

### Different Types of Ions in Hydrogen.

IN a previous letter (NATURE, June 16, 1923, p. 810), and more recently in the Proceedings of the Royal Society (105, p. 116, 1924), I described some experiments on the products of ionisation in hydrogen, nitrogen, and oxygen. It may be recalled that the method depended on the combination of an ordinary ionising potential arrangement with a simple positive ray analysis apparatus.

For hydrogen the principal conclusion drawn was that ionisation at 16.5 volts was not accompanied by dissociation. This conclusion rested on results at very low pressures where no atomic ions were detected below twenty volts and comparatively few even up to the highest voltages used. It was found, however, that at higher pressures the relative intensity of the atomic ions,  $H^+$ , became much greater, apparently due to a secondary dissociation of the molecular ions,  $H_2^+$ . No appreciable number of triatomic ions,  $H_3^+$ , had been observed at low pressures, and no search was made for them in the few experiments made at high pressures.

I have now set up an entirely new apparatus very nearly identical with that used in Cambridge and wish to report further results. The conclusion that the primary product of ionisation in the neighbourhood of 17 volts is  $H_2^+$  has been confirmed. However, as the pressure is increased, it is found that  $H^+$  does not necessarily become dominant. The effect due to  $H_2^+$  becomes smaller and both  $H^+$  and  $H_3^+$  increase in intensity, but their relative size depends on the arrangement of the electrical fields (to be specific, on the strength of the field designated  $V_2$  in previous communications). Thus, by varying conditions of pressure and electric field it is possible to produce almost any desired proportions of the three types of positive hydrogen ion.

The new evidence on a possible critical potential at about 20.8 volts corresponding to ionisation accompanied by dissociation is not conclusive, but makes its reality very doubtful.

The most interesting new result I have to report is, perhaps, the observation of peaks corresponding to apparent values of  $m/e = 1/2$  and  $1/3$ . These are not attributed to anything so unexpected as doubly and trebly charged hydrogen nuclei, but merely to ions which have fallen through the entire electric field as  $H_2^+$  or  $H_3^+$ , but which break up in the field-free space between the two slits before passing into the magnetic field. It is nevertheless remarkable that the atomic ions so formed should retain the direction and velocity of the original ions sufficiently to pass on through the magnetic field and produce a "peak." Obviously these results suggest a reinterpretation of the effects in nitrogen and oxygen previously attributed to doubly charged atoms. They also offer interesting possibilities for studying the mechanism of ionisation.

These points and others will be taken up in a full report of the work which I hope to write in a few months.

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### Transplantation of Heads of Insects.

It may be of some interest to biologists if I supplement Dr. W. T. Calman's letter under the title of "Chimæras Dire" (NATURE, July 5, p. 11) by a brief record of some experiments of my own. Not having any water-beetles available at the time, I tried to repeat Dr. Finkler's experiments on meal-worms. I cut off the heads of two pairs of specimens, and inter-

changed those of each pair. In a third case I had a single specimen which had recently moulted, and after removing its head put in its place that of another individual. The heads became attached to the alien bodies. I kept the specimens in Petri jars with a little meal. They made no spontaneous movements, but showed signs of life for a varying number of days, the maximum number being five. The signs of life in question were response to stimulation of the body with a blunt point. The head seemed to be dead long before the body. The only remarkable thing in the result of these experiments was the tenacity of life of the insect body after decapitation, and it may be doubted, especially after the results of Drs. Blunck and Speyer, whether anything more occurred in Dr. Finkler's experiments. J. T. CUNNINGHAM.

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### Velella at Port Erin.

WE have just found enormous numbers of the remarkable Siphonophore *Velella spirans* cast up by the tide in a neighbouring bay (Perwick). My daughter and a friend first noticed some specimens floating in a shore pool, and then we found abundance amongst the wet sea-weed at high tide mark, and picked up several hundreds in a few minutes. They were all dead, but many still showed the polypes and tentacles and the beautiful violet coloration.

This is not actually a new record for the Irish Sea, though a very rare event. A similar case was recorded, I think, in the first volume of the L.M.B.C. "Fauna of Liverpool Bay" many years ago, and probably indicates an exceptionally marked inflow of Atlantic water. Those who are now studying the variations in the movements of the currents and the plankton in British Seas may be interested to hear of this unusual occurrence. W. A. HERDMAN.

Port Erin, July 13.

### A Rare British Oligochaet.

IN Mr. Beddard's Monograph of the Oligochaeta, p. 216, reference is made to *Rhynchelmis timosella* Hoffm., in these words: "There is every probability that it is a native of this country." I reported the finding of a specimen some years ago at Ringwood, but there was an element of doubt. Now, however, I am in receipt of an excellent specimen sent me by Mr. W. J. Lucas, which puts the matter beyond all question. Mr. Beddard thinks there is a specimen in the Oxford Museum, but I have had no confirmation of this. HILDERIC FRIEND.

"Cathay," Solihull.

### Physical Properties of Clay.

THE late Dr. R. Mullineux Walmsley was interesting himself in my work on the above subject, and for this purpose I lent to him my own special set of my five papers on the subject which were read before the Society of Engineers in the five years 1919-1923 inclusive. Unfortunately, this set has not been found among Dr. Walmsley's papers either at the University of London, the Northampton Polytechnic, or at his private house, and, knowing how careful he was, this points to his having probably lent the papers to somebody in connexion with the matter with which he was dealing. As the sets of these five papers are now so scarce, and especially as the set in question was my own private set, if this letter meet the eye of the person to whom the set was lent, I shall be greatly obliged if he will be so good as to return it to me. A. S. E. ACKERMANN.

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