

The Expedition of the *Meteor* in the South Atlantic.

THE third report<sup>1</sup> on the progress of the *Meteor* Expedition, of which an account was given in NATURE of Jan. 1, includes some interesting results of an extensive survey of the chemical and physical conditions of the waters of the South Atlantic.

Water cooled below the Arctic ice in the northern hemisphere falls and creeps slowly southward as a deep current, rising in the zone 50°-60° S. and turning back to flow as an intermediate current at a depth of between 500 metres and 1000 metres towards the equatorial zone, where it mingles with the upper layers. A similar type of circulation was recently found in the Indian Ocean by Schott.<sup>2</sup>

The estimations of dissolved phosphate made on this expedition are singularly interesting as a factor governing the fertility of the ocean, for the conclusions based on them by Wattenberg are in excellent agreement with the conclusions arrived at by Atkins<sup>3</sup> from his work in the North Atlantic and around the coasts of Britain. In the tropics the sudden increase of phosphate with depth is accounted for by its utilisation in the surface layers by vegetable plankton

On the West African coast, water rising from the depths continually enriches the surface layers and occasions a rich growth of plankton. A considerable fouling of the ship's bottom in this area was also noticed, and it was observed that the colour of the sea was modified by the greater number of plankton organisms in it, which by reflecting yellow and green light give it a greenish blue appearance on looking down over the ship's side.

A table by Hentschel shows the average number of individual plankton organisms per litre found during the course of the ten cruises already made across the ocean, and brings out very clearly the relation of fertility of the water to latitude.

Mean latitude . . . . .	55° S.	48° S.	42° S.	35° S.	28° S.	23° S.	15° S.	10° S.	3° S.	2° N.
Plankton organisms per litre at 200 metres . . . . .	1528	1415	302	718	171	695	443	600	747	702
Plankton organisms per litre at 1000 metres . . . . .	74	29	34	49	19	28	24	55	62	62

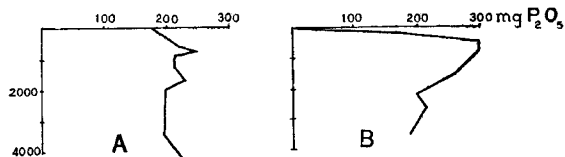


FIG. 1.—Vertical distribution of dissolved phosphate in the South Atlantic. Abscissae show milligrams P<sub>2</sub>O<sub>5</sub> per cubic metre, ordinates depth in metres. A: ca. 50° S.; B: Tropics.

organisms; here the sudden difference in density between the light warm upper layers and the cold heavy water below hinders mixing by means of convection currents, whereas in more southerly latitudes the upper layers, nearer in density to the water below, are continually being renewed by this means, giving rise to much greater plant growth.

<sup>1</sup> Die Deutsche Atlantische Expedition auf *Meteor*. Bericht 3. Zeitsch. der Gesells. für Erdkunde zu Berlin, 1927.  
<sup>2</sup> Ann. der Hydrog., 54, 417-431; 1926.  
<sup>3</sup> Jour. Marine Biol. Assn., 13, 119-150, 700-720, 14, 447; 1923-1926. NATURE, 116, 784; 1926.

The minimum of life does not occur in the equatorial region but around latitude 28° S., in the region corresponding to the Sargasso Sea in the North Atlantic, where warm surface water forms a pool in the ocean.

In this connexion it is interesting that Lohmann<sup>4</sup> in the *Deutschland* found more plankton in the equatorial region than in about 20° N. The explanation in both cases seems to be that water rich in phosphate and nitrates rises near the equator to take the place of that which flows away in the west-going currents, whereas immediately north and south of this zone the upper layers are not enriched from below to any appreciable extent and plant life is reduced to a minimum, giving rise to the barren deep blue areas of the oceans.

Estimations of alkalinity of the water in the tropical regions indicated that the surface layers were to a slight extent depleted of dissolved calcium carbonate through the agency of minute plant organisms which secrete an enveloping shield of calcareous plates, while the water close to the bottom was somewhat richer than the intermediate layers owing to solution of calcium carbonate from the detritus of dead organisms. Sea water generally is almost, but not quite, saturated with respect to calcium carbonate.

<sup>4</sup> Arch. für Biontologie, 4, Heft 3. Berlin, 1920.

The Gas Industry and Carbonisation.

UNDER the presidency of Mr. J. Wilkinson, of Nottingham, the Institution of Gas Engineers held its annual meeting in London on June 14-16. Mr. T. Carmichael discussed the economics of carbonisation as based on operations of the Portsmouth Gas Company, where a wide range of plant is at work. The cost of production of gas in vertical and horizontal retorts showed no great difference and is only half that of the cost of producing carburetted water gas. There is then no incentive to produce gaseous fuel from oil at the present time, so far as cost of production is concerned. Mr. G. M. Gill described types of modern chamber ovens and coke ovens and discussed their suitability as carbonisation units for gas-works purposes. Mr. T. Canning devoted a paper to the relations of a gas undertaking to its consumers. The pre-carbonisation of coal before combustion is to-day kept constantly in the public eye. The town's gas industry is carrying out such processes under strictly commercial conditions, and is the

only industry doing so on a national scale. Its results and experiences as indicated by these papers deserve close study by all advocates of coal carbonisation.

The progressiveness of the industry is indicated by the great space devoted to the various reports on research. The Gas Research Fellow's report of a study of the properties of coke prosecuted at the University of Leeds contains more observations on the remarkable influence of inorganic catalysts on the gasification of coke in steam, carbon dioxide, and oxygen. Sodium carbonate is again shown to have a far-reaching effect on these reactions. An interesting experimental technique is described for studying the reactivity of carbon with oxygen which, owing to the great evolution of heat, has been a very difficult matter. In the eighteenth Report of the Joint Research Committee with the University of Leeds, an account is given of studies of the carbonisation process as applied to 30-lb. charges. The rôle of sodium carbonate, which had been demonstrated on

the laboratory scale, has been confirmed on 30-lb. charges and a striking increase in the production of gas was shown, doubtless owing to the decomposition of water vapour present by the carbon, stimulated by the presence of the soda.

The seventeenth Report of the same Committee gives a continuation of the study of the products of combustion of gas fires. In order to do this, it was necessary to develop and revise the method of determining carbon monoxide to deal with the minute traces which here require measurement. It was considered possible to do this with a precision of 1 part in a million. It was also established that carbon monoxide is always present in a city atmosphere in quantities reaching 6 parts per million under normal conditions, and in foggy weather reaching 25 parts. In association with the British Refractories Research Association, the Institution of Gas Engineers supports a wide range of experimental work which was reported to the meeting.

### University and Educational Intelligence.

**BIRMINGHAM.**—The Charter has been revised so as to embody alterations and additions the desirability of which has been suggested by experience. The chief points are: (1) Alterations in the titles of officers of the University. The "Vice-Chancellor" becomes "Pro-Chancellor," and the "Pro-Vice-Chancellor" becomes "Deputy Pro-Chancellor." The "Principal" becomes "Vice-Chancellor and Principal" and the conferring of degrees will be one of his functions. (2) The appointment of the Vice-Chancellor and Principal is to be made by the Court of Governors, on the recommendation of the Council, who shall have consulted the Senate. The appointment was formerly made by the Crown. (3) The Guild of Graduates will elect a representative on the Council, and the non-professional staff will elect from its number one member of Council and six representatives on the Court of Governors. (4) Power has been granted to create a Faculty of Law. The revised Charter has been approved by the King in Council.

**OXFORD.**—The Board of the Faculty of Physical Sciences has appointed Mr. Graham Lambert, fellow of Merton College, to be Ordian demonstrator in chemistry for four years from the first day of Michaelmas term, 1927.

**St. ANDREWS.**—At the graduation ceremonial on June 28, the honorary degree of LL.D. was conferred (*in absentia*) upon Prof. John Rankine Brown, of Victoria College, Wellington, New Zealand. The degree of D.Sc. was conferred upon W. S. Duke Elder for a thesis on "The Nature of the Intraocular Fluids and the Pressure Equilibrium in the Eye," and on David Stiven for a thesis entitled "A Study of the Phosphatase-Phosphatase System of Muscle Extract."

The University of Maryland has conferred the honorary degree of Doctor of Science on Sir John Russell, Director of the Rothamsted Experimental Station.

The degree of Doctor of Science has been conferred by Columbia University, New York, on Frank B. Jewett, vice-president of the American Telephone and Telegraph Company, and president of Bell Telephone Laboratories, New York. In conferring the degree, President Butler referred to Dr. Jewett as "bringing to the art of telephony and its development the full weight and power of modern scientific knowledge; building on this foundation a notable organisation of

research workers and applied scientists, and thereby contributing in highest degree to the perfection of the art of communication between human beings and over increasing distances."

In a letter in the *Times Educational Supplement* for May 28, the Chairman of a special committee of the Science Masters' Association directs attention to the strange diversity in the attitude taken up by different universities with regard to the recognition of advanced courses in science in secondary schools. While exact uniformity may not be essential, there seems to be a danger that the progress of scientific education may be hampered in certain areas owing to the policy of the local university; Oxford and Cambridge show their appreciation of the advanced courses by granting certain exemptions to students who have passed the higher certificate, and their influence, fortunately, is not confined to any particular locality. The last year at school is often of supreme importance in the formation of the mind and character of a boy; if injudicious pressure is brought to bear upon him to leave school and enter on a career of narrow specialisation at too early an age, the boy himself may never attain to his full mental stature, the university will receive less competent students, the standard of science teaching for all boys in the school will be depressed and the status of science relative to other subjects will inevitably suffer.

THE increase in recent years in the demand for higher education and in its cost is shown in a recent publication by Mr. A. J. Klein, Chief of the Division of Higher Education, Bureau of Education of the United States ("Higher Education Biennial Survey, 1922-1924" (Bulletin, 1926, No. 20); Washington, D.C.: Government Printing Office). For example, in 1912 there were 255,673 students enrolled in the colleges and universities of the United States; in 1922 the number had become 550,906. The income of higher institutions in 1912, excluding additions for endowment, was 90 million dollars; by 1922 it had risen to 273 million. This increase is far greater than the increase in population or in the income of the country. The additional money has been largely used in increasing teachers' salaries. In small colleges salaries have risen from an average of about 1400 dollars to an average of 2000; in medium-sized institutions from 2500 dollars to 4000; in large institutions from 5000 dollars to 8000 or 10,000. The number of members of staff increased from 30,000 in 1912 to 50,000 in 1922. There has been much criticism of the products of higher education. There is a general demand that those who enjoy its benefits should contribute more largely to its cost. Everywhere there has been a tendency to increase tuition and institutional fees, but this has had little effect in reducing the number of students. Various measures have been adopted with the view of restricting admission to those who are most likely to benefit from a university training; e.g. Harvard has limited its entering class to 1000 and changed its entrance requirements; while the personal interview has also been used. The junior-senior high-school system is being modified with the view of providing completion courses for those who are not proceeding to college. "The burden upon the [university] institutions makes them friendly towards the idea of developing separate two-year junior colleges," which will (1) provide a liberal arts course leading to entrance to the 'junior year' in a university, *i.e.* skipping the freshman and sophomore years; (2) conduct two-year professional or pre-professional courses; (3) offer two-year completion courses for those who do not desire to secure a degree or enter a profession.