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A NEW CLEANING TECHNIQUE FOR THE PREPARATION OF CALCAREOUS FOSSILS

SIR,—The removal of adherent ferruginous material from calcareous fossils is often a difficult task. Examples of mechanical and chemical techniques are given by Franco (1947); Stevens, Jones & Todd (1960); Kummel & Raup (1965). Most of these treatments, however, though successful in some cases, often result in serious corrosion or cause physical disintegration of the sample. A survey has therefore been made of the comparative cleaning efficiency of a number of solvents, and, though no reagent was entirely satisfactory, the best results were obtained using chelating rust removers in an alkaline medium.

Acid Treatments.—Inorganic acids weak enough not to dissociate the carbonate failed to attack the iron oxides. Those acids tried included ortho-boric and telluric acid. The weakly acidic properties of phenol and substituted phenols suggested that they might prove satisfactory but no substantial solution of the oxide could be detected. Their use with an ultrasonic cleaner, however, gave results superior to those obtained using water alone, with ortho-cresol being the most efficient. Salicylic acid dissolved some of the oxides but resulted in attack of the carbonate—particularly on prolonged treatment. The di-sodium salts of E.D.T.A. buffered to a pH 6·6 with phosphates gave a similar result.

Alkaline Treatments.—In alkaline conditions NN di (2 hydroxy ethyl) glycine was tried with limited success and a better result was obtained using alkali gluconate in saturated alkali solution. Sodium gluconate is readily available and its solution in saturated caustic soda was therefore tested first. Much of the iron oxide was removed with this reagent but the carbonate was also attacked. An equivalent potassium solution produced even greater etching of the carbonate surfaces investigated. The lithium anologue was therefore made, by adding an excess of lithium hydroxide to glucono-delta-lactone, and the application of this reagent provided satisfactory solution of the oxide with minimal carbonate etching. It therefore seems likely that lithium gluconate in an aqueous saturated lithium hydroxide solution may prove a useful addition to the range of reagents suitable for fossil preparation.

Procedure.—The reagent is prepared by dissolving glucono-delta-lactone (5 g) in distilled water (50 ml), warming gently for 10 min at about 35° C to allow hydrolysis to the acid to take place, and then adding lithium hydroxide (14 g) and diluting to 100 ml with distilled water.

The sample, which if delicate may be suspended in a nylon net bag, is boiled in the reagent for about 30 min, washed and brushed in water and finally rinsed in acetone. The specimens used for trials were echinoid spines from Faringdon sponge gravel and from the Red Crag lamellibranchs. Several pure minerals, including haematite, chalybite, limonite and pyrite were treated and little or no attack was observed. Treatment of a ferruginous calc-arenite showed that some shell types were cleaned and others not.

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MICROPALAEONTOLOGICAL EVIDENCE ON THE AGE OF THE CLARA GROUP (SOUTH-EAST IRELAND)

SIR,—The micropalaeontological investigations of specimens from the Clara Group which were mentioned in an earlier publication (Tremlett, 1966)—and also some from the nearby Dunganstown Sandstone—have now been completed by one of us (C. D.) on material collected by the other (W. E. T.). Although the results are not by themselves conclusive, nevertheless when considered in conjunction with earlier palaeontological information from Clara rocks, they give useful evidence on the period to which the group belongs.

Six specimens were examined from the Clara Group—four from the eastern flanks of Trooperstown Hill, ranging from 3 m (10 ft) above the base of the group, where it rests unconformably on Knockrath rocks, to some 150–180 m (500–600 ft) up into the group (Tremlett, 1959a, Fig. 2), and two from the Parkroe brachiopod locality (1959a, p. 61). All are similar in containing only sparse, highly carbonized and damaged sphaeromorph acritarchs, 7–50 μ in diameter. The absence of more elaborate acritarchs and other microfossils is regarded as evidence of a pre-Arenig age. Similar material has been obtained from Pre-Cambrian and Cambrian rocks elsewhere but not from any Ordovician samples (C. D.). The presence of brachiopods in these rocks (Tremlett, 1959a, p. 61) appears to rule out a Pre-Cambrian age (Glaessner, 1966). Hence a combination of the micropalaeontological and macropalaeontological evidence supports the previously advocated Cambrian age (Tremlett, 1959a, 1966) of the Clara Group.

Micropalaeontological material was also obtained from 2 km ($1\frac{1}{4}$ miles) south-west of Glenealy at the outcrop of a silty layer in the Dunganstown Sandstone, a bed previously taken to mark the base of the Ordovician succession (Tremlett, 1959a, p. 59; 1959b, p. 19). This includes *Micrhystidium* cf. *shinetonensis* and large specimens (70–130 μ) of *Leiosphaeridia* sp. in abundance, both indicating an Upper Cambrian–Ordovician (or even younger) age. Fragments suggesting chitinozoa (*Conchitina*) occur, but none can be confidently identified. A few opaque discs may be damaged *Baltosphaeridium* (Ordovician or younger). The assemblage does not match precisely any known elsewhere.

The lithological similarity of the Dunganstown Sandstone to the Arenig rocks of other parts of south-eastern Ireland and its apparent stratigraphical position in the succession between the Clara Group and the Caradocian volcanic rocks of the Rathdrum area (Tremlett, 1959b, p. 19) still appear to provide the best available evidence of the age of this bed. For the Clara Group, however, a group having no known counterpart in other parts of south-eastern Ireland outside southern Co. Wicklow, this new micropalaeontological evidence indicates an upper age limit which, taken in conjunction with the lower limit fixed by brachiopods, confirms the previously advocated Cambrian age.

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