

Biogeographical remarks about the Ascidian littoral fauna of the Strait of Gibraltar (Iberian Sector)

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The ascidians are considered excellent material for biogeographical studies, having an higher percentage of endemisms than other benthic groups (Péres & Picard, 1964). The biogeography of ascidians has been little studied in the Mediterranean Sea. Peres (1958) establish the biogeographical elements (Atlantic-Mediterranean, Senegalense, endemic, paleomediterranean, Arctic, immigrated from the Red Sea, circumtropical and cosmopolitan, giving a necessary view of the whole.

Fifty-seven ascidians species have been collected on littoral hard-bottoms (0 to 30 m depth) in the Iberian sector of Gibraltar Strait and adjacent zones (from Cádiz to Fuengirola, Málaga). These species have been divided in five biogeographical groups, according to Ramos (1988)

1. **Atlantic-Mediterranean species** (47.4%), from British Isles (western sector) to Dakar. Three elements may be separated: i) Lusitanian-Mauretanian components (26.4%) from British Isles to Cape Blanco (*C. nana*, *D. fulgens*, *D. lahillei*, *D. spongiforme*, *P. lacazei*, *P. canetense*, *L. perforatum*, *S. elegans*, *S. argus*, *A. coeruleum*, *A. densum*, *A. albicans*, *D. variolosus*, *S. socialis*, *P. squamulosa*); ii) Senegalense component (3.5%) from Senegal (*D. obscurum*, *P. dura*); iii) Mediterranean component (17.5%), which appears in Atlantic area (Canary and Azores Islands, Portugal) (*P. adriaticum*, *D. granulatum*, *S. blochmanni*, *R. neapolitana*, *C. edwardsi*, *P. ingeria*, *P. fumigata*, *H. papillosa*, *M. polymorphus*, *M. nudistigma*)
2. **Endemic species** (17.5%), signaled only in the Mediterranean sea (*D. coccineum*, *D. commune*, *T. inarmatum*, *Trididemnum pedunculatum* n. sp., *C. dellavallei*, *A. conicum*, *A. haouarianum*, *P. crucigaster*, *P. cynusense*, *M. savigny*)
3. **Boreal species** (17.5%), reaching north European waters (North Sea, Scandinavia) (*C. lepadiformis*, *P. crystallinus*, *D. maculosum*, *T. cereum*, *S. turbinatum*, *P. aurantium*, *A. mentula*, *P. rustica*, *P. pomaria*, *M. occulta*)
4. **Tropical affinity species** (8.8%) (*C. dellechiajei*, *D. candidum*, *P. viridis*, *E. turbinata*, *M. exasteratus*)
5. **Cosmopolitan species** (8.8%) (*D. coriaceum*, *D. listerianum*, *P. bilobatum*, *B. schlosseri*, *B. leachi*)

	Gibraltar	Alboran	Levante	Cataluña	Baleares
Atlantic-Mediterranean	47%	42.5%	42.5%	42%	42%
endemic (Mediterranean)	17.5	19.5	20.5	24	28
boreal	17.5	21	19	18	14
cosmopolitan	9	10	10	10	.9
tropical affinity	9	7	8	.6	.7

Table 1. Percentages of the biogeographical elements of the Gibraltar Strait in comparison with the different sectors of the Iberian Mediterranean (modified from Ramos, 1988)

According to table 1, a strong presence of the Atlantic-Mediterranean component is observed, and a gradual decrease of the endemic one. The low percentage of the Boreal species is probably due to the shallowness of the bottom sampled (no more of the -30m depth).

The Mediterranean component (endemic + Mediterranean species reaching Canary and Açores Islands, and Portugal) is about 35%, that means an high influence of shallow mediterranean waters on this sector.

It is noted the presence of the Atlantic species *Polycarpa rustica* and *Stolonica socialis*, and Indopacific one *Didemnum candidum*.

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Eritrean Decapods in the Levant - Biogeography in motion

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The Levant basin, a warm and salty cul-de-sac, is remarkably poor, both in species and individuals, compared with the rest of the Mediterranean. But, since the opening of the Suez Canal over 120 years ago, more than 200 Eritrean species colonized the Levant (Por, 1978) bringing about a profound change in the local fauna.

Ecological, geographical and historical factors have favoured the process, termed Lessepsian migration, that is, the colonization of the Mediterranean by Eritrean species migrating through the Suez Canal. Decapods are among the more prominent migrants, to date thirty one species of Eritrean decapods became established and founded thriving populations along the Mediterranean coast of Israel (Holthuis and Gottlieb, 1958; Lewinsohn and Holthuis, 1964; Galil, 1986).

Three migrants have been discovered but recently. A species of *Metapenaeopsis* - an Indo-Pacific genus not previously reported from the Mediterranean - is the sixth migrant penaeid. *Metapenaeopsis seeyllia* is known from the Red Sea, Djibouti and the Maldives Islands. It appears that within a remarkably short space of time it has succeeded in well establishing itself and forming flourishing populations. *Panulirus ornatus* (Fabricius), recently found in Haifa Bay, is widely distributed throughout the Indo-Pacific but has only been recorded twice from the Red Sea (Holthuis, 1968). *P. ornatus* is known to conduct seasonal migrations (Moore and Macfarlane, 1964) and is known to inhabit shallow coastal waters and lagoons (George, 1968). Its euryhalinity and proclivity for migration mark it as a candidate for lessepsian migration. *Matuta banksi* Leach is another widely distributed Indo-Pacific species, commonly found on shallow sandy bottoms, that occurs in the Red Sea and was found lately off our coast.

Biogeographically, the fauna of the Israeli coast is part of the Mediterranean, sharing origin as well as basic organization of its communities. However, it is set apart from other regions of the Mediterranean by some peculiar properties derived from its position, origin and distribution of species. The thirty-one Eritrean decapods that have entered the Mediterranean are now well established in various habitats in the southern Levant basin and comprise almost 20% of the known decapod fauna in our waters. This large contingent of successful colonizers demonstrates that some types of habitats for tropical species are available in the region. The Lessepsian migration is an ongoing process and we expect that a continuously growing proportion of the fauna will be composed of migrants and change the faunal picture of this corner of the Mediterranean - a fascinating, unique phenomenon of zoogeographical modification through human interference.

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