

spectrum without much change of intensity, and it is undoubtedly due, on all grounds, to a different atomic or molecular mechanism from that producing the bands. This superposed spectrum exhibits very pronounced "constant frequency difference" effects, and there is good reason to believe that sets of series spectra of the ordinary Rydberg type may be included in it and form the basis of the constant differences of wave-number. The series spectra of hydrogen would then be no longer confined to the Balmer series.

On the photographs the behaviour of the "band" lines is peculiar. The "head"—a word not used in the ordinary sense, but as denoting the strongest line of the band and the one most remote from the red end—is preserved in intensity in helium, or even enhanced, while all the other members disappear. A line in pure hydrogen may be weak, but if it is really a band-head in this sense, it is prominent in the presence of helium—the head is not always the strongest line in a band in pure hydrogen. This consideration is the real clue to the interpretation of the photographs, and it has been found possible to isolate the entire Fulcher band, which is of a remarkable structure and accounts for the great majority of lines between  $H_\alpha$  and  $H_\beta$ , in part of which region the previous measures have been very incomplete and misleading. Other strong bands of similar character occur in other regions, and it is already clear that the complete analysis involves only a few such individual bands showing no Zeeman effect, together with a line spectrum showing Zeeman effect, and apparently capable of arrangement in constant frequency differences.

These investigations will shortly be published, but in view of the importance this spectrum has now assumed in relation to atomic structure a preliminary statement of its nature appears to be desirable.

J. W. NICHOLSON.

University of London, King's College,  
March 21.

#### International Council for Fishery Investigations.

A PERUSAL of the programme of the International Council for Fishery Investigations, as outlined in NATURE of March 18, substantiates the criticisms published in 1902 and 1903, as well as later. In the interests of the fisheries and of the public in these critical times it is imperative to direct attention once more to the position. In the original programme of about twenty years ago the Council were to discover whether the yield of the sea-fisheries was increasing or diminishing, and especially to demonstrate the impoverishment of the sea (as if the myriads of ova on the fishmongers' slabs every year afforded no lesson); to show to what extent fishing-grounds could be depleted without danger; to point out what fishing apparatus was destructive; to investigate the small fish grounds; to make discoveries of practical importance to the fisheries; to publish annual results; and finally to produce data (even within two years) on which British and foreign legislation could be based.

Now, after sixteen to twenty years' labour and a great expenditure of public money (for salaries went on during the war), it is found that the impoverishment plea is dropped, along with most of the heads just mentioned as requiring solution. The new scheme, to take the heads in the order in which they appear (see NATURE, March 18, p. 84), includes an inquiry into the result of "the most gigantic scientific experiment ever made in respect to the closure of areas." It is unlikely that the fisheries of the North Sea will be to any extent altered by the partial closure caused through the operations of the

Grand Fleet. The ways of Nature are not so simple. Then comes the old phantom of the diminishing plaice and the protection of the race by a size-limit, an impracticable idea so far as the security of the younger plaice goes. The larval, post-larval, and smaller forms are in prodigious numbers, and are safe. Nor is confidence in the Council increased when the ten years' work of the Scottish Fishery Board's ship, *Garland*, in the closed areas is now regarded as ineffective, and the subject not sufficiently studied! In other words, the deliberate conclusions of the Scottish Board, so resolutely upheld, and on which the closure of the Moray Firth and other areas was based, are null and void. That is one way of escaping from an untenable position. The Council may well spare the "intensive study" of the plaice so far as the prosperity of the British fisheries is concerned, and so with further experiments on plaice-marking and drift-bottles, as well as on the food of the young. Nothing important on these heads can result from continued expenditure. The lemon-dab requires little attention, for, like other doomed fishes of the kind, it has re-asserted itself. There is no urgent need for studies on the herring, though this was supposed to be one of the diminishing fishes not long ago. Yet a word must be said in favour of the Danish exploration of the North Atlantic, where, and in the Mediterranean, Dr. Johs. Schmidt carried out such excellent work on the life-history of the eel.

The hydrographical and plankton work of the Council has hitherto borne little fruit in the matter of the fisheries, and it is unlikely that, after twenty years' probation, more will be accomplished.

The revival of the bathybius-myth in the form of the supposed "vitamines" in sea-water may give point to a sentence, thus: "The searcher for economic results in fisheries must have the basal theory and knowledge . . . as the foundation on which he has to build," but that is *vox et praeterea nihil* unless a practical acquaintance with the whole details of the life-history of the sea-fishes is possessed by him. Mere collation of statistics without such a check is of little avail in the complex problem of the sea-fisheries, which, however, now as heretofore, hold their own against the combined attacks of their own kind, as well as of man, seals, whales, birds, and invertebrates. Marine animals have been kept in pure sea water without food for years, yet the suggested application of the "vitamine" theory to the oyster and mussel does not offer much scope. The best *parcs* for fattening the oysters have much more than "vitamines," and even the *ejectamenta*, etc., of the mussels in the estuaries will by and by raise mounds several feet above sea-level.

Four French names are given as members of the Council, but they are less familiar than those of Fabre-Domergue, Canu, Cligny, Raveret-Wattel, and Pellegrin. Again, one British name is conspicuous by its absence, viz. that of Dr. A. T. Masterman, a highly trained and talented fisheries expert. It is to be hoped that no interference by officialdom, as dealt with in the leading article in NATURE of March 25, is connected with his retirement. Those who remember the case of Sir Joseph Hooker and Mr. Ayrton have reason to be jealous of the official status of experienced men of science in carrying out their researches for the benefit of the country.

Finally, there can be little doubt that Britain would be better and more economically served by competent workers in its marine laboratories, where, moreover, young zoologists could acquire a competent knowledge of the marine fisheries.

W. C. McINTOSH.