

The term "Coated grains" was coined by WOLF (1960) as a substitute for FOLK's (1959), to include other concentrically formed materials such as pisolites and Rhodoids (c.f. PERYT, 1983). According to TUCKER and WRIGHT (1990) coated grains are polygenetic in origin with different process forming similar types of grains and many of these process are still very poorly understood.

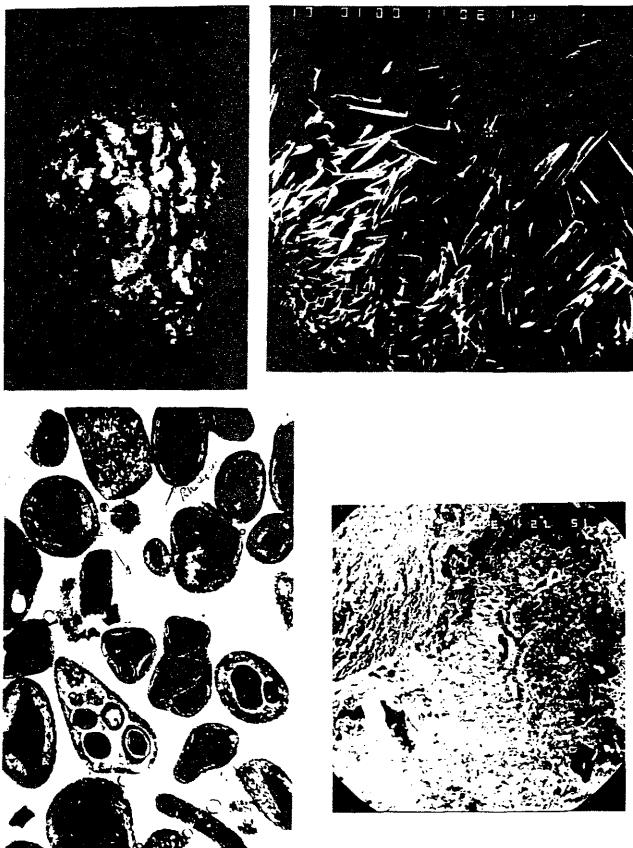
The present study aims to study the types of coated grain, the microfibrils and the mineralogy as well as to study the origin of this coated grains using a combination of SEM, XRD and petrographic techniques.

The study area, situated between Sidi Abdel Rahman and Matruh, covering the beach and the inner shelf, west of Alexandria, Egypt. Shelf sediments were collected from a peterson grab sampler, where beach sediments were collected by hand. Samples were subsequently analyzed for mineralogy (XRD), microfibrils (SEM), petrography (thin sections). For mineralogy the samples were scanned from 25° to 33° (Cu-K $\alpha$ ) at 1/2 degree per minute. The peak area method (MILLIMAN and BORNHOLD, 1973) was used for calculating the percentage of different mineral species. Thin sections were prepared and studied petrographically. Representative coated grains were analyzed by means of JEOL JSM U-3 Scanning Electron Microscope.

#### Results and Discussion

Among the coated grain, Both chemical precipitate coated grains (Ooids) and biologically encrusted grains (Rhodoids) were recognized. Most of the ooids collected from the shelf and beach sediments have tangential microfibrils, and consist of aragonite "grains" whose long axes are aligned parallel to the ooid laminae. The grains consist of aragonite rods without crustal terminations less than 3  $\mu$ m long and have an average diameters of 0.2  $\mu$ m. Many of the ooids have a complex nucleus. Some of the nucleus are terrigenous grain (quartz) other are carbonate grain (pellets or skeletal fragments).

Rhodoids were also observed, where coralgae has been coated with tangential layers of aragonite. These rhodoids are similar to those rhodoid from Ras Muhammad, Gulf of Aqaba, Red Sea (c.f. HOTTINGER, 1983). Mineralogical analysis reveals that these ooids consist mainly from Aragonite (comprises 80% of the total minerals) and Mg-calcite (12 mol% MgCO<sub>3</sub>, comprises 20% of the total minerals). On the basis of microfibrils of the studying coated grains, available data on the growth rate of rhodoid (c.f. HOTTINGER 1983), as well as the mineralogical composition of these coated grains. It can be concluded that many of these coated grains are recently formed. However the radial microfibrils of some grains were also found, indicating the presence of ancient ooids. This conclusion agrees with the previous study on the oolitic sand from the same area of study (ANWAR *et al.*, 1984; EL-SABROUTI, 1990).



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A suite of 46 surface sediment samples from the eastern Aegean Sea, along the Turkish coasts has been subjected to petrographic and chemical analyses, together with land geology, in order to study the main controls on heavy metal dispersal and provenance.

The sediments are mixtures of the varying proportions of terrigenous and biogenous components of variable grain-size composition, whereby the petrology of the terrigenous constituents corresponds closely with the land geology (ERGIN *et al.*, 1990). The mud or muddy sediments commonly dominate near the mouths of the main rivers and the protected areas of relatively low energy conditions. The carbonate contents of the sediments (1-70% CaCO<sub>3</sub>) normally reflect the amounts of the biogenic material of shell/skeletal remains present, although contributions also occur from terrigenous carbonates, especially off the southern coasts of study area. Biogenic carbonates are mostly confined to areas around islands and peninsulas where the benthonic productivity is seemingly high. In general, the organic carbon contents of sediments are found to be relatively high (0.6-1.9%) at most of the inshore stations located near or at the major river mouths indicating significant contributions from the land-based sources. Otherwise, the majority of the C<sub>org</sub>-levels in the sediments (0.3-0.7%) can be accounted for the normal marine production of organic matter in the Aegean Sea.

The heavy metal data (Fe : 0.59-5.74% ; Mn : 103-2625 ppm ; Co : 2-41 ppm ; Cr : 9-312 ppm ; Cu : 3-77 ppm ; Ni : 11-406 ppm ; Zn : 19-162 ppm) show a considerable measure of similarity in composition to the average sediments/sedimentary rocks worldwide (TUREKIAN and WEDEPOHL, 1961 ; EMELYANOV, 1972 ; HIRST, 1974 ; SMITH and CRONAN, 1975 ; SHAW and BUSH, 1978 ; VOUTSINO-TALIADOURI and SATSMADJIS, 1982 ; BODUR and ERGIN, 1988 ; EVANS *et al.*, 1988 ; ERGIN *et al.*, 1991 ; YUCESOY and ERGIN, 1991). Exceptions to regional trends reflect : unusual geology in the source areas ; postdepositional mobility of the metal within sediment ; and maybe to some extent, anthropogenic effects. The latter appears to be significant off the Meriç river mouth and inner Izmir Bay, where the concentrations of Cu and Zn are somewhat higher than the average abundance. The levels of Fe off the mouths of Menderes and Gediz rivers are rather high, presumably resulted from the metamorphic rocks of Menderes Massif and related ore deposits. Exceptionally high Mn, and to lesser degree, Co concentrations in the sediments around the Marmaris peninsula maybe due to a combination of substantially input from the terrigenous sources together with diagenetic enrichment in sediment. The distribution of the Cr and Ni concentrations is largely controlled by a contribution from ultramafic rocks and related economic chromite deposits on land. From the relationships among the geochemical variables, it is concluded that the great portions of the metals studied are associated with the Fe, Mn, clay, and to lesser extent, organic fractions of the sediments.

Overall, the distribution of the heavy metals in the surface sediments of eastern Aegean Sea can largely be explained in terms of variations in depositional environment and provenance.

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