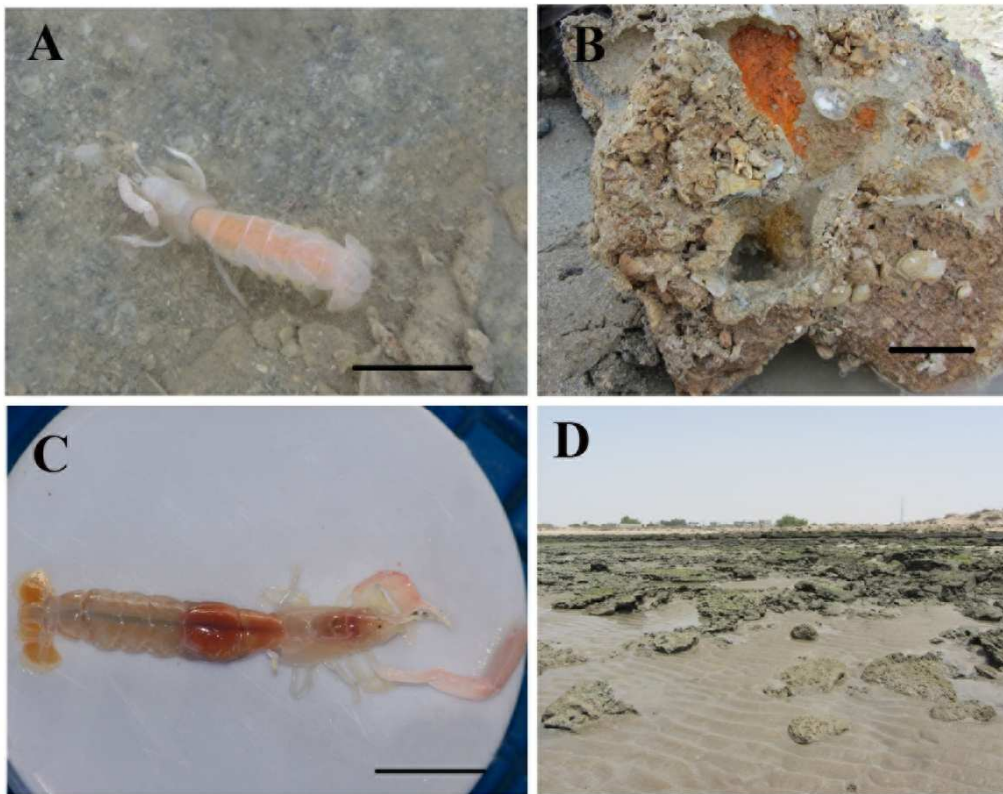


FIGURE 2. A) *N. jousseaumei*, scale: 2cm; B) Burrowing shape in *N. jousseaumei*, scale: 1cm; C) *N. calmani* scale: 1cm; D) Habitat type for two species.

Burrowing Shape: Burrows of this species characterized by two openings on the sand flat surface with a small mound and a funnel for each burrow.

Size: TL: males from 37.2 to 41.3 mm, and CL: 12.1 to 13.9 mm, TL: females (ovigerous) from 39.3 to 42.1 mm, and CL: 13 to 14.1 mm.

According to Sepahvand et al. (2012), the most common Axiid shrimps of the Iranian coast were *Neocallichirus jousseaumei* and *Neocallichirus calmani*, But It seems, these two species are more present in the Gulf of Oman than in the Persian Gulf, and the current study provides the first records of these ghost shrimps in littoral zones of the Persian Gulf. previously some studies were carried out in the Persian Gulf (see Nobili, 1906, Sakai & Türkay, 1995, Dworschak, 2009, Sepahvand et al., 2012). Previously *N. jousseaumei* was reported as *N. indicus* in UAE by Sakai & Apel (2002). Until this study, *N. calmani* was not reported in the Persian Gulf. *N. jousseaumei* an epizoic *Clausidium* copepods living on the chelipeds and carapace. Animals such as grapsid crabs, scale worms, amphipods, snapping shrimp and sponges found as symbionts with this species. Animals with *N. calmani* include crabs, amphipod, and mollusks. Sometimes a mantis shrimp occur with this shrimps. It seems that richness, difference or similarity in number of burrow associates might be result of the availability in oxygen in the burrows. Oxygen content in the burrow of callianassids is relatively high, which this is due to of high ventilation activity of these shrimps (Dworschak, 1983, Astall et al., 1997). The most important character used in diagnosis of *N. jousseaumei* from *N. calmani* is major cheliped propodus of *N. jousseaumei* which is much longer than carpus compared to *N. calmani*. These two species with respect to body size were significantly different. Also, preferred substrate type of habitat can be

useful for identification of these species. *N. jousseaumei* usually prefers under the boulders and carbonate rock for living where the sufficient clay for covering the burrows walls are accessible. In contrast, *N. calmani* prefers the muddy-sand habitats with mollusks shells fragments. The shape of ex-current-openings of the burrows of these two shrimps was different. *N. calmani* had two mounds on ex-current-opening but *N. jousseaumei* burrow shows no mounds. The current study can be used as a basis for survey on ecology of these species with topics such as animal symbionts, in different habitat, feeding pattern and sediment bioturbation.

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