

RADIAL VELOCITIES AND DISTANCES OF THE STARS.—The very puzzling relationship between the linear velocities of the stars and their spectral type has given rise to much speculation. Eddington's suggestion that the relationship is fundamentally between *distance* and velocity received support from the results obtained by Kapteyn for the K-type stars. Dr. W. S. Adams has recently extended the analysis to stars of the other main types (Proc. Nat. Acad. Sci., vol. i., p. 417; also *Astrophysical Journal*, November), with similar results—stars of types F, G, K, and M, having large proper motions, have also high linear velocities. For stars of types B and A the velocity difference is not so marked, but the range of proper motion is also considerably less.

The low average velocity of the distant stars of types F to M—stars of high absolute luminosity—together with the exceptionally great average radial velocity of the observed absolutely faint stars, stars of probably small mass, is held to favour Halm's hypothesis of the equipartition of energy among the stars.

A NEW ASTRONOMICAL PUBLICATION.—Under the ægis of the French Committee of Astronomy there has recently been launched a new periodical, entitled *Journal des Observateurs*. The editorial duties have been assigned to M. Henry Bourget, director of the Marseilles Observatory. The journal is to be strictly and exclusively devoted to the publication of observational matter concerning—for the present—planets and comets. The first number contains series of observations of comet Mellish (1915a), from Lyons, Algiers, and Marseilles, together with observations of minor planets. Numbers are to be published as occasion demands, and the terms of subscription are 25 francs per volume of twenty parts. We wish the new venture every success.

LANCASHIRE SEA-FISHERY INVESTIGATIONS.

NOTWITHSTANDING the fact that investigations at sea practically ceased with the outbreak of war, the report of the Lancashire Sea-Fisheries Laboratory for 1914 shows that much useful work was still carried on under the more restricted conditions which the war imposed. As Prof. Herdman points out in his introductory chapter, the present seems an opportunity to concentrate attention upon the cultivation of the shallower seas, and any increase of employment on the seashore or in shallow waters may be of direct and immediate advantage, both to the fishermen and to the country. "Such industries as shellfish cultivation, shrimping and prawning, whitebait and sprat fishing, if extended and exploited judiciously, will add to employment, will increase the food supplies of the country, and may lead to the establishment of permanent industries of a profitable nature."

One of the most useful sections of the report is the memoir by Dr. James Johnstone on the bacteriology of shellfish, which records the results of experimental work on the methods of cleansing mussels from ingested sewage bacteria. The self-cleansing of sewage-polluted mussels by placing them for some days in pure sea-water had previously been demonstrated. The experiments now described deal (1) with the periodic bacteriological examination of mussels from a polluted source, which were laid down either on the shore or in floating tanks in localities where pure sea-water is found; and (2) with similar bacteriological examination of mussels from a polluted source which were kept in sea-water sterilised by the addition of five parts in a million of chlorine. In both cases the number of organisms in the mussels was so far reduced that the shellfish might be safely used as food.

In an appendix to the memoir, Dr. Johnstone gives a more minute and detailed examination of the scientific methods employed in his investigations and of the principles involved, which will be greatly valued by specialists in this line of work.

A second memoir by Dr. Johnstone deals with diseased and abnormal conditions of marine fishes, and forms a substantial addition to his previous work on this subject. The greater part of the memoir is devoted to the description of tumours found in fishes. Both benign and malignant tumours occur, the malignant being rare. All the malignant tumours the author has seen in fishes are sarcomata, due to an excessive growth of connective-tissue and almost always of the subintegumentary connective-tissues. Cases of hæmangioma in the eye of a stickleback and of papillary cystadenoma in a ling are also described.

A paper of high scientific value is that by Prof. B. Moore and Messrs. E. B. R. Pridaux and G. A. Herdman, entitled "Studies of Certain Photo-synthetic Phenomena in Sea-water." In this paper, seasonal variations in the reaction of sea-water in relation to the activities of vegetable and animal plankton are investigated and discussed. It is shown that the alkalinity of the water in the Irish Sea increases in the spring and summer months. This increase in alkalinity is not due to increasing temperature disturbing the equilibrium between the carbon dioxide of sea-water and atmosphere, for the rise in alkalinity clearly precedes in time the rise in temperature. It is caused, the authors state, by photo-synthesis, as is shown by its coincidence in its occurrence with the rapid lengthening of the day in March and the increasing sun's altitude, as also by the great changes in alkalinity which may be produced by exposure of sea-water containing algæ to sunlight.

Other subjects dealt with in the report are the plankton of the Irish Sea, the spawning period of the common shrimp, the whitebait fisheries of the Menai Strait, measurements of the Irish Sea race of herrings, and the variations in the amount of fat in these herrings at different seasons. The report as a whole shows that much valuable work is being carried out, and the Lancashire Sea-Fisheries Committee is to be congratulated upon it.

THE ACTION OF GASES ON IRON AND STEEL.

BY a curious coincidence, three out of the eight papers presented at the recent autumn meeting of the Iron and Steel Institute deal with the effects of a gas or its compounds when present in iron or steel. The gases dealt with are oxygen, by Mr. Wesley Austin; nitrogen, by Prof. N. Tschischewski, of Tomsk; and blast-furnace gases, by Mr. T. H. Byrom. The prominence thus given to the question of the action of gases reflects the increasing attention which this subject demands in practice. During most ordinary manufacturing processes our metals are exposed—often for prolonged periods—to the action of gases, and a knowledge of their action is thus of great importance. The subject is, however, beset with difficulties, since in many cases it is not at all easy to prepare alloys containing a given gaseous element in any desired proportion, while even the analytical determination of the nitrogen or oxygen contents of steel is by no means free from doubt and difficulty.

These difficulties are evident in the two papers named above, which deal with oxygen and nitrogen. Mr. Austin's specially prepared "oxygen alloys" contain relatively very large amounts of oxygen, and this makes it difficult to bridge the gap between his laboratory series and even the most highly oxygenated