

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/355916416>

New Record of from Coastal Waters of Iraq *Squilla mantis*

Article in *Indian Journal of Ecology* · January 2021

CITATIONS

0

READS

18

2 authors, including:



Abdulhussein Ghazi

University of Basrah

24 PUBLICATIONS 48 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



Effects of temperature and tank color on post larvae release and survival of freshwater Prawn *Macrobrachium nipponense* [View project](#)



shrimp [View project](#)



New Record of *Squilla mantis* from Coastal Waters of Iraq

Abdul-Hussein H. Ghazi and Hala F. Hassan

Department of Natural Marine Science, Marine Science College, University of Basrah, Iraq
E-mail: abdulhussein73@yahoo.com

Abstract: A new record of the stomatopod, *Squilla mantis*, of the family Squillidae from the coastal waters of Iraq at the North-West of the Arabian Gulf made. The morphological features of this species have been diagnosed. The total length of specimens were 110 – 170 mm. DNA barcoding is used for the identification of new species involving DNA extraction subjected to PCR and sequencing of COI gene, indicated that the specimens are belonging to *S. mantis*, which was not recorded in the region before.

Keywords: Stomatopod, *Squilla mantis*, DNA sequences, Arabian gulf

Stomatopod is a small group of marine Malacostraca, occupy a wide range of habitats, which live in burrows in sand or near coral reefs. They are benthic animals that live in marine water at depths of less than 200 meters, and some live in brackish habitats, although there are species that live in depths of up to 1500 meters in the soft bottoms (Ahyong et al 2017). The group was recorded from the Mediterranean Sea and the Atlantic Ocean (Maynou et al 2004, Colmenero et al 2009). The Indo-West Pacific area, contains the highest percentage of them, reaching 67 % of all stomatopod of the world (Ahyong et al 2017). *Squilla mantis* is a benthic species mostly present on the coastal soft bottoms of the continental shelf down to 100 m in depth (Manning 1977). There are many studies on *S. mantis*, including biology (Maynou et al 2005, Rossetti et al 2005), growth and behavior (Heitler et al 2000), reproductive parameters and seasonal variations in the fatty acids composition (Mili et al 2011). In the Iraqi coastal waters, Ahmed (1971) described *Oratosquilla arabica*, as a new species in the region, but was synonymous with *S. mantis* (Linnaeus 1758). The genetic code technique is an important tool for diagnosing new species in different environments. Cytochrome c oxidase I (COI) is very important gene, called the mitochondrial encoded Cytochrome C Oxidase I (MT-CO1) which is a protein that in humans is encoded by the MT - CO1 gene. Cytochrome c oxidase subunit I (CO1 or MT-CO1) is one of three mitochondrial DNA (mt DNA) encoded subunits of the electron transfer chain of mitochondrial oxidative phosphorylation. It is a gene widely used DNA barcode to diagnose organisms species, furthermore it, MT-CO1 gene sequence is so perfect for this role in order to its mutation rate is often fast enough to identification exactly related species (Hebert et al 2003). The present article represents first

records of the stomatopod *S. mantis*, which was not reported before in the region.

MATERIAL AND METHODS

About 120 specimens of *S. mantis* were collected by trawling net during 2017. The approximate GPS coordinates is 29° 44 200 N; 48° 40 00 E. The sampling sites were located at a depth between 7 to 12 m under water. The collected specimens were measured and preserved in 75% alcohol. The taxonomic identification depended on some related references (Manning 1971, 1978, 1995). Water parameters like temperature, pH, salinity and dissolved oxygen were measured in the field by multi meter.

Identification by COI gene amplification: DNA Extraction according to QIAGEN Kit (Serial NO: 56404) for alcohol embedded sample was carried out. The mitochondrial Cytochrome Oxidase subunit I is based on published COI sequences deposited in GenBank, amplification of a 688 bp fragment. The process of sequencing of PCR amplification for COI gene reagents and PCR program given in Table 1 and 2).

RESULTS AND DISCUSSION

Environments conditions: The environmental conditions recorded in this study were, water temperature between 29-33°C; pH 6.8 - 7.5, salinity 40 - 41 ppt. and dissolved oxygen 6.6 - 7.3 mg l⁻¹.

Identification and morphological diagnosis of *S. mantis*: The eyes of *S. mantis* were T-shaped, cornea bilobed, carapace, thorax, and abdomen with longitudinal ridges or carina. The total length of the specimens recorded in the current study was 110 – 170 mm. The individuals have paired dark spots on the dorsal part of the telson. The telson is with

distinct median carina. Dectylus of raptorial claw has six teeth on inner edge, slender, no inflated or buttressed basally, propodus raptorial claw lined with blunt pectinations. Carapace rounded poster laterally, with no excavation, there are clear interrupted in the carapace carina at base of bifurcation.

Molecular identification using COI gene: The extracted DNA from the sample was subjected to PCR for the amplification of the COI gene (Fig. 1). The specimens' band of the gene was marked by 688 bp in comparison with the standard molecular DNA Ladder (100-1500 bp). Agarose gel (2 % g and 60V, 2MA) form of electrophoresis show PCR amplified products of gene COI. Lane M: 1.5 kb DNA ladder, lanes 1- 9: COI gene bands of *S. mantis*.

Sequencing for COI gene of *S. mantis*: COI gene and nucleotides sequencing for the extracted DNA of *S. mantis* from coastal waters of Iraq are listed below:

CATAAAGATATTGGAACCTTTATATTTTCATTCTAGGGGCTT
 GATCAGGAATAGTAGGGACAGCCCTTAGTTTGATTATTC
 GAGCTGAGCTAGGTCAACCAGGTAGGTTAATTGGAGAT
 GACCAAATCTACAATGTTATCGTTACAGCACACGCTTTT
 GTTATAATTTTTTTATAGTTATACCTATTATAATTGGGGG
 GTTTGAAACTGATTAGTGCCTTTAATATTAGGGGCC
 CTGATATAGCATTCCCCCGTATAAATAACATAAGATTTTG
 ATTACTACCTCCCGCACTCACCTTATTACTATCTAGGGG
 CTTAGTTGAAAGAGGGGTTGGTACTGGATGAACAGTTT

Table 1. PCR amplification reagents for COI gene

| No | Reagent | Volume |
|-----|---------------------|--------|
| I | DNA template | 5 µl |
| II | Forward primer | 1 µl |
| III | Reverse primer | 1 µl |
| IV | Master Mix | 5 µl |
| V | Nuclease-free water | 8 µl |
| | Total | 20 µl |

Table 2. Touchdown PCR Condition for COI gene

| Steps | Temperature | Time |
|-------|--------------------------------|---------------|
| One | 95 °C | 2 min |
| Two | 95 °C | 30 sec |
| Three | 59.8 °C decrease 0.5 per cycle | 30 sec |
| Four | 72 °C | 90.0 sec |
| Five | Repeat steps 2-4 | 14 more times |
| Six | 95 °C | 30 sec |
| Seven | 52.8 °C | 30 sec |
| Eight | 72 °C | 90.0 sec |
| Nine | Repeat steps 6-8 | 19 more time |
| Ten | 72 °C | 5 min |

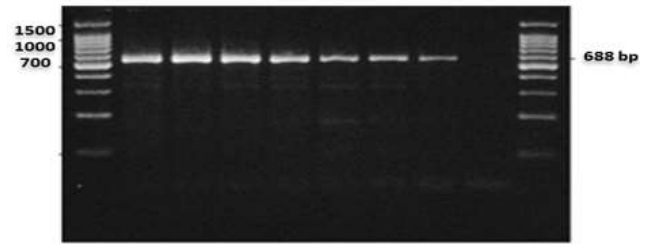


Fig. 1. Agarose gel (2%gm and 60V, 2 MA) electrophoresis patterns show PCR amplified products of gene COI. Lane M: 2kb DNA ladder, lanes 1- 9: Gene COI bands of *Squilla mantis*

ATCCCCCTTTATCAGCAGGAATTGCGCATGCCGGGGCT
 TCTGTAGATATGGGTATTTTCTCTTTACATTTAGCAGGA
 GCTTCTTCAATTTTAGGAGCTGTAAATTTACTACTACG
 GTAATTAATATACGATCAAACGGAATGACTATAGACCGTA
 TACCTTTATTTGTATGGTCTGTTTTTACTACAGCAATTTT
 ACTACTTTTATCACTACCTGTTTTAGCGGGTGCCATTAC
 CATACTACTAACAGACCGTAATTTAAACACATCGTTTTTT
 GATCCTGCTGGAGGGGAGACCCTGTACTATATCAACA
 TTTATTTTGATTTTTTGGTCACC.

Generally, *S. mantis* reached a maximum size of 200 mm as recorded in the Mediterranean (Ragonese et al 2012). But however in study, collected some lesser sizes specimens that ranged between 110-170 mm. The stomatopods are widely spread in tropical and temperate regions, and hide between coral rocks or bury themselves in the soft sand bottoms (Ahyong et al 2017). The *S. mantis* was recorded for the first time from the Iraqi marine waters, but (Ahmed 1981) described a new species of stomatopods commonly collected with the fishing catches by trawling nets. However, recent reports from a quite close spot, from the Kuwait coastal region a species designated as *Gonodactylus demani*, were recorded (Jones 1986). Apparently, the *Oratosquilla arabica* is possibly a synonymous to the present species *S. mantis* or *G. demani*, but DNA sequencing technique revealed that it is *S. mantis*. Many factors such as, climate changes, competition for food and habitat, pollution and existence of species that act as carrier like large animals, so that many species are leaving their native habitat and spreading into a new habitats (Silva et al 2003). This species is distributed in all the Mediterranean Sea, Atlantic Ocean, Indian Ocean and Indo-Pacific Ocean (Atkinson et al 1997, Al-Zaidan et al 2006). Local environmental conditions are suitable for the prevalence of *S. mantis*, is confirmed by (Raicevich et al (2014). The stomatopod is common on coral reefs habitats (Connolly et al 2003, Reaka et al 2008). Coral reef were recorded in the coasts of various Arab countries such Saudi Arabia, United Arab Emirates, Bahrain and Qatar. (Pohl et al

2014) have recorded coral reefs in the coastal water of Iraq. The presence of coral reefs, favorable environmental conditions, additionally, mixture of sand and mud bottom are expected to encourage the migration and survival of this species.

REFERENCES

- Ahmed MM 1971. A new species of *Oratosquilla* (Crustacea: Stomatopod) from Arabian Gulf. *Scientific Research Journal* **14**: 251-253. Ahyong ST, Caldwell RL and Erdmann MV 2017. Collecting and processing stomatopod. *Journal of Crustacean Biology* **37**: 109-114.
- Al-Zaidan ASY, Kennedy H, Jones DA and Al-Mohanna SY 2006. Role of microbial mats in Sulaibikhat Bay (Kuwait) mudflat food webs. evidence from $\delta^{13}C$ analysis. *Marine Ecology* **308**: 27-36.
- Atkinson RJA, Froglija C, Arnieri E and Antolini B 1997. Observation on the burrows and burrowing behavior of *Squilla mantis* (L.) (Crustacea: Stomatopod). *Marine Ecology* **18**(4): 337-359.
- Colmenero AI, García Raso JE and Abelló P 2009. New records of *Parasquilla ferussaci* (Roux 1830) (Crustacea, Stomatopod) from the Eastern Atlantic and Western Mediterranean. *Arxius de Miscel. lànea Zoològica* **7**: 72-77.
- Connolly SR, Bellwood DR and Hughes TP 2003. Indo-Pacific biodiversity of coral reefs: Deviations from a mid-domain model. *Ecology* **84**: 2178-2190.
- Glaser P, Villani G, Papa S and Capitano N 1994. The proton pump of heme copper oxidases. *Cell Biology International* **18**(5): 345-355.
- Hebert PDN, Cywinska A, Ball SL and De Waard JR 2003. Biological identifications through DNA barcodes. Proceedings of the Royal Society of London. *Biological Science* **270**: 313-321.
- Heitler WJ, Fraser K and Ferrero EA 2000. Escape behavior in the stomatopod crustacean *Squilla mantis*, and the evolution of the caridoid escape reaction. *The Journal of Experimental Biology* **203**: 183-192.
- Kosakyan A, Heger TJ, Leander BS, Todorov M, Mitchell EA and Lara E 2012. COI barcoding of nebelid testate amoebae (Amoebozoa: Arcellinida). extensive cryptic diversity and redefinition of the hyalospheniidae Schultze. *Protist* **163**(3): 415.
- Manning RB 1971. Keys to the species of *Oratosquilla*, (Crustacea: Stomatopod), with descriptions of two new species. *Smithsonian contributions to Zoology* **71**: 16-25.
- Manning RB 1977. A monograph of the West African Stomatopod Crustacea. *Atlantide Report* **12**: 25-181.
- Manning RB 1995. Stomatopod Crustacea of Vietnam: the legacy of Raoul Serène. Tokyo, Crustacean Research, the Carcinological Society of Japan, Specia. *Crustacean Research* **4**: 1-339.
- Manning RB 1978. Further observations on *Oratosquilla*, with accounts of two new genera and nine new species (Crustacea: Stomatopod: Squillidae). *Smithsonian contributions to Zoology* **272**: 44-51.
- Maynou F, Abelló P and Sartor P 2004. A review of the fishery biology of the mantis shrimp, *Squilla mantis* (L., 1758) (Stomatopod, Squillidae) in the Mediterranean. *Crustaceana* **77**(9): 1081-1100.
- Maynou FP, Belló A and Sartor P 2005. A review of the fisheries biology of the mantis shrimp, *Squilla mantis* (L., 1758) (Stomatopod, Squillidae) in the Mediterranean. *Crustaceana* **77**: 1081-1099.
- Mili S, Bouriga N, Missaoui H and Jarbou O 2011. Morphometric, reproductive parameters and seasonal variations in fatty acid composition of the mantis shrimp *Squilla mantis* (Crustacea: Stomatopod) in the Gulf of Gabes (Tunisia). *Journal of Life Sciences* **5**: 1058-1071.
- Pohl T, Al-Muqdadi SW, Ali MH, Fawzi N, Ehrlich H and Merkel B 2014. Discovery of a living coral reef in the coastal waters of Iraq. *Scientific Reports* **4**: 4250-4258.
- Ragonese S, Morara U, Anali EC, Agliarino EP and Ianchini MLB 2012. Abundance and biological traits of the spot tail mantis shrimp, *Squilla mantis* (L., 1758) (Crustacea: Stomatopod), off the southern coast of Sicily. *CBM-Cahiers de Biologie Marine* **53**(4): 485-489.
- Raicevich S, Minute F, Finoia MG, Caranfa F and Di Muro P 2014. Synergistic and antagonistic effects of thermal shock, air exposure, and fishing capture on the physiological stress of *Squilla mantis* (Stomatopod). *Plos one* **9**(8): 105060.
- Reaka ML, Paula J, Rodgers PJ and Kudla AU 2008. Patterns of biodiversity and endemism on Indo-West Pacific coral reefs. *Proceedings of the National Academy of Sciences* **105** (Supplement 1): 11474-11481.
- Rossetti I, Sartor P, Francesconi B and Belcari P 2005. Fishery and biology of mantis shrimp, *Squilla mantis*, exploited with rapido trawl in the eastern ligurian Sea. *Biologia Marina Mediterranea* **12**(1): 585-588.
- Rumbley J, Gennis RB, Garcia-Horsman JA, Barquera B and Ma J 1994. The super family of heme-copper respiratory oxidases. *Journal Bacteriology* **176**(18): 5587-560.