

The Occurrence of Coastal Swarms of the Scyphomedusa, *Pelagia Noctiluca* (Forskål) Around the Maltese Islands

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ABSTRACT

Data on the occurrence of coastal swarms by *Pelagia noctiluca* around the Maltese Islands for January, February and March 1984 is presented, together with details of the characteristics of such swarms and relevant environmental parameters. The small average size of the component individuals indicates that they are representatives of recent spawning. It is suggested that such swarms reached the islands from the NW sector.

Introduction

Since 1977 there has been a number of reports on the occurrence of coastal swarms of the scyphomedusa, *Pelagia noctiluca* in several Mediterranean regions (e.g. Rottini-Sandrini and Stravisi, 1980; Vučetić, 1983; Axiak, 1983). Such swarming has elicited interest and indeed concern due to its potential health hazard to swimmers and also due to possible interference with fishing activities (Rottini-Sandrini *et al*, 1983b). The recent coastal swarms of this species around the Maltese Islands were first reported in 1980 (Axiak, 1983). In the present paper, some observations on this phenomenon for the period January to March 1984 will be reported.

Methods

Since 1982, a monitoring programme to identify the extent and seasonal occurrence of such blooms, was carried out. Much of the data is provided by the Maritime Section of the Task Force (local coast guard authority) whose personnel are asked to report

sightings of such swarms at sea together with other relevant information on special forms. Data collected during the first quarter of 1984 will be presented here. Other data for 1983 have been presented elsewhere (Axiak, 1983). Meteorological data presented in this study have been collected from the Meteorological Office, Malta. More recently this monitoring programme has been extended to include the participation of other volunteers such as coastal hoteliers and beach management authorities.

Results

Figure 1 represents the locations and date of occurrence of the major swarms for the period under consideration, together with information regarding wind speed and direction for the whole period as well as for the 15 day period prior to each sighting. On the 8 January a very large swarm was sighted 6 km off the north coast of the island of Gozo. The average density was recorded at greater than 10 individuals per m³ forming wind rows about 2 m wide and approximately 190 m apart. This swarm extended over several km². The majority of the medusae were of small size ranging from 10 to 20 mm in umbrellar diameter. The surface sea water temperature (SST) was 10°C with wind blowing from the SW with force 5. Another major swarm was sighted in the South Comino Channel, on the 5th February. This was again composed of relatively small individuals of up to 15 mm in diameter at an average density of greater than 10 individuals per m³. The SST was 15°C with a wind direction from the NE and wind force 4 to 5. On the 21 February a large swarm was reported about 2 km off the NW coast of Malta. Individuals were again small in size ranging from under 10 mm up to 20 mm. The recorded SST for the day was 14°C and at the time of sighting there was no wind. The last swarm for this period was reported on the 17th March in the South Comino Channel with an average density of 15 individuals per m³, and average umbrellar diameter of 10 to 20 mm. The wind was blowing from the SW with force 3, while the SST was 15°C.

As indicated in figure 1, the prevalent wind directions for this period were NW and WNW with a speed greater than 40 km/h for 8% of the time. Moreover the prevalent wind directions for the 15 day periods prior to three of the swarming reports were also NW and WNW.

Table 1 represents the mean monthly SST (\pm SD) for the period 1966 to 1971 which may be taken to be representative of "no swarming" years, as well as for the years 1979 and 1980 when the recent swarms were first reported and for January, February and March, 1984.

Discussions and Conclusions

No satisfactory hypothesis has yet been proposed to explain the recent coastal *Pelagia* swarms in the Mediterranean and the environmental factors which control such a phenomenon have yet to be identified. One major difficulty is the lack of precise data on the occurrence and characteristics of such swarms. The generally accepted idea is that this is a manifestation of natural fluctuations in the population densities of this species which may be related to long term environmental changes in the water mass dynamics (Vučetić, 1983) and to general climatic conditions (UNEP, 1983). In fact reports of *Pelagia* blooms in the Mediterranean date back as early as 1802 (Goy, 1983).

From the data presented here and elsewhere (Axiak, 1983) it may be concluded that in this region, large coastal *Pelagia* swarms may occur throughout the year and not necessarily in summer. Moreover, swarms appearing during the first three months of

the year are characterized by the small size of their component individuals, compared to summer swarms. These small medusae are presumably representatives of recent spawning. Rottini *et al* (1983a) found that there is no direct correlation between the reproductive maturity of *Pelagia* and its umbrellar diameter in the range 30 to 60 mm. Although no direct proof is available, the smaller size of the medusae in this case indicate their reproductive immaturity. Although work by Rottini *et al* (1983a) indicated that *Pelagia noctiluca* breeds all through the year in the central Mediterranean region and though ephyrae have been collected from Maltese waters in April (Axiak, 1983) and in February, May, July and December (Rottini *et al*, 1983a) the present work suggests that in this region the breeding of *Pelagia* may be more pronounced during Autumn or early Winter.

The horizontal mobility of *Pelagia* is generally determined by surface sea currents. Figure 1 indicates that the northwesterly winds were prevalent for the period under

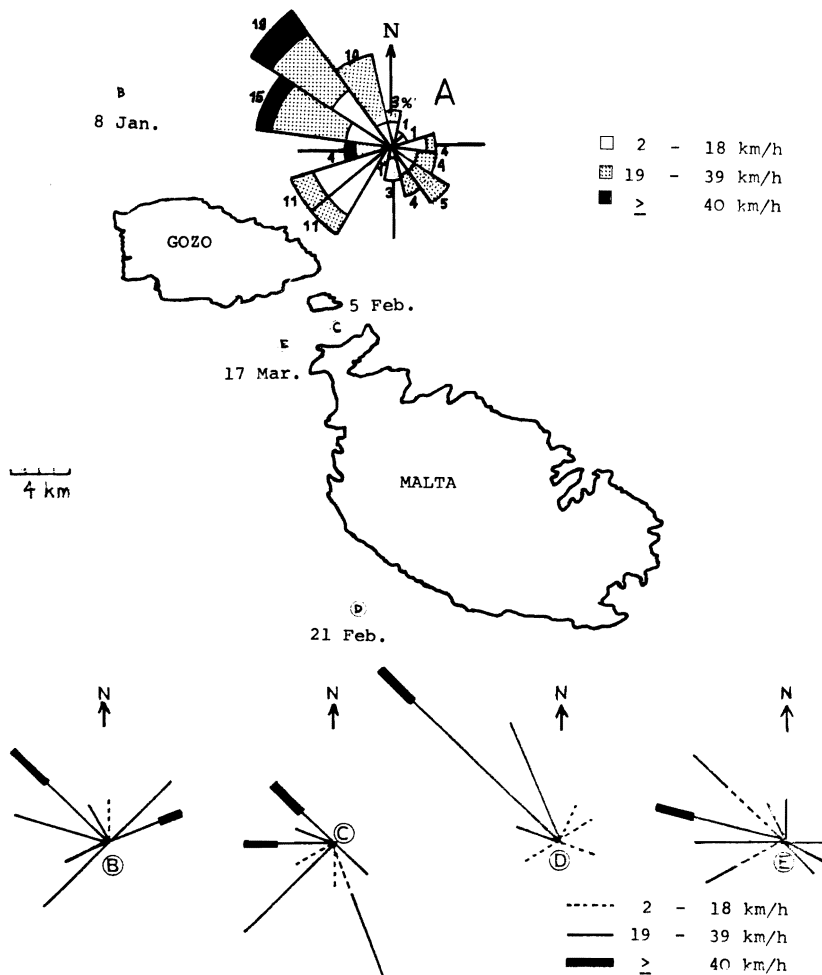


Fig. 1. Occurrence of coastal swarming of *Pelagia noctiluca* during January, February and March 1984, showing location and date, together with percentage frequencies of wind speed and direction for this three months period (A); and for the 15 day period prior to each report of swarming (B, C, D and E).

consideration. Havard (1980) found that during periods of light surface winds (less than 18 km/h) the surface sea current sets along the coast to the southeast for the greater part of the day. During periods of stronger northwesterly winds (more than 40 km/h) the current sets always to the southeast with a maximum velocity of 0.5 m/sec. with a diurnal variation in speed but not in direction. The data on wind directions and speeds presented here suggests that the recorded swarms reached local waters from the NW sector.

The appearance of coastal swarms of *Pelagia* at Villefranche (Goy, 1983) and at the Gulf of Trieste (Atravisi, 1983) has been tentatively correlated with warm winter SST anomalies. The data presented here does not indicate that this observation is applicable to the Central Mediterranean region. The recent swarmings of *Pelagia* around Malta were first reported in 1980. From table 1, it is evident that while the lowest seasonal SST recorded for the 'no swarming' period (1966 to 1971) was 15.2°C, this was 15.9°C for 1979, 14.7°C for 1980 and 14.5°C for 1984. Thus, while there is an indication that for 1979 the lowest winter SST was slightly higher than usual, the same does not apply for 1980 or 1984.

Our understanding and knowledge of biological responses to long term environmental fluctuations require a general integrated approach to the problem with contributions from many sciences. This particular case of recent jelly fish swarming in coastal Mediterranean regions with its possible economic implications may well provide the Mediterranean scientific community with just such an exercise.

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