

since. The sixth conference took place under the same auspices of the NBS, IEEE and URSI from June 25–June 28, again at Boulder. Papers were contributed almost equally by firms and by academic organizations, but although contributions from academic centres came not only from the USA but also from Australia, Canada, France, Germany, Japan, Russia and Britain, industries outside North America contributed only one paper, which came from Japan.

Possibly of greatest interest to those from the United States was the inaugural speech by the Assistant Secretary of Commerce for Science and Technology, John F. Kincaid, who, after emphasizing the importance of measurement in industry, dealt with metrication. He announced that Congress was at that very moment putting the finishing touches to “Bills to authorize a study in depth of the pros and cons of our adoption of the metric system. The Department of Commerce is strongly in favour of this Bill. The metric system has been legal in the USA since 1866, but it has never been widely used in industry and commerce, even though there has been a steady shift of other countries into the metric camp. Recently, the situation seems to have become critical. On the one side is the persistent and alarming weakness in our balance of payments. On the other is the fact that with Great Britain’s shift to the metric system, 90 per cent of our Earth’s population is now committed to its use. This leaves us virtually isolated in our adherence to the inch and the pound.”

The technical programme at the conference covered d.c., low frequency and high frequency measurements, automation of measurements, modulation, time and frequency. Instructive papers on lasers were read by delegates from France, Japan, Russia and the USA. To mention only two among many good papers, the direct current comparator (MacMartin and Kusters, NRC, Canada) promises to revolutionize potentiometer methods, and investigation of the 3.39 μm methane line by two different methods (Shimoda, University of Tokyo, and Hall, JILA, Boulder) may well provide exceptional means for frequency stabilization of lasers leading to new standards of length and of frequency. The excellent arrangements we expect from the National Bureau of Standards afforded a flexibility which made it possible for the delegates to organize additional meetings. One such meeting was devoted to an informal discussion of proposals for time and frequency broadcasts designed to satisfy the needs of physics as well as those of navigation and other human activities which depend on the angular position of the Earth rather than on a uniform scale of time. Another dealt with the application of the Josephson effect to the determination of the atomic constant h/e .

Using the Sea

from a Correspondent

As part of an attempt to promote contacts between various disciplines, a joint meeting of the Challenger Society and representatives of various marine laboratories was held at the University of Strathclyde from July 3 to 5. There was some talk of the use of hydraulic models of estuaries (D. I. H. Barr), the movement of tides and water in the Clyde (A. Thomson) and the behaviour of spoil dumped in the same estuary (R. Gair). For the Thames estuary, R. Cloet pointed out

that the movements of sand banks and the patterns of sand waves are not obviously related to the direction of the currents.

A special lecture by K. A. Pyefinch dealt with the salmon fishery along the west coast of Greenland. Landings have increased more than five-fold since 1960 and exceeded 1,000 tonnes in 1967. Fish tagged in salmon rivers of the British Isles, Sweden, Canada and the United States have been recovered from the area. The inshore fishery off Greenland has had no detectable effect on the catches from European waters, but an offshore fishery which has developed recently might prove to be more troublesome.

At the conference, V. Bainbridge related variability in the zooplankton of the north-west North Sea to fluctuations of oceanic inflow and to the intensity of vertical mixing in the spring. The fortunes of the herring fisheries seem to be partly related to events in the plankton. The physiology of limpets was described by P. Spencer Davies, who suggested that differences in zonation of *Patella vulgata* and *P. aspera* are related to differences in metabolic rates.

In a session on microbiology, J. Bruce reviewed work on marine yeasts, many of which are of terrestrial origin. Miss M. McCallum said that faecal bacteria are rare in the Clyde except in the upper reaches and near the dumping ground in the outer Clyde. In seawater, enterococci die within nine days—much more quickly than in tap-water, where they may temporarily increase. The uptake of vitamin B₁₂ by *Monochrysis* was discussed by M. R. Droop, who suggested that rapid adsorption on to the surface is followed by slower diffusion into the cell. This may explain the apparent “luxury consumption” of nutrients observed in cultures of algae.

An important theme of the meeting was the farming of the sea lochs. The advanced techniques of marine cultivation in Japan were described by J. E. Shelborne and J. H. Allen. Fish, prawns and oysters, with high growth rates and retail values, are cultivated in impoundments including floating cages and bays closed by netting. A relatively large labour force is needed. The construction of an experimental fish farm at Ardtoe in Argyll was described by P. H. Milne. Sea water is circulated by sluices and weirs in the retaining wall; fresh water is diverted by a pipeline. D. R. Swift reviewed requirements for improving the technology and husbandry of fish farming in Britain. More information is required about fundamental ecology, such as predation by shore crabs, the subject of a paper by Miss J. M. Penfound. The meeting ended on an encouraging note with a report by J. Mason on mussel cultivation in Loch Sween. Growth rates almost equalled those achieved on the Galician coast of Spain, one of the most important centres of mussel cultivation.

The First Fishes

from our Vertebrate Palaeontology Correspondent

Two recent papers by R. H. Denison provide new information on the environment and evolution of the early fish. In the first paper (*Fieldiana: Geology*, 16, 131; 1967), Denison discusses the earliest known vertebrate remains, *Eriptychius* and *Astraspis*, which come from the western United States. These were first found in the extensive Middle Ordovician Harding Sandstone of