# MORPHOLOGICAL AND ECOLOGICAL CHARACTERISTICS OF MALVUFUNDUS REGULUS FORSKALL, 1775 FOUND IN ANTALYA BAY, TURKEY

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## Abstract
*Malvufundus regulus*, an alien species in the Mediterranean Sea has been examined morphologically and ecologically in connection with submarine caves in Antalya Bay.
*Keywords: Western Mediterranean, Mollusca, Bivalves*

**Introduction**
Levantine Sea where the fauna has always been shown to get influenced by the lessepsian migration through the Suez Canal [1,2,3]. The Bay of Antalya is always exposed to that migration pressure. Many bivalve species belonging to the Indo-Pacific fauna were already recorded in Turkish waters. A member of Malleidae, *Malvufundus regulus* Forskall, 1775 is one of those remarkable lessepsian species, has been already extended to the Greek waters [2,5]. This work is to be informative about this alien species for better understanding its adaptation to a new ecosystem.

**Material and Methods**
Specimens were collected near the cave entrances at the depths of 1-5m by Scuba diving along the rocky cliffs of the Antalya Bay at $36^0$53′02″N–$30^0$40′ 47″E and $36^0$53′ 05″N–$30^0$41′54″E. Samples of *Malvufundus regulus* were taken to the laboratory for further investigation.

**Results**
Members of *Malvufundus regulus* were found as attached on rocks among other cemented bivalves such as *Spondylus spinosus*, and *Pinctada radiata* while a measurement of faunal abundance of the caves in the littoral zone of Antalya Bay. Solitary *M. regulus* seemed to prefer shaded rocks or their crevices but not on bare substrates and was observed in close association with the vegetal cover of the rocks (Fig.1).

Fig. 1. *Malvufundus regulus*

The rocky littoral zone of Antalya is found mostly covered by coralligen formations, constituted by several species of rodophyta, heterokontophyta and chlorophyta in numbers of 23, 9 and 8, respectively. Living forms of *M. regulus* were in upright position and adhere themselves to hard surfaces by a small but strong bundle of byssus threads. Shell has thin, translucent valves generally elongated posteroventrally, and shows a striking contrast in its shell form. Right valve is moderately convex, while the left is nearly flat or a little concave. A posterior tooth extends along the posterior part of the dorsal margin. The shell thickness differed that the dissoconch part was much harder and softened towards the posterior end gradually. Colour is found variable, some were dark purplish throughout, but yellow is also frequent. A pattern was seen to give a butterfly wing appearance at the posterior margin (Fig. 2a). The nacreous layer is very thin and restricted to the dissoconch. Valves held shut by one large adductor muscle. The body is laterally compressed. Soft tissues were mainly the mantle **(M)**, adductor muscle **(A)**, body **(B)** and the ctenidia **(C)**. The foot **(F)** appeared a very degenerative. Body organization could not be determined as it was almost flattened in shape. Byssus is produced from the center just above the ctenidia and extended out by the hinge. The gills were the most prominent structure **(Fig.2b)**.

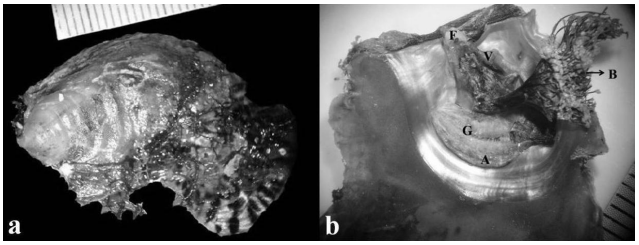


Fig. 2. A-b

**Discussion**
Submarine caves are semi-closed systems within the marine ecosystem [6] . Many marine invertebrate groups use cryptic habitats for settlement. *Malvufundus regulus* is such one that was frequent in the study area. The species is also described to inhabit in deeper waters [4].*M. regulus* is found singly. It is not a burrowing species as burrowers are usually lost their byssal aparatus [7]. The organism seemed to burrow slightly at its post-larval stage and then a permanent attachment is provided by byssus. The soft parts were confined in a much smaller and narrower chamber. But after settlement, the shell stated to grow only posteroventrally to an elongated valve which is to facilitate the posterior end in free communication with the water above [7]. The shell strength of the specimens differed along the shell as thickness is gradually reduced, is reckoned that shellstrength is directly correlated withshell thickness.The opportunity to examine the ecological and morphological status of such alien species helps for better comprehension of their connection between ecosystem and biodiversity changes in the Levantine Sea. The species become a strong competitor for space and food to persist under the fixed condition in the settling site. Surrounding vegetation seems an important biological factor as well as the physicals of light and wave exposure. It is assumed that a hydrodynamism is generated as a consequence of seaweed plasticity which helps to determine the sustainability of this alien species. Due to water currents the food particles become available for this filter feeding organism. Oxygen profile of the water is backed up by the existing seaweeds because oxygen consumption is closely related to production. Further studies will be needed focusing particularly the population dynamics of this organism relative to seasonal biological and physical conditions within the area.

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