studies on enzymes by Willstätter and his co-workers, who succeeded in preparing protein-free solutions of enzymes after previous autolysis of cell proteins.

Antisera diluted 1:10 were adsorbed by large amounts of kaolin (usually one part kaolin to one part serum). This mixture was allowed to stand about 24 hours at 37° and filtered. Aliquot portions of the adsorbed kaolin-serum residue were then resuspended in a number of solutions of organic substances (glycocol, glycerol, glucose, etc.), which under certain conditions are effective eluents. Glycocol was first used by Fodor and his co-workers to elute peptide-splitting enzymes from adsorbate, thus obtaining solutions of enzymes which without previous autolysis were practically free from proteins.

Our experiments showed that antibodies adsorbed on kaolin could be obtained in solutions of glycocol in 2 per cent sodium chloride. The eluates of antibodies obtained corresponded to the protein-free enzymes in that they were chemically free from proteins. Not only the usual colour and precipitation reactions like that of Millon or Esbach, but also the more susceptible Jones-Spiegler test, which indicates 0·0002 per cent proteins, were negative.

The two known typhoid agglutinins reacted differently towards elution with glycocol-sodium chloride. By elution with a solution containing about 2 per cent glycocol and 2 per cent sodium chloride, only the flagellar agglutinin was recovered. However, on diminishing the quantity of sodium chloride (0·3-0·5 per cent), the amounts of flagellar agglutinin recovered became much smaller and at the same time small quantities of somatic agglutinins appeared. The antitoxin behaved like the flagellar agglutinins.

The antitoxin content of the protein-free eluates was tested by the intracutaneous neutralisation test employed by Roemer, while the agglutinin content was determined by the usual agglutination technique. The recovered antibody in the protein-free solutions was, both in the case of diphtheria antitoxin and flagellar typhoid agglutinin, about 20 per cent of the concentration in the original sera. This does not imply that this is the maximum recoverable percentage. In these experiments we were primarily concerned with the problem whether it is possible to purify antibodies by the method of adsorption and specific elution. The problem of yield and concentration as well as the various chemical and serological questions arising from the possibility of separating antibodies from the serum proteins are under investigation.

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### Commensal Algæ and Reef Corals.

DR. YONGE has directed my attention to an error in my recent paper on coral reefs (*Bull. Mus. Comp. Zool.*, **71**, 6; 1930), the origin of which is of no importance. The statement is that *Millepora* and reef-building *Alcyonaria* do not possess commensal algæ. This is quite contrary to fact—for Prof. Hickson showed me them in *Millepora* upwards of forty years ago—and also to the main argument in my course of lectures delivered at the Lowell Institute at Boston. I had decalcified pieces of more than forty colonies of these various forms from surface reefs in the Indian and Pacific oceans and found that zoochlorellæ were present in all. They included *Millepora* and *Heliopora*, which in certain positions may be as important builders as reef corals, and the soft corals (*Sarcophytum*, *Sclerophytum*, and *Lobophytum*) so widely distributed on lagoon and protected reefs.

Prof. Hickson and I have recently examined between us five colonies of *Tubipora*, in all of which we have found the same commensal algæ. I did not think that they existed in *Millepora* from greater depths, having failed to find them by the teasing method in two of Agassiz's specimens of the same from more than 20 fm. Since my return to England I have found them in sections of both *Millepora* and *Heliopora* at various depths down to 50 fm., and believe them to be of universal occurrence in all these reef-builders, though varying in amount. I may add that I found these algæ in a species of the coral *Gardineria* from more than 222 fm., here presumably a parasite.[1]

The argument in the paper in question was that coral reefs have come into existence owing to the active growth of plants and of the above and other plant-animals, especially true corals, which necessarily are dependent *inter alia* on the depth to which light of sufficient intensity for their chlorophyll can penetrate sea-water. This varies mainly with the amount of plankton and other suspended material, but the maximum depth is about 50 fathoms. Under certain conditions the reef-building corals are covered by a white slime, which lies on and in the surfaces of their polyps, and ultimately kills them. This I suggest to be a precipitation of amorphous carbonate of lime from the supersaturated sea-water, owing to the chemical operations of their chlorophyll in utilising carbon dioxide. It is well seen on true corals in lagoon conditions below 10 fm., and I have found a similar slime on Lithothamnioneæ, but not on any of the other builders mentioned. It this be so, it is obvious that shoals cannot be built up on lagoon floors below 10 fm. except near passages or where there is an active flow of water. My object in writing was to induce biologists to examine this and other suggestions in the field. In particular, I should be grateful for any observations upon whether all these several animals digest their commensal algæ, if their feeding conditions are unfavourable. There are places of suitable temperature and with plenty of food, but none of these reef-builders seem to be able to live below 50-60 fm.

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[1] *Terra Nova* Exp., Brit. Mus., 5, 128; 1929.

### Laterites and Lateritic Soils.

DURING the course of the past few months I have been afforded numerous opportunities of making field observations on soils over practically the whole range of Australian climatic conditions.

A conscious look-out has been kept for evidences of tropical soil weathering processes distinctive from those of temperate regions, and for evidences of laterite formation. Two outstanding results of these observations have been: on one hand, the inability to observe any real distinction between the leached tropical soils and the corresponding temperate series usually carrying eucalyptus savannah forests, both being entirely podsolic in character; and on the other hand, the observation that every authentic case of laterite, from the geologist's point of view, was fossil in character—that is, the laterite was to be regarded entirely as a parent material from which new soils were being produced in equilibrium with current climatic conditions. In certain cases, notably in Western Australia, such soils are quite abnormal and



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