

THE GULF OF 'AQABA, A ZONE OF GREAT BIOLOGICAL INTEREST

J. E. A. GODEAUX

Laboratory of marine Biology, University of Liège, Belgium

The Red Sea, a rather young sea, is connected to the Indian Ocean through the strait of Bab el Mandab at 12°40'N. It is entirely located in a very arid, hot and dry area. Owing to the increase in salinity, life conditions become harder in its two northern appendages, the shallow Gulf of Suez (depth < 60 m) and the deep Gulf of 'Aqaba. At the entrance of this Gulf, the narrow sill of Tiran (252m) rises between two >1200m deep trenches, with steep slopes.

Ecological conditions prevailing in the Gulf of 'Aqaba are known thanks to the Data Collecting Program in the Gulf of Elat ('Aqaba) (D.C.P.E.) initiated by the Heinz Steinitz Marine Biology Laboratory in 1974 (Reiss & Paperna, 1975; 1976; Shilo & Cohen, 1979; Shilo & Paperna, 1977). Surface temperature varies between 20°C in the winter and 27°C in the summer season; at about 150m temperature is 21°C. Salinity increases from the entrance owing to evaporation, reaching 40.8‰ and more in the depth (below 500m). There are no significant thermocline and halocline. Waters are oligotrophic but well oxygenated; the primary production is low.

Thaliacea, although collected at all depths, are mainly caught with closing nets in the upper layers, from 200m to the surface (>21°C). Doliolums and salps are only found, as pyrosomas were never recorded from the Red Sea. The thaliacean fauna is a mixture of Indo-Pacific and ubiquitous species (Table I). Although devoid of endemic species, this fauna exhibits original features.

1) Dwarfism shown by many species: e.g. the phorozoids and gonozoids of *Doliolum denticulatum* reach a length of 3-4mm (instead of 5mm and more in Atlantic specimens) (personal observation).

2) The remarkable presence of salp species rather uncommon in other seas (Godeaux, 1978;

1979; 1985). *Ritteriella amboinensis* is usually a rare species but it can be considered as characteristic of the Gulf, and *Brooksia rostrata* with a low catch frequency in the equatorial zone is rather abundant here. *Doliolina indicum*, an Indo-Pacific species, is regularly observed in the samples. On the contrary, *Salpa cylindrica*, the commonest species in the oceanic tropical waters, is found in the Red Sea proper but it is practically absent in the Gulf (a single catch). The same is true for *Salpa maxima* (*S. tuberculata*) often collected by the Manihine Expedition (1948-49) (Van Name, 1952) and now very rarely found. *Thalia rhomboides* is rare, except locally.

3) The occurrence of ecological races: Three species of Ctenocera are known from the northern part of the Red Sea: *Evadne tergestina* (Gulf of 'Aqaba), *Evadne spinifera* (main basin) and *Penilia avirostris* (Gulf of Suez). The specimens of these three species are in external morphology strictly similar to the specimens from other parts of the world, as proved by the scanning microscope (Meurice, 1983; Meurice & Dauby, 1983). Probably, the differences are limited to the physiological level. As far as the Thaliacea are concerned, the same considerations may be evoked: e.g. the morphology of the specimens of *Thalia cicar* and *Doliolum denticulatum* are fully identical to those from both Atlantic and Indian Oceans.

Some species are truly tropical (*Thalia cicar*, *Ritteriella amboinensis*). Others, rather tolerant to temperature variations, (*Iasis zonaria*, *Brooksia rostrata*) became adapted to severe ecological conditions. Some species were not successful, as they occur only rarely, e.g. *Salpa cylindrica* and *Salpa maxima* while *Thalia democratica* and *Salpa fusiformis* are completely lacking.

Table I The thaliacean fauna of the Red Sea, Gulf of 'Aqaba, Gulf of Aden, and the Arabian Sea

Thaliacea	Red Sea		Gulf of 'Aqaba	Gulf of Aden	Arabian Sea
	N	S			
<i>Cyclosalpa pinn. sewelli</i>				*	*
<i>Cyclosalpa floridana</i>	*				
<i>Cyclosalpa bakeri</i>	*		*		
<i>Brooksia rostrata</i>	*	*	*	*	
<i>Salpa maxima</i>	*		*		*
<i>Salpa cylindrica</i>	*	*	*	*	*
<i>Ritteriella amboinensis</i>	*	*	*	*	*
<i>Ritteriella picteti</i>				*	
<i>Melcalffina hexagona</i>				*	*
<i>lasis zonaria</i>	*	*	*	*	*
<i>Thalia rhomboides</i>	*	*	*	*	*
<i>Thalia cicar</i>	*	*	*	*	*
<i>Thalia orientalis</i>				*	*
<i>Pegea confederata</i>		*		*	*
<i>Doliolina muelleri</i>	*	*	*		*
<i>Doliolina krohni</i>					
<i>Doliolina intermedium</i>		?			
<i>Doliolina indicum</i>	*	*	*	*	*
<i>Doliolum denticulatum</i>	*	*	*	*	*
<i>Doliolum nationalis</i>	*	*		*	*
<i>Dolioletta gegenbauri</i>		*		*	*
<i>tritonis</i>			?		
<i>Pyrosoma spinosum</i>				*	*
<i>Pyrosoma agassizi</i>				*	

(Compiled from different sources, Godeaux, 1985)

The fauna of the Red Sea is different from that of the Eastern Mediterranean; as a matter of fact there is no proof of former connections between the two seas. From the beginning, the fauna of the Red Sea was of Indo-Pacific origin but it is somewhat impoverished: e.g. *Thalia orientalis*, *Melcalffina hexagona* and the pyrosomas present in the Gulf of Aden and the surrounding areas are absent in the Red Sea. *Pegea confederata* is present only in the southern part of the Red Sea.

Obviously, the fauna of the northern Red Sea, exemplified by the Thaliacea living in the Gulf of

'Aqaba, is the result of selective ecological pressures.

REFERENCES

- GODEAUX, J., 1978. Les populations de Thaliacés du Golfe d'Elat. *Bull. Soc. r. Sci. Liège*, 47 : 386-389.
- GODEAUX, J., 1979. Thaliacea from the Red Sea, the Gulf of Aden and the western Indian Ocean. *Annls Soc. r. zool. Belg.*, 109: 117-119.
- GODEAUX, J., 1985. The thaliacean faunas of the

- Mediterranean and the Red Sea. In: R. van Grieken & R. Wollast (eds) *Proc. Progress in Belgian oceanographic research*. Brussel: 451-460.
- MEURICE, J. C., 1983. Morphologie et ultrastructure comparés des appendices et des différenciations léguméntaires chez les Cladocères et quelques autres Entomostracés. Thèse doct. Univ. Liège, 1, 2: 136pp., 179 figs.
- MEURICE, J. C. & P. DAUBY, 1983. Scanning electron microscope study and computer analysis of taxonomic distances of the marine Podonidae (Cladocera). *J. Plankton Res.*, 5: 787-795.
- REISZ Z. & I. PAPERNA, 1975. Fourth report of the H. Steinitz marine biology laboratory Elat. *DCPE-Data collecting program in the Gulf of Elat. Rep.*, 1: 46-55.
- REISZ, Z. & I. PAPERNA, 1976. Fifth report of the H. Steinitz marine biology laboratory Elat. *DCPE-Data collecting program in the Gulf of Elat. Rep.*, 2: 22-68.
- SHILO, M. & I. PAPERNA, 1977. Sixth report of the H. Steinitz marine biology laboratory Elat. *DCPE-Data collecting program in the Gulf of Elat. Rep.*, 3: 31-54.
- SHILO, M. & Y. COHEN, 1979. Seventh report of the H. Steinitz marine biology laboratory Elat. *DCPE-data collecting program in the Gulf of Elat. Rep.*, 4: 22-25.
- VANNAME, G., 1952. The Manihine expedition to the Gulf of 'Aqaba 1948-1949.- Tunicata. *Bull. Brit. Mus. nat. Hist.*, (Zool.) 1(8): 215-220.