

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

THE third report¹ 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.²

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 Atkins³ 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

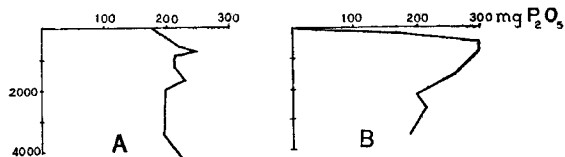


FIG. 1.—Vertical distribution of dissolved phosphate in the South Atlantic. Abscissae show milligrams P₂O₅ per cubic metre, ordinates depth in metres. A: ca. 50° S.; B: Tropics.

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.

¹ Die Deutsche Atlantische Expedition auf *Meteor*. Bericht 3. Zeitsch. der Gesells. für Erdkunde zu Berlin, 1927.
² Ann. der Hydrog., 54, 417-431; 1926.
³ 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 Lohmann⁴ 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.

⁴ 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