

Plankton biomass of the Mediterranean during late spring 1969

by

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Introduction

There is little available information on planktonic biomass of open waters of the entire Mediterranean [JESPERSEN 1923] and even these data are based on volumetric measurements which true value is quantitatively doubtful. However, there are some good data, expressed as dry weight for the entire Adriatic [VUČETIĆ 1961, SHMELEVA 1964] and, to our knowledge, rather episodically for certain parts of the Western Mediterranean [BERNARD 1958, DEVEZE 1959, MAZZA 1964].

In spite of such a poor knowledge we are dealing already from the time of *Lohman* until these days [FURNESTIN, 1968] with an almost categorical statement that standing crops of western mediterranean plankton are as much as three times higher than those of the Eastern Mediterranean. Knowing the situation in adriatic, and superficially in levantine and southern tunisian waters, having some preliminary observations from the Ionic sea, made during the 1966 cruise of our R.V. *Argonaut II*, and considering the obvious fertilising influences of colossal fresh-water masses entering the Eastern Mediterranean, we never blindly believed in these statements.

Therefore I was very pleased to have an opportunity to participate at the mediterranean cruise of R.V. *Atlantis II*. and to measure the biomass of over 50 plankton samples, collected during May-June 1969 between Rhodos and Cadiz. It is my great pleasure to express at this occasion all my gratitude to the cruise's chief scientist Dr. R. BACCUS and to Dr. R. SCHELTEMA and Dr. G. GRICE, all from Woods Hole Oceanographic Institution, USA, who made this work possible.

Methods

Samples were made by means of oblique tows through upper layers (aproximatively 0-150 m for 20 minutes at the speed of 3 - 3.5 knots, allways at noon or at midnight). A standard net, 3/4 m in diameter, 3 m in lenght and 333 microns in mesh size, with T.S.K. flowmeter, was used. Samples were fixed and preserved by standard procedure.

All samples were divided with the Folsom Splitter into a subsample for further taxonomic work and another one for biomass measurements. Biomass subsamples were dried at 80°C for 24 hours and the dry weight measured in humidity controled containers. Afterwards samples were burned at 600°C for 30 minutes (or constant weight) and ash content determined. Ash content has been subtracted from dry weight and biomass expressed as total organic matter (combusted matter).

Rapp. Comm. int. Mer Médit., 21, 8, pp. 541-544, 1 fig. (1973).

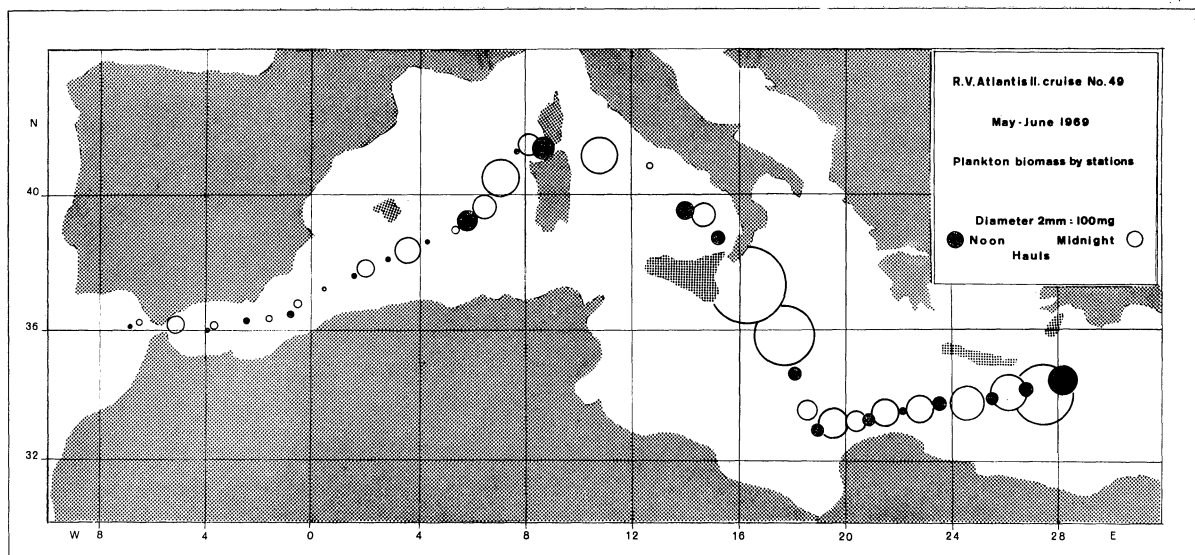


FIG. 1. — R.V. *Atlantis II*, cruise No 49. May-June 1969.

Plankton biomass by stations.

Diameter 2 mm = 100 mg. ● Noon

○ Midnight

○ Hauls.

Results

The detailed results, showing basic data for stations, dry weight, ash content and organic matter are given in the Table 1. and illustratively on the Figure 1, where the data for organic matter, distinctively for noon and midnight hauls, are plotted on the map of the Mediterranean.

Following conclusions, regarding of course the observed period only, have to be stated :

1. The planktonic biomass was during this period significantly higher in the eastern mediterranean waters as in the western ones. An average eastern sample was with its 589 mg almost twice as rich as a western one with 317 mg of the biomass. Considering absolute values for the Western Mediterranean, only its central part between Balears and Sardegna and the most eastern Tyrrhenian were showing as high biomass values as they have been found as a rule at all stations in the Eastern Mediterranean. The highest absolute values have been found in northern levantine waters, according perhaps to interactions of aegean and Nile influences, and in waters close to the Strait of Messina, according obviously to the known upwellings in this area. The lowest biomass have been found surprisingly just in the waters which are supposed to be under a direct influence of the Atlantic (Alboran and offshore of Algeria). In conclusion we can say that during the observed period the planktonic biomass seems to be distributed in a way which is exactly opposite of the mentioned "classical" statements.

2. Comparing biomass of our noon and midnight samples, there is among them a very significant difference which has to be stressed. In all those parts of the Mediterranean where a stable, oceanic-like situation is established there are as a rule the midnight samples with an average biomass of 568 mg more than twice as rich as the noon samples with their 239 mg. This phenomenon represents an obvious consequence of nocturnal, surfaceward migrations of mesopelagic or, so called deep scattering layers (DSL), composed in the Mediterranean we have seen, above all by siphonophorans, pelagic molluscs and decapods, euphausiids and of course of, mostly myctophid fish. These nocturnal elements, enriching our night samples as much as it has been mentioned above, were found abundantly not only in oblique hauls but also in neuston nets, filtering first ten centimeters of the sea surface. It has to be mentioned here that the 1969 cruise of R.V. *Atlantis II*. was dealing mostly just with the study of mesopelagic layers and it is an extensive work in the preparation by Dr. R. BACCUS and his collaborators.

TABLE 1. — Basic data on plankton stations of the Cruise No 49 of the R.V. *Atlantis II.* during May-June 1969 in the Mediterranean and data for 1/2 of the total biomass collected by means of 30 minutes oblique plankton tows in surface layers (0-150 m.)

Station No	Date 1969	Latitude o'	Longitude o'	Dry Weight in mg	Organic Matter in mg
2	11.V.	34 35 N	28 07 E	621	547
3	12.V. <i>N</i>	34 04 N	27 49 E	1,347	1,150
4	12.V.	34 05 N	26 47 E	285	260
5	13.V. <i>N</i>	34 01 N	26 08 E	761	711
6	13.V.	34 02 N	25 52 E	215	197
7	14.V. <i>N</i>	34 00 N	24 36 E	737	675
8	14.V.	34 00 N	23 29 E	296	274
9	15.V. <i>N</i>	33 52 N	22 35 E	545	490
10	15.V.	33 53 N	22 12 E	175	166
11	16.V. <i>N</i>	33 44 N	21 30 E	554	504
12	16.V.	33 38 N	20 56 E	262	237
13	17.V. <i>N</i>	33 35 N	20 20 E	451	406
15	18.V. <i>N</i>	33 21 N	19 44 E	621	567
16	18.V.	33 20 N	19 09 E	248	224
17	19.V. <i>N</i>	33 44 N	18 40 E	452	406
18	19.V.	34 48 N	18 09 E	206	190
19	20.V. <i>N</i>	35 46 N	17 25 E	1,271	1,153
21	21.V. <i>N</i>	37 48 N	15 38 E	1,560	1,447
23	22.V.	38 45 N	15 10 E	284	250
24	23.V. <i>N</i>	39 17 N	14 18 E	1,140	1,044
25	23.V.	39 32 N	14 12 E	396	328
28	24.V. <i>N</i>	40 53 N	12 48 E	159	143
29	29.V. <i>N</i>	41 10 N	10 47 E	832	767
30	29.V.	41 21 N	08 43 E	455	428
31	30.V. <i>N</i>	41 19 N	08 01 E	455	427
32	30.V.	41 20 N	07 37 E	98	88
33	31.V. <i>N</i>	40 22 N	06 59 E	844	774
34	1.VI. <i>N</i>	39 49 N	06 34 E	472	445
35	1.VI.	39 15 N	05 39 E	424	402
36	2.VI. <i>N</i>	39 06 N	05 12 E	241	220
37	2.VI.	38 42 N	04 15 E	72	68
38	3.VI. <i>N</i>	38 27 N	03 40 E	523	480
39	3.VI.	38 23 N	02 57 E	106	99
40	4.VI. <i>N</i>	37 58 N	01 59 E	337	312
41	4.VI.	37 57 N	01 57 E	122	111
42	5.VI. <i>N</i>	37 20 N	00 32 E	35	29
43	6.VI. <i>N</i>	36 49 N	00 25 W	218	202
44	6.VI.	36 36 N	00 44 W	147	134
45	7.VI. <i>N</i>	36 30 N	01 30 W	168	157
46	7.VI.	36 19 N	02 27 W	170	155
47	8.VI. <i>N</i>	36 16 N	03 55 W	208	198
48	8.VI.	36 15 N	03 56 W	126	112
49	9.VI. <i>N</i>	36 01 N	05 20 W	345	320
50	9.VI.	36 09 N	06 59 W	73	56
51	10.VI. <i>N</i>	36 09 N	06 48 W	119	104

Remarks : 1. Samples which are marked with *N*, have been collected at midnight, non-marked at noon.

2. Total organic matter means here a difference between the dry weight and the weight of the residual ash after the combustion of total samples at 600°C.

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Discussion

M. Bernard demande quelques précisions sur le nombre de pêches effectuées le jour et la nuit.

M.-L. Furnestin souligne l'intérêt d'observations qui touchent une grande partie de la Méditerranée (bien que limitées en quelque sorte à une ligne de stations) et fournissent des résultats comparables dans les bassins occidental et oriental. Bien entendu, on peut s'étonner de ces résultats qui vont à l'encontre des précédents.

J. Stirn précise lui-même qu'ils ne concernent qu'un temps assez court (mai-juin 1969) et qu'il faudra attendre des données portant sur l'ensemble d'un cycle annuel pour se prononcer définitivement sur la richesse des deux bassins.