Investigations of the surface sediments of the Nozha hydrodrome near Alexandria (Egypt)

by

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So far we know only preliminary few studies were made on the Hydrodrome sediments. ELSTER & JENSEN [1960] gave a rough index of organic matter in the Hydrodrome sediments.

The present work is mainly concerned with some physical and chemical studies of the surface sediments of the Hydrodrome. The results obtained are compared with those from the surface sedimenιs of the Schöhsee in North-Germany [SAAD, 1966].

Materials and Methods

Surface mud samples were collected with an *EKMAN*-dredge at 24 stations (Fig. 1). The density of wet mud was determined by means of a pyknometer. The mud was dried at 105°C. The density of dry mud was calculated from both wet mud density and water content. The organic matters were determined by ignition loss at 520°C. The inorganic substances were treated by 12.5 p. 100 HC1. The methods used for the present work were described by the author (1966).

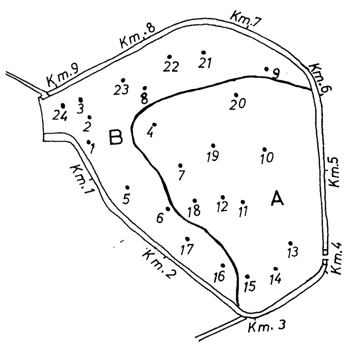

Figure 1

Results

Every substance mentioned in this work is present in all samples, though it varies from minimum to maximum values. The maximum density of wet mud (1.71 g/cm^3) is present in sample 13. This is mainly due to the increase in the weight of dry matter which reaches its maximum value in this sample (1.03 g/cm^3). This dry matter consists principally of great amounts of allochthonous material (0.56 g/cm^3) and calcareous matter (0.41 g/cm^3). The organic substances of this sample weigh only 0.06 g/cm^3. The

Rapp. Comm. int. Mer Médit., **20**, 4, pp. 515-517, 1 fig. (1972).

minimum density of wet mud (1.13 g/cm^3) is present in sample 22. This is mainly due to its maximum water content (0.94 g/cm^3) and minimum dry matter of value 0.19 g/cm^3. This low value of dry matter is due to the great decrease in the allochthonous material, calcareous and organic matters which reach their minimum values of 0.10, 0.07 and 0.02 g/cm^3 respectively.

Samples 7 and 11 show the minimum value of water content (0.65 g/cm^3). The maximum values of organic substances (sample 5 and 9), calcareous matter (sample 20), and the allochthonous material (sample 6) weigh 0.08, 0.50, 0.57 g/cm^3 respectively. The density of the dry matter reaches a maximum value of 5.16 g/cm^3 in sample 2, and a minimum value of 2.54 g/cm^3 in sample 11.

The area of the lake bottom from which samples 4, 7, 10, 11, 12, 13, 14, 15, 18, 19 and 20 were taken, and which is represented by letter A (Fig. 1), shows high amounts of calcareous deposits ranging from 0.39 - 0.50 g/cm^3 wet mud. The remaining part of the lake sediments, which is represented by letter B has low contents of calcareous matters, which differ from 0.07 - 0.36 g/cm^3.

Discussion of results

Samples were analysed into two main fractions; 1. ignitable matter (equal approximation to organic content); 2. unignitable residue, which is further differentiated into calcareous matter and allochthonous mineral substances plus diatoms shells. The quantity and quality of any material laid down in a unit volume of the sediments may be determined by internal and external events.

With regards to the calcareous deposits, the lake bottom is divided into area A and B (Fig. 1). In area A the amount of calcareous matter exceeds that of area B. This excess is due to the increase in the amount of shells of dead bivalves and tubes of calcareous tube worms in area A.

The differential distribution of organic matter in the sediments depends direct or indirect upon several factors; the most important of which are; 1. primary production of the lake; 2. intensity of mineralization of dead organisms before and after sedimentation; 3. water depth, particle composition of the sediments, bottom configuration and water movements. According to the special environmental conditions the Hydrodrome has developed to a high productive lake.

The low content of organic matters in the Hydrodrome sediments are due mainly to the rapid rate of decomposition of organic remains favoured by the special environmental conditions in the regions. It would be expected that a high organic production of the Hydrodrome must be followed by somewhat similar high organic contents in its sediments. Owing to the high intensity of mineralization, the organic contents of the sediments is relatively too small [El-Wakeel, 1964]. The decrease in the organic content of the sediments may be also due to the increase in the rate of sedimentation of mineral matter in the Hydrodrome.

Microscopic examinations of the wet mud show the complete absence of autochthonous organic remains in the sediments. This case was also observed by Pennington [1943].

Comparison of Hydrodrome and Schöhsee Sediments

A comparison of the Hydrodrome and Schöhsee sediments seems to be of special interest from the limnological point of view, since the two lakes are present under different environmental conditions. The difference in compositions of both types of deposits is due mainly to the difference in the internal and external events. Saad [1966] has studied the sediments of Schöhsee using the same methods of the present work. Deep cores and recent sediments were obtained for that purpose. The results of surface samples described in that work will be used in the present comparison.

The maximum water value in the Egyptian lake sediments (83.18 p. 100) is slightly lower than that of the German lake sediments (87.16 p. 100). The minimum value of water content in the Egyptian lake sediments (39.70 p. 100) is much lower than that of the German lake sediments (67.04 p. 100). Accordingly the amounts of the dry matters in the Egyptian lake sediments should exceed that of the German lake sediments. The maximum value of the dry matter in the Egyptian lake deposits (60.30 p. 100) is nearly double that of the German lake deposits (32.95 p. 100).

The high amounts of the dry matters in the Hydrodrome deposits reflect mainly the richness of these deposits in the calcareous and allochthonous materials. The maximum value of calcareous matter in the Hydrodrome deposits (71.21 p. 100) is more than double the maximum value in the Schöhsee deposits (31.22 p. 100). Also the minimum value of calcareous matter in the Hydrodrome sediments (29.38 p. 100) is much higher than the minimum value present in the Schöhsee sediments (17.63 p. 100). Such increase in the amounts of calcareous matters in the Hydrodrome sediments is principally due to the nature of this lake bottom. This type of lake bottom differs from the common European lake bottoms and has a more marine character. The maximum amount of allochthonous material is slightly higher in the Egyptian lake sediments (64.45 p. 100) than that of the German lake sediments (58.95 p. 100). The high contents of allochthonous materials in the Schöhsee sediments are due to the great amounts of mineral matters thrown in this lake from its side (SAAD, 1966).

It is also of special interest to compare the organic contents of both types of deposits. The maximum value of organic matter in the Egyptian lake sediments (11.34 p. 100) is nearly $\frac{1}{3}$ that maximum in the German lake sediments (32.54 p. 100). The minimum value of organic matter is also much lower in the Egyptian lake sediments (5.45 p. 100) than that minimum in the German lake sediments (12.49 p. 100). The great decrease in the organic contents of the Hydrodrome sediments may be due mainly to the rapid rate of mineralization of organic remains favoured by the special environmental conditions in the region. This rate of mineralization must be greater than that of the Schöhsee sediments, although OHLE [1965] has proved a decrease in the autochthonous organic contents of the Schöhsee deposits owing to the strong intensity of mineralization.

Summary

Some physical and chemical characters of the surface sediments of Nozha-Hydrodrome (an artificial Egyptian lake) were investigated. The results of analysis were compared with those obtained from the surface sediments of Schöhsee in North-Germany.

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