Neutron activation analysis of the rock indicated 19·7 ± 0·68 per cent for its magnesia content.

The presence of a large mass of dolomite in the East Rutts area is surprising, considering the present stratigraphic and structural ideas on that part of the English Channel. Hill and King[1] indicate the presence of metamorphic rocks in the locality, with New Red Sandstone deposits to the north and west, the latter giving place to the metamorphic rocks comprising the Eddystone reef. Apart from presenting the evidence of the existence of the dolomite we have as yet no explanation to offer for its position, other than the very tentative suggestion that it may be a very localized facies of the Devonian or of New Red Sandstone lying within the Eddystone–Start Point metamorphic thrust zone. It is hoped that further investigations now planned will provide more evidence.

We thank Mr. A. Stone, of the Neutron Generator Laboratory, Wantage Research Laboratories, for checking the magnesia content of the rock by neutron activation analysis. We also thank Dr. K. Sandford, of the Department of Geology and Mineralogy, University of Oxford, for helpful discussions, and Mr. A. Hancock and Mr. D. Gill for the collection of *in situ* samples of rock under arduous diving conditions.

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[1] Hill, M. N., and King, W. B. R., *Quart. J. Geol. Soc.*, **109**, Fig. 5 (1952).

## Local Distribution of Elements in the Tests of Foraminifera

Electron probe X-ray microanalysis permits the determination on a micro-scale of local distribution and concentration of elements in a sample. In a preliminary enquiry, the tests of calcareous Foraminifera have been investigated.

The analysis was preceded by optical emission spectrographic analysis of the tests of approximately 12 specimens of each species investigated. These analyses determined the elemental composition of the tests plus included sedimentary particles which cannot (with certainty) be cleaned out of the innermost chambers. The results of the spectrographic analyses were used to eliminate the necessity of preliminary searching on the electron probe, thus saving much time.

Foraminifera for probe analysis were cleaned in dilute hydrogen peroxide. After drying, they were embedded (under partial vacuum) in polystyrene. The method of embedding is described in detail by me (submitted for publication). A median section was cut and polished, and a thin metal layer was deposited on it by vacuum evaporation, to ensure electrical continuity.

Generally, interpretation of results was complicated by topographical and microstructural effects. The calcium and silicon concentration variation in Recent *Elphidium excavatum* (Terquem) and *E. bartletti* (Cushman); calcium concentration variation in Recent *Quinqueloculina seminulum* (L.); calcium, iron, silicon, manganese, and magnesium concentration variation in the Tertiary *Operculina victoriensis* (Chapman and Parr); and calcium and magnesium concentration variation in Recent *Operculina complanata* (Defrance) have been recorded.

Improved magnesium detection is desirable, because this element has been shown to be of classificatory and ecological significance in the Foraminifera.

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# METALLURGY

## Effect of Impurities on the Electrical Resistivity Increase during Elongation of Cadmium at 71° K

Observations of electrical resistivity increases in metals during plastic deformation[1] have been attributed to changes in the concentration of point, line and planar defects. Further experiments have demonstrated that prior deformation and recovery[2] as well as impurity concentration[3,4] affect the slope of the resistivity–elongation curves. It is the purpose of this communication to present some results obtained on cadmium containing impurities. The influence of lead, magnesium and copper, in particular, is discussed.

Polycrystalline cadmium wire, which for most experiments was 1 mm in diameter, was obtained in various degrees of purity as indicated in Table 1. Specimens, about 14 cm long, were elongated in liquid nitrogen and the resistance change was measured potentiometrically as a function of elongation. A more detailed description of the experiment is available in ref. 5.

Table 1. Emission Spectrograph Analysis of Cadmium Impurities (p.p.m.)

| Sample impurity | 69-Cd + 1,000 p.p.m. Pb | 69-Cd + 1,000 p.p.m. Mg | 69-Cd + 10 p.p.m. Cu | Commercial Cd | 49-Cd | 59-Cd |
|---|---|---|---|---|---|---|
| Pb | 1,000 | <1 | <1 | 100 | 3 | <1 |
| Mg | <1 | 1,000 | <1 | <1 | 10 | <1 |
| Si | <1 | <1 | <1 | <1 | 10 | <1 |
| Fe | <1 | <1 | <1 | <1 | 10 | <1 |
| Cu | 10 | 10 | 10 | 10 | 3 | <1 |
| Ag | <1 | <1 | <1 | 3 | 10 | <1 |
| Al | | | | | 10 | |
| Total impurities (nominal) | 1,000 p.p.m. Pb 10 p.p.m. Cu | 1,000 p.p.m. Mg 10 p.p.m. Cu | 10 p.p.m. Cu | 110 p.p.m. | 56 p.p.m. | 1 p.p.m. |
| Slope (approx.) | <3·4 | 3·4 | 3·4 | 1·8 | 1·2 | 3·4 |

The results of the deformation experiments at liquid nitrogen are shown in Fig. 1. The closed and open squares represented by curves *A* and *B* are data on the same 59-cadmium specimen measured while the load was on and after the load was removed, respectively. Part of the difference between *A* and *B* can be attributed to the elastic recovery, which is estimated to be less than 0·1 per cent. However, the greater part of the difference is undoubtedly due to the presence of the stress and its subsequent effect on the scattering of conduction electrons. It can be seen that both *A* and *B* show a linear dependence on strain. The results for cadmium doped with copper, lead and magnesium also fall on curve *B* although the cadmium containing lead shows some deviation. Curve *C*

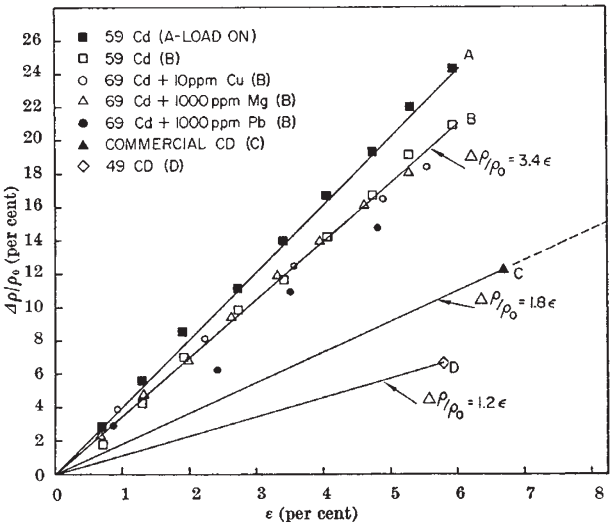


Fig. 1. Percentage resistivity increase for cadmium specimens of various purities as a function of elongation strain at 78° K