of the year. Beyond the Mediterranean water a transition to Lake water occurred for a distance of 10 km (the salinity changing from 39·85 p.p.t. on the northern edge to 44·06 p.p.t. at the southern edge), this transition being found in approximately the position normally expected throughout the rest of the year. Thus almost all the Gulf/Lakes waters were confined south of Lake Timsah, although in Lake Timsah, below 7 m, the water had a salinity of less than 38 p.p.t. in early September, indicating the extent of the intrusion of Mediterranean water, compared with a salinity of 43 p.p.t. in May, which is representative of Bitter Lakes water.

From the results there is clear evidence of a southerly current in September 1966, a situation similar to that which occurred each year before the building of the Aswan High Dam. An examination of the differences in salinity at Port Said between April and September, for the years before and after the building of the Aswan High Dam, indicates that the effect of the Nile flood on the currents in the canal could at the most be of only a minor nature, and because from the daily weather reports[8] it can be observed that the meteorological situation could have produced an effect on the sea level at Port Said coinciding in time with these results, the indication is that the prime factor determining the observed fluctuation in sea level must be the wind stress on the water. It is suggested that the advance of the Mediterranean water into the canal may be independent of the Nile floods.

It is recognized that meteorological conditions vary in time, duration and intensity from year to year, and a comprehensive study should take these variations into account. This could not be achieved from a single year's cruises, and a proper understanding of the precise conditions prevailing during the month of September can only be obtained if and when regular observations are taken at frequent intervals during the month.

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MOHAMED IBRAHIM EL-SABH*

Institute of Oceanography and Fisheries,
Suez, UAR.

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*Present address: Fisheries Laboratory, Lowestoft, Suffolk.

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X-ray Studies of Clay Minerals in Investigations of Contact Metamorphism

CLAY mineralogical analyses have been important in sedimentology, in studies of the genesis and behaviour of soils and in ceramics. The effect of high temperatures on clay minerals has also often been reported[1–8]. The work reported here concerns the importance of X-ray analysis of clay minerals in studies of contact metamorphism.

From the type area in the Cuddapah basin (Andhra Pradesh, India), samples of Pre-Cambrian Tadpatri shales have been collected, both from the contact metamorphic zone in the immediate vicinity of the Cuddapah traps and from an area away from the influence of the traps. The altered shale is red, whereas the fresh (unaltered) shale is typically green. Clay mineral fractions separated by standard procedures from the altered and the unaltered shales in identical conditions were subjected to temperatures of 600° C and 800° C for 3 h. A General Electric *XRD*-6 diffractometer with filtered Cu K_α radiation was used to obtain X-ray diffraction patterns for the original and the heat-treated fractions of the altered and unaltered clay.

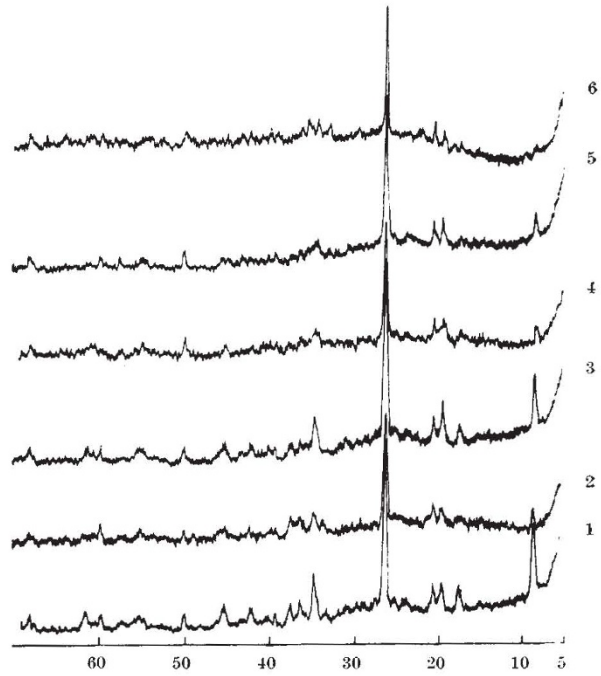

Fig. 1. X-ray diffractometer traces for Tadpatri shales. 1, 3 and 5 are for fresh shale at room temperature, 600° C and 800° C, respectively. 2, 4 and 6 are of altered shale at room temperature, 600° C and 800° C.

The results are shown in Fig. 1. The clay mineral used was illite. The pronounced peaks at 4·26 Å, 3·36 Å and 1·82 Å are caused by quartz which could not be effectively removed. The X-ray analyses indicate that although the peaks—001 (10·10 Å), 200 (2·57 Å), 202 (2·46 Å) and 005 (1·99 Å)—of illite in the fresh (unaltered) specimen decrease considerably in intensity during heat treatment, the changes in intensity are not pronounced for the respective peaks in the altered fraction. Comparison of the intensities of the peaks 001, 200, 202, 005 and the collapse of the peaks 002 (4·98 Å) and 060 (1·49 Å) shows that the altered field sample (Fig. 1, traces 1 and 2) closely resembles the fraction of the original sample which was subjected to a temperature of 800° C (Fig. 1, traces 1–5), indicating that the altered field sample might have suffered contact metamorphism at a temperature equivalent to about 800° C in normal atmospheric conditions. In plutonic conditions, however, the effect of pressure might be to shift this range of temperature.

D. M. RAO
K. V. G. K. GOKHALE

Indian Institute of Technology,
Kanpur, India.

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