or possibly, in a few instances, in dust storms. Observations of atmospherics have therefore been found to have definite meteorological value as they enable barometric depressions to be located and traced by observing the atmospherics which are generally associated with them.

Information on the diurnal and seasonal variation in the activity of atmospherics covering a period of more than a year is also given in the report. It has been found that the maximum activity of atmospherics occurs in the afternoon from 3 to 4 p.m. in any locality, although this maximum is less marked for sources over sea than for those over land. In Australia, atmospherics are very prevalent over the tropical areas in summer, but in winter, atmospherics arising within the continent are relatively few, those observed being associated with barometric depressions. Towards the end of 1931 two automatic directional recorders, of the narrow-sector type developed in Great Britain, were installed, and with the aid of these instruments more complete information on diurnal and seasonal variations is being obtained.

The report shows that this line of research has been satisfactorily established in Australia on a sound basis, and the results of the continuation of the investigation will be awaited with interest.

Hæmolytic Streptococci*

THE group of micro-organisms known as the hæmolytic streptococci is responsible for a number of acute inflammations in various regions of the body, such as erysipelas, heart disease, and puerperal fever, as well as for such diseases as scarlet fever and certain types of pneumonia. In addition, they are important secondary invaders, attacking those whose resistance is already lowered by some other infection. They spread in the body both by the lymph and the bloodstream and are frequently found on mucous surfaces in apparently healthy individuals. They are only known as parasitic upon the animal body and appear to maintain themselves in a human population like the meningococcus or pneumococcus, namely, by carriers.

Since these organisms are responsible for so many different diseases, it is of interest to inquire whether a particular variety of hæmolytic streptococcus is associated with each different disease. The late Sir Frederick Andrewes devoted seven years to the study of this problem and a report of the investigation, prepared for publication by his colleague, Mrs. Christie, and Dr. Christopher Andrewes, has now been issued.

The hæmolytic powers of *Streptococcus pyogenes*, the typical hæmolytic streptococcus, depend upon the production of a definite toxin which passes out into the medium and disintegrates the limiting membrane of the red blood cells: this soluble hæmolysin will pass through porcelain filters of the coarser type. The living organisms also reduce hæmoglobin or may convert it to methæmoglobin. As a method of separating the different types, it was soon clear that agglutination tests by themselves would prove of little value. It was necessary for an accurate antigenic analysis to carry out quantitative agglutin-absorption tests. Antisera were prepared by injecting an emulsion of the streptococci, killed by exposure to dilute formaldehyde in the cold for some days, intravenously into rabbits, on alternate days for about four weeks. The sera obtained had high titres. In carrying out a test, graduated doses of an emulsion of the organism are added to the same volume of serum. After standing overnight, the tubes are centrifuged and the clear supernatant fluid pipetted off and titrated, that is, its agglutinating power for the strain with which the serum was prepared, is tested. The closer in type the strain used for the absorption of agglutinin is to the latter, the less agglutinin will there be left unabsorbed, and vice versa.

The investigation has shown that these hæmolytic streptococci have such inherent powers of adaptation to their chemical environment as to make it impossible, for the present at any rate, to prepare a permanent systematic classification. The methods used for discrimination between forms of different origin may themselves change the characters of the organisms under observation. Only exceptionally are two strains serologically identical, but very rarely are they entirely dissimilar. In the case of scarlet fever, it appears that no one serological form can be credited as causal agent, though three or four recognisable serological types seem to be quite commonly found in it. An occasional representative of a scarlet fever group was found among the puerperal, surgical and erysipelas strains, but otherwise no distinct types stood out from this mixed group.

The general conclusion is that this group of organisms is in a state of constant flux in which it is difficult to find any firm foundation for a permanent systematic classification: success is probably unattainable by purely serological methods of investigation. The dangers of the hæmolytic streptococcus to human life appear to arise from this instability of behaviour: it has a special facility in adapting the refinements of its living chemistry to the particular host environment in which it finds itself. Progress would seem to lie in a deeper knowledge of the exact chemical events involved in this reaction between the host and the invading organism.

* "The Hæmolytic Streptococci: their Grouping by Agglutination". By Frederick W. Andrewes and Ethel M. Christie. Medical Research Council, Special Report Series, No. 169. Pp. 73. (London: H.M. Stationery Office, 1932.) 1*s*. 3*d*. net.

University and Educational Intelligence

CAMBRIDGE.—At King's College the following have been elected to fellowships: A. G. D. Watson, scholar and Harold Fry student of the College, and E. S. Shire, Reginald John Smith student and formerly scholar of the College.

THE use of sound films as an aid in the teaching of physical science is being tested in the University of Chicago with a series of twenty films of which the first two, entitled "Oxidation and Reduction" and "The Molecular Theory of Matter", have been produced under the supervision of the professors of chemistry and physics of the University. Three others on "Energy and its Transformation", "Electrostatics" and "The Velocity of Light" are in preparation. Similar series of twenty films each are to be produced dealing with biological science, social science and the humanities. The technical work is in charge of Erpi Picture Consultants and further particulars can be obtained (according to an article in the January issue of *School Life*) from the University of Chicago Press, 5750 Ellis Avenue, Chicago, Ill.