

## First record of the blue mussel *Mytilus edulis* (Linnaeus, 1758) in Shatt Al-Arab River, Basrah, Iraq

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**Abstract.** The mussel *Mytilus edulis* is considered an euryhaline marine and estuarine mollusc that lives in a wide range of salinity. During 2018, the salt wedge progressed towards fresh water in Shatt Al-Arab river and reached the regions of north of Basrah province which led to the entrance of many marine species that are able to adapt and live in this new environment. *M. edulis* was first recorded in Shatt Al-Arab river at Hareer and Al-Garmah regions, where the salinity was 2.73 and 3.95ppt respectively, and the dissolved oxygen was 12.5 and 11.7, respectively during the sampling period. The maximum length of the shell from the beak to the anterior end of the valves was 4cm, and the colors ranged from brown to pale yellowish.

**Key Words:** Bivalvia, euryhaline, Mytilidae, shells.

**Introduction.** The Family Mytilidae is considered one of the ancient mussel that date back to the Devonian era. It is an edible mussel that has been collected for food for centuries, especially in Europe. It has a wide distribution and grows on all hard beaches in Europe, as well as in the North Waters of the western Atlantic and Pacific oceans (Moore 1983). Bivalve include mussels of more than 20 genera (Soot-Ryen 1955). It has genera of commercial importance such as *Perna*, *Aulocomya*, *Chloromytilus*, *Musculus* and *Mytilus* that dominate global production (Lutz et al 1991). The *Mytilus* species had been an important subject of study for a long time, because of their wide geographical distribution and its environmental role (McLeod 2002). Mussels are consumed by people most of the time due to their palatable taste and flavor. It has been bred in large fisheries, especially in Europe (Prou & Gouilletquer 2002). Mussels are ideally suited for aquaculture because they are highly tolerant to environmental conditions, low position in the food chain and consume natural primary production, exhibit high fertility and high productivity, grow at high densities (Asmus 1987), and form the basis of complex dynamic populations by increasing habitat heterogeneity, biodegradation and modifying environmental processes (Norling & Kautsky 2007). Bivalve molluscs belonging to the genus *Mytilus* are distributed worldwide and are widely used as model organisms in numerous agricultural studies: more than 20 countries have reported regular harvests of farmed mussels, but global production is dominated by two countries, China and Spain (Hickman 1992).

Many studies were conducted in the Arabian Gulf, including the study of the accumulation of hydrocarbons in three types of organisms, including the mussel *M. edulis* (Bayat et al 2019). It was also mentioned in the Coastal and Marine Ecological Classification Standard (CMECS) for the Qeshm Island area located the Hormouz Strait in the intertidal zone along the coast with a length of 122 km (Ansari et al 2014).

The mussel belongs to the Mollusca phylum, Bivalvia class, Mytilida order, Mytilidae family, *Mytilus* genus, and the species binomial name is *Mytilus edulis* Linnaeus, 1758.

**Material and Method.** Samples were collected during November and December 2020. The water salinity were measured by digital salinity meter and oxygen by Winkler method. Samples of the mussel *M. edulis* were collected from Shatt Al-Arab River at the Hareer and Al-Garmah regions. Collection was carried out by hand picking in the exposed areas surrounding by quadrates with 25x25cm dimensions, and by D-frame net with dimensions of 25x25cm, in the locations on the cliff below the water surface, then they were transported to the laboratory by using plastic containers. The classification was done according to Harasewych and Moretzsohn (2014).

**Results.** Figure 1 represents the collection areas for the mussels *M. edulis* north of Basrah province. The salinity of water was recorded when specimens were collected and it was 2.73 and 3.95ppt in Hareer and Al-Garmah regions, respectively, and the dissolved oxygen was 12.5 and 11.7 in the tow stations respectively. The species density was calculated in square meters in both stations during samples collection and it was recorded as 213 and 240 ind/m<sup>2</sup>, respectively in each stations.

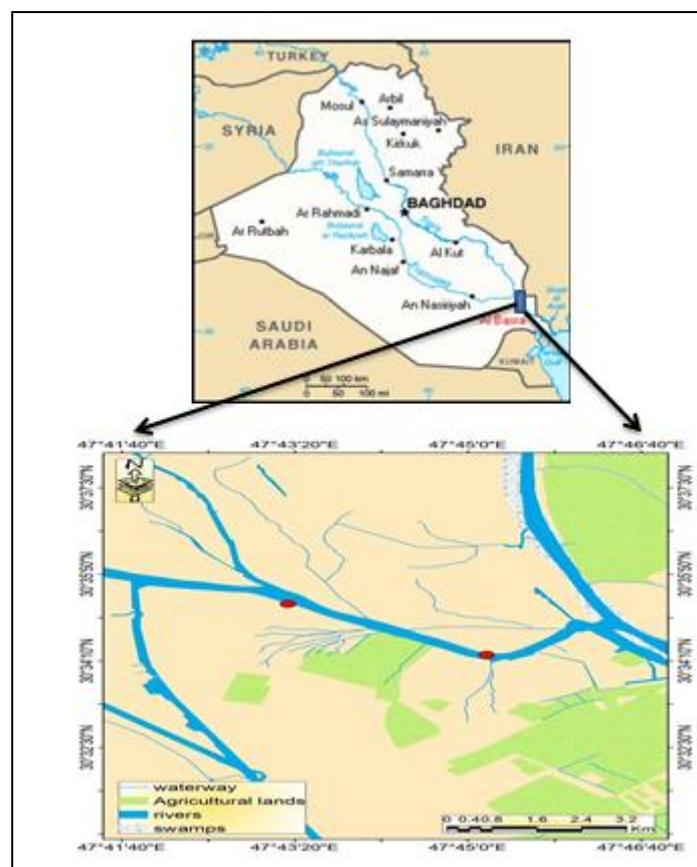


Figure 1. Sampling locations (map generated using ArcGIS software).

**The description of the specimens.** The shell has a maximum length of 4cm. Hard shell, uneven with pointed front end and it is almost triangular in shape; articulated line without teeth, with a small socket, under the neck, smooth edge, wide pallial line; anterior adductor scar very small, posterior large hinge line without teeth, but with 3-12 small crenulations, under the umbones (Figure 4). External ligament hidden, extending more than half-way from the posterior end of the beak to the end of the shell. Concentric shape and color brown to yellowish, shell with prominent dark brown radial circles. Periostracum almost dark brown (Figure 2). Figure 3 shows the variation in the length of the shells obtained during sampling, which the minimum length was 1.5 cm.



Figure 2. The shell of mussel *M. edulis*.



Figure 3. Length ranges obtained during sampling.



Figure 4. The inner side of the shell for the mussel *M. edulis*.

**Discussion.** The mussel *M. edulis* is one of the euryhaline Bivalves that live and settle in marine to estuarine waters which fluctuate in salinity, as Costa and Pritchard (1978) observed sudden low salinity of the water leads to the retention of highly saline water within the mantle cavity. *M. edulis* were native in Arabian Gulf and Indian Ocean and Arabian Sea. Because of the progress of salt wedge from the gulf towards the fresh water of Shatt Al-Arab River due to the exiguity of the discharge that came from Euphrates and Tigris rivers, especially in 2018 that reached 14.5 psu according to Al-Asadi and Alhello (2019), many marine types of organisms entered the Shatt Al-Arab River and some of them inhabit the river, and the mussel *M. edulis* was one of them, whereas the salinity in the stations during samples collection was 2.73 and 3.03 psu at Hareer and Al-Garmah regions, respectively. According to Harasewych and Moretzsohn (2014), the length of the valve from the beak to the end of the shell can reach 250 mm, and in the Arabian Gulf they reached 7.5 cm according to Dadgar (2013). In Shatt Al-Arab River the maximum length observed was 4 cm, and this may be the effect of fluctuation in salinity that may affect the growth of the valves, or due to the new environment for the mussel. The mussel *M. edulis* is considered an exotic species in the waters of the Shatt al-Arab River, as it is considered native to the Arabian Gulf and this is the first record of it in the Shatt al-Arab River.

**Conclusions.** The decrease in the discharge of the Tigris and Euphrates Rivers had led to the advancement of the salty wedge coming from the Arabian Gulf that had reached the top of the Shatt al-Arab River. This led to the emergence of exotic marine species that were able to live in this environment, even after the decrease in salinity, such as *Mytilus edulis*.

**Conflict of Interest.** The authors declare that there is no conflict of interest.

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