at extremely high concentrations, possesses only a small tendency to jellify. Aqueous solutions of the methyl and mono-glycol ester of pectic acid (polygalacturonic acid) do not jellify when borax is added. However, cross-linking takes place, if the monoglycerol ester which carries the required diol group is used.

All the above-mentioned jellies are not formed under acidic conditions. The gels are liquefied by treatment with compounds of low molecular weight which are known to form complexes with boric acid (for example, mannitol, fructose, glycerol, but not sucrose). Their mechanical properties (ropiness, plasticity) can be explained on the assumption that the cross-linkages are not fixed but perpetually destroyed and rebuilt.

It is of interest to note Lopatkin's observation[5] on the agglutination of *B. Shiga-Kruse* by boric acid. This micro-organism produces a polysaccharide which contains rhamnose[6]. Certainly many other mucilages found in animals, plants and micro-organisms will react with borax in a similar manner to the above-mentioned substances. The reaction described might prove to be valuable to macromolecular chemistry and bacteriology. Adjacent hydroxyl groups in the *cis* configuration can thus be identified.

These investigations will be published in full elsewhere.

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Constitution of Monazite

X-RAY examination of monazite has been carried out by Hadding[1], Gliszczynski[2] and Parrish[3], and the space group and crystal class uniquely determined. According to Goldschmidt[4], the thorium which is usually present is 'captured' during crystallization of the phosphate from its parent magma because of its favourable ionic size. To compensate for the increased cationic charge of the thorium ion, the resulting lattice must possess a defect structure in which some of the sets of equivalent cationic positions are only partially occupied. The quantity of thorium which can be tolerated in such a structure is not known, but monazites the thoria content of which varies from nil to at least 18 per cent (approximately 0·2 atoms per atom of rare earth element) have been reported[3,5].

While there is agreement about the gross structure of the mineral, the role of certain minor constituents, particularly silica, has not been satisfactorily explained[5]. Many components reported in monazite analyses are undoubtedly due to the presence of a considerable proportion of extraneous heavy minerals which, because of high specific gravity or other factors, have not been removed from the sample. This is the case with much of the iron, tin, chromium, titanium, and probably zirconium in samples of alluvial or littoral origin. Petrographic examination reveals that even single crystals of monazite are seldom free from inclusions of foreign substances. Microscopical observations reveal a much greater degree of homogeneity, however, in some fine-grained monazites obtained from beach sands, natural processes having effectively separated the grains from associated minerals.

The proportion of inclusions in such material is scarcely sufficient to account for the percentage of impurities given by chemical analysis of the sand, even after allowance has been made for the small quantity of extraneous material (insoluble in sulphuric acid) which remains in the sand after repeated magnetic and other separations. It is not unreasonable, therefore, to suppose that some at least of the 'impurities' occupy positions in the lattice of the mineral, for example, silica (usually present to the extent of about 0·5–1 per cent), lime (about 0·2 per cent), urania (about 0·2 per cent UO_2), and other oxides in smaller amounts. Thus calcium and tetravalent uranium, like thorium, could be easily accommodated because of favourable ionic size[4,6].

Marshall[7] has commented on the replacement of silicon by phosphorus in certain silicate structures. A similar replacement appears to occur in certain varieties of zircon rich in phosphorus[8]. The reverse phenomenon is observed in the apatite minerals wilkeite[9] and ellestadite[10], and in the mineral abukumalite, for which Shin Hata[11] has found the ratio Si/P to be 4. The replacement of silicon by phosphorus arises from the comparable size and regular tetrahedral structure of the groups SiO_4 and PO_4[6,12,13]. The possibility arises, therefore, that silica in monazite is present in the phosphate lattice to the extent of about 1 silicon atom for 23 phosphorus atoms. A defect structure with some unoccupied anionic positions would compensate for the increased charge of the phosphorus ion. Conceptions such as these would account both for the variable quantities of thorium and silicon in the lattice and for the variable thorium to silicon ratio observed, thus overcoming the difficulties of the earlier theory of solid solution of thorium silicate in rare earth phosphate, a theory which was shown to be untenable because it demanded constancy of the thorium to silicon ratio.

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