to the Australian situation, there is likely to be some evolutionary pressure in favour of a virulent virus. Fleas on rabbits infected with such a strain will naturally leave the rabbit when it dies and spread the highly lethal virus. Where, however, a rabbit survives, the *Spilopsyllus* may have no occasion to seek a fresh host. Even if the rabbit dies after a chronic illness, there may well be only a little virus on the flea's proboscis at that stage. On a short-term basis survival of the highly lethal virus could thus be favoured. Marshall and Fenner[5] have made suggestions on similar lines.

This, however, can scarcely be the end of the story. For, as Theobald Smith taught, a parasite which kills all its victims will soon perish for lack of fresh hosts to infect. There will thus be a counteracting long-term tendency to perpetuate a not too virulent virus. In practice there have been several instances where, at the beginning of a myxomatosis outbreak, highly lethal virus has been recovered, whereas in samples obtained later in the outbreak attenuated virus has predominated. Rabbits with attenuated virus may be ill for a long time and the virus may persist in attenuated form by exchange of infected fleas in burrows. The resultant of opposing evolutionary tendencies may well be a mixture of highly lethal and attenuated viruses existing side by side in the same locality. Such a result could be brought about if the favoured virus were one which, as regards virulence, was genetically unstable; but what will in fact be the outcome, only time and alertness of investigators can reveal.

Changes in resistance of rabbits. In Australia, a standard virus which originally killed 90 per cent of wild rabbits was only able, after the population had been exposed to seven successive epizootics, to kill 30 per cent of currently caught young ones[6]. This tremendous increase in resistance seems to be of more practical importance than any change in the virus; and infection with myxomatosis has now become a minor factor in controlling Australian rabbits despite the fact that there is usually an epizootic each summer. The British results summarized above do not suggest that any such change has occurred among our rabbits. One wonders, indeed, whether this would be expected in a population of hosts with an average life-span of about a year and with outbreaks of disease at irregular intervals which may, as around Edenbridge, be as long as four years.

Discussion. The main object of this article is to try to dispel the idea that myxomatosis here is bound to behave just as it does in Australia. There is already good evidence that it is not doing so, and possible explanations of this have been brought forward. We do not know how the virus persists between outbreaks and how it manages to re-appear after an apparent absence when rabbit numbers have materially increased. It could conceivably persist in a modified form in an immune population or in some biting arthropod; but evidence is lacking that either method is actually possible over a period of years. It could also be introduced on rabbit fleas temporarily carried on migrating birds, or on wind-dispersed, infected *Anopheles maculipennis* (= *A. atroparvus*) since these mosquitoes are known to be vectors in southern England, though of minor importance compared with fleas. Their role is believed to be rather greater in France, and if this is in fact so, myxomatosis there may have a different future from that in England. There remains the possibility of deliberate introduction by man, even though the Pests Act of 1954 made it an offence to use a rabbit infected with myxomatosis to spread disease among uninfected rabbits. Few would deny that the indiscriminate spreading of the disease is undesirable, particularly in the absence of much more knowledge about the infection and the long-term consequences of its introduction. In any event we must admit that we do not know which, if any, of the agencies discussed are adequate to account for the persistence of the disease and its re-appearance at times after a considerable absence.

The increase in rabbit damage to crops in 1959 serves as a reminder that, despite myxomatosis, the rabbit population of Britain is again rising. Much useful control has been possible by the concerted action of landholders through Rabbit Clearance Societies; there are now 370 of these, covering seven million acres of land or about 15 per cent of the agricultural area of Britain: it would be most unwise to relax such efforts. Above all, it is of tremendous importance for the future of farming in Britain that we should learn more of the natural history of myxomatosis and the factors making for changes in the virus and in the rabbits. Myxomatosis provides an unusual opportunity to study and compare the evolution of a host–parasite relationship in the contrasting environments of countries at opposite ends of the Earth.

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INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

SPECIAL INTERNATIONAL GEOPHYSICAL YEAR MEETING

As part of the oceanographic programme for the International Geophysical Year the onus of carrying out a Polar Front Survey in the North Atlantic Ocean was placed by the Comité Spécial de l'Année Géophysique Internationale (the body established by the International Council of Scientific Unions for the planning of International Geophysical Year operations) on the International Council for the Exploration of the Sea with the help of the International Commission for the Northwest Atlantic Fisheries. A sub-committee of the International Council for the Exploration of the Sea under the chairmanship of Dr. G. Böhnecke (Federal Republic of Germany) co-ordinated the research plans of the different countries, and forty-six research and other ships of eleven nations took part in the survey. At

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a meeting held under the chairmanship of Dr. J. B. Tait (Britain) at the Council's headquarters in Copenhagen during October 1–3, 1959, 45 papers were presented dealing with the first results of the survey.

About sixty attended the meeting, and Mr. A. J. Lee and Dr. D. H. Cushing (Britain) acted as reporters.

Hydrography

The hydrographical papers were given in groups, according to geographical regions.

Barents Sea. The paper by Prof. I. Hela (Finland) described Finnish work at the beginning of the International Geophysical Year. Various sections were worked and can be compared with those of the German research ship *Poseidon* in 1927. The temperature and salinity of the Atlantic water penetrating the Barents Sea were higher in 1957 than in 1927. An increase in salinity of 0·04 per mille on the standard values of all the basic water masses was observed; surface temperatures and salinities were higher than the average values given in the atlas by Dr. Krauss. Mr. A. J. Lee showed that the volume transport of the West Spitsbergen Current was below normal taking the International Geophysical Year as a whole, and that temperatures in the south-eastern Barents Sea were subnormal. He related this state to the abnormally strong development of the Polar high-pressure system and the southward displacement of the atmospheric Arctic Front. Norwegian work in the area during various seasons was described in a paper by Mr. L. Midttun (Norway) which was read by title.

In the first of two papers on the chemistry of Barents Sea water, Dr. S. Gripenberg (Finland) found that the alkalinity/chlorinity ratio was higher in the Norwegian coastal water than in the Atlantic water or the East Spitsbergen Current, but that the reverse applied when the boron/chlorinity ratio was considered: this implies that most of the boric acid is bound up in organic complexes. In the second paper, Dr. A. Voipio (Finland) showed that different methods of analysis gave different results for the total iodine content of sea water and demonstrated how little we know about the iodine content of sea water.

Greenland and Norwegian Seas. Drs. T. I. Gorshkova and E. V. Solyankin (U.S.S.R.) showed that the deposits on the sea-bed, by differing in their chemical composition, particularly in their content of carbonates and of iron and manganese oxides, are indicators of the hydrographic conditions prevailing in the basins of these two seas. Dr. J. N. Carruthers (Britain) pointed out the pioneer use by Otto Pettersson of this technique. In a paper read by title, Dr. G. N. Zaitsev *et al.* (U.S.S.R.) have computed the water and heat budget of these seas. When the various components are summed, the difference between the heat input and output amounts to only 0·4 per cent. The authors then proceed to show the relative importance of these different components in different parts of the seas: advection of heat by currents is found to be the most important. Finally, they have computed the nutrient salt budget. Dr. A. P. Alekseev *et al.* (U.S.S.R.) described Russian hydrographic work in the southern part of the Norwegian Sea in 1958. In April the East Iceland Arctic Current was strong, blocking the inflow of Atlantic water to below average: in October the inflow was intensified. The waters near the bottom in this area were found to have a salinity of 34·87–34·88 per mille and the authors assumed that they are related to the East Iceland Arctic Current and flow from west to east. It was pointed out by Mr. O. Sælen (Norway) that these salinity values are lower than the standard values for Norwegian Sea bottom water. Dr. J. B. Tait (Britain) pointed out that the water might have been Arctic Intermediate Water. In reply to a question, Prof. J. V. Preobragenski (U.S.S.R.) said that the salinities had been determined by the Knudsen titration method. At this stage Prof. G. Dietrich (Federal Republic of Germany) stressed that the results collected during the Polar Front Survey should be sent to the International Council for the Exploration of the Sea as well as World Data Centres *A* and *B*. Mr. Sælen described Norwegian work in the same area in 1958, in March and October: an intensification of the inflow of Atlantic water in the latter month was noted, as had been reported by the Russian workers. A special feature observed was the ascent of cold water along the continental slope off Norway. Finally, Dr. J. Eggvin (Norway) presented a series of temperature, salinity and current charts for the Norwegian and Greenland Seas, and showed how the Norwegian Sea bottom water is formed in the region north of the Jan Mayen Ridge in some years and not in others, depending on the meteorological conditions, and how this bottom water flows southwards from the Greenland Sea along the foot of the Norwegian continental slope towards the Faroe–Iceland Ridge. It was further shown that the temperature of the bottom water of the Greenland Sea increased in temperature northwards from the main area where it is formed. This temperature increase is a result of mixing with Atlantic water. The positive difference between the temperature of the bottom water of the Arctic Ocean and that of the Greenland Sea can therefore be explained without, as previously, assuming a submarine ridge (1,200–1,500 m.) between Spitsbergen and the north-eastern part of Greenland. This is of interest in view of the recent work of Dr. L. Balakshin (U.S.S.R.), who by investigations on board ice-breakers has shown that the sill depth between the Greenland Sea and the Arctic Ocean exceeds 3,000 m. In discussion of this paper it was pointed out that the sinking of water to form the bottom water might set up a system of compensatory surface currents which would be of importance to the Barents Sea fisheries.

Shetland–Faroe–Iceland Region. Dr. J. B. Tait and Mr. J. H. A. Martin (Britain) had computed the volume transport through the Faroe–Shetland Channel over the period of the International Geophysical Year and found it to be high at the beginning and end but low at other times. Gulf of Gibraltar water seems to have been present in the oceanic water-mass in June 1957 and June 1958. In June 1957 the inflow was cut into two parts by Arctic Intermediate Water which was moving southwards, and in June 1958 it was similarly divided by a southerly flow of Norwegian Sea water. Overspill of cold Norwegian Sea water was noted along the Faroe–Iceland Ridge in June 1957 and March 1958 but not at other times.

On the basis of surveys made along the Faroe–Iceland Ridge during 1957–58, Dr. J. H. Steele (Britain) had come to the conclusion that overflow of very cold (0–2° C.) water is rare and unimportant, but that there is continuous overflow of a slightly warmer

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(2–4° C.) water which is the product of mixing of water masses of Atlantic and Arctic types on the top of the ridge. This overflow has a geostrophic motion north-westwards along the southern side of the ridge, and it then turns southwards along the eastern side of the Reykjanes Ridge. The total flow over the ridge is calculated as being near the mean value of the Faroe–Shetland inflow. A discussion of this paper by Prof. Dietrich showed that, on about 50 per cent of the surveys of the ridge, overflow of cold (0–2° C.) water has been found. The relative importance of overflow directly across the ridge and outflow through the channel between Faroe and Faroe Bank was debated by Dr. Tait, Mr. F. Hermann (Denmark) and Dr. Carruthers.

North Atlantic Ocean. Prof. Dietrich described various stages in the evolution of the International Geophysical Year and considered the next stage: the exploitation of the observations. He suggested the preparation of an atlas of maps and sections of the North Atlantic. Using German observations, he demonstrated the existence of six water masses on the Cape Farewell–Flemish Cap section. In particular, he examined the origin of the North Atlantic deep water in the Labrador Basin and the overflow of cold water across the Iceland–Greenland Ridge, and showed how the latter could be tracked over a great distance clinging to the lower part of the continental slope and not flowing along the very bottom of the basin. He also showed how the winter surface isotherms are a guide to the circulation of the North Atlantic in that season.

A paper was given by Dr. W. Krauss (Federal Republic of Germany) showing that internal waves can be set up in the deep layers of the ocean as well as in the upper layers by the action of the wind.

From dissolved oxygen/potential temperature diagrams, Dr. L. H. N. Cooper (Britain) concluded that the water column in the Bay of Biscay consists of a layered series of resident water masses resembling a pile of plates stacked one on the other. He regarded these plates as being the result of the overspill of boluses of cold water across the Faroe–Iceland Ridge. He also demonstrated a secular change in dissolved oxygen content since 1922. It was pointed out by Prof. Dietrich that the stepwise structure described could also be explained by Dr. Cooper's earlier turbidity current theory, and that this structure had not been as yet found in other areas where very detailed hydrographic observations had been made (for example, south-west of Iceland). The dating of the climatic fluctuation which had brought about the secular change in dissolved oxygen content was discussed by Mr. Lee and Dr. Cooper.

French observations in the North Atlantic and Davis Strait were described by M. G. Peluchon (France). Charts of the currents in the region of 50° N. showed the meandering of the current as it leaves the Grand Banks area and a decrease in the meanders as the current proceeds eastwards.

Dr. J. Joseph (Federal Republic of Germany) described his work with a transparency meter combined with a thermocouple. The turbidity distribution depends on local production on one hand and advective processes and turbulence on the other. Connexions between the turbidity sections and the temperature sections could be seen. He also showed that there is no change in turbidity at the deep scattering layer. In discussion a strong case was made for fish as being the cause of this layer.

Dr. H. Weidemann (Federal Republic of Germany) described work with towed electrodes (*GEK*) between Greenland and Iceland. At a fixed station south of Iceland the records collected over a period of 30 hr. allowed the relation between wind and surface current to be investigated. The results gave a mean deflexion of current to the right of the wind of 27° and a current/wind ratio of 1·4–1·5 per cent. The difference between these values and Ekman's theoretical values can be explained by assuming that conditions were non-stationary.

Mr. F. Hermann described Danish observations in the North Atlantic in July–August 1958. West of the Reykjanes Ridge the basin was largely filled with sub-arctic mixed water, as already described by Prof. Dietrich. Cold water coming over the Iceland–Greenland Ridge was again found on the bottom in the western part of the Irminger Sea. East of the Reykjanes Ridge a bottom layer with a temperature below 3° C. was found, consisting of mixed water derived partly from overflow across the Faroe–Iceland Ridge, partly from Atlantic water and partly from sub-arctic water. This water circulated anti-clockwise around the basin and crossed the Reykjanes Ridge to flow north on its westward side and mix with the overflow across the Iceland–Greenland Ridge. In the Davis Strait water which had overflowed the Greenland–Baffin Island Ridge but which does not contribute to the North Atlantic circulation as a whole was detected.

Dr. R. A. Cox (Britain) gave an account of the work of R.R.S. *Discovery II*. A section showing the distribution of silicate along lat. 24° N. had three outstanding features: the depletion of silicate but not of phosphate at the surface in the Sargasso Sea; the high silicate content of the bottom water of Antarctic origin west of the mid-Atlantic Ridge; and the very irregular bottom topography. Work with Swallow's neutrally buoyant floats west of Portugal showed how even in the deep ocean there are great variations in current speed and direction. The outflow of Mediterranean water from the Straits of Gibraltar had also been tracked by these floats, and it was shown that a westward movement of 12 nautical miles/day could exist close to the Spanish coast, but that farther south there were large eddies. Dr. Cooper pointed out that the silicate distribution along lat. 24° N. showed that Antarctic bottom water must make a contribution to the bottom waters east of the mid-Atlantic Ridge, and Prof. T. Braarud (Norway) did not think that the silicate deficiency prevented phytoplankton production in the Sargasso Sea. The phosphate budget of the Mediterranean Sea was discussed by several speakers. Mr. Sælen then described Norwegian work carried out in collaboration with R.R.S. *Discovery II* west of Portugal. Current measurements from an anchored ship allowed the tidal streams to be analysed; they were present to the bottom (760 m.) and showed no decrease in velocity with depth, but there were indications of some differences in the direction of rotation. The residual current, however, decreased with depth.

Prof. N. Menendez (Spain) gave an account of temperature and salinity conditions along the meridian of Tarifa in August 1958. Sections were worked at different states of the tide and the distributions found could only be explained in terms of changing mixing conditions depending on the strength of the tidal streams.

Mr. L. V. Worthington and Mr. W. G. Metcalf (U.S.A.) examined the salinity/potential temperature

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relationship in the North Atlantic deep water using the very precise salinity data that have now become available with the development of conductimetric techniques. A salinity/potential temperature curve for the western North Atlantic below the 4° C. potential isotherm has been established and its shape accounted for in terms of water masses. Departures from this curve in different parts of the Atlantic can be used as indicators of water movement. The outstanding features shown by this form of analysis were the formation of the newest Atlantic deep water in the Labrador Basin; the part played by the South-East Newfoundland Ridge in preventing the Antarctic bottom water from reaching the Labrador Basin; the water of the Norwegian Sea origin on the eastern slope of the mid-Atlantic Ridge; the outflow and spreading of Mediterranean water; and the fact that the western basin of the South Atlantic is the source of the deep cold water found in the rest of the Atlantic, communication to the eastern basin being through the Romanche Trench.

A paper by Mr. J. R. Lumby (U.S.A.) read by Dr. Tait showed that there were large differences in the dissolved oxygen values at comparable stations worked by American, British and Russian ships during the International Geophysical Year. Mr. Worthington said that such differences could depend to some extent on the type of water-bottle used, and on the method of standardization of the sodium thiosulphate solution used for titrating the samples.

Baltic and North Seas. In a paper on the southern Baltic Sea, Dr. A. Majewski (Poland) showed that the inflow of oceanic water had decreased since 1951–52 and that, at the end of 1958, the salinity in the Baltic basins had reached its lowest level since 1952. The year 1958 had been a cold one so far as the Baltic was concerned. Similarly, in a paper on the North Sea by Dr. J. Filarski (Poland), read by title, the winter and spring of 1958 were shown to have been cold, but by the autumn of 1958 there were positive anomalies of temperature. Dr. V. V. Betin and Prof. J. V. Preobragenski (U.S.S.R.) submitted a paper which was read by title on ice research in the Baltic during the International Geophysical Year. Aircraft were used to make synoptic surveys of ice conditions. The curves of accumulated temperature, ice extension and ice accretion so produced were found to be related.

Biology

Prof. E. Steemann Nielsen (Denmark) presided over the biological session.

Productivity. Three papers were presented. The first was by Mr. Grim Berge (Norway) on the productivity of the Norwegian Sea using, besides carbon-14 measurements, an estimate of productive capacity, derived from measurements of transparency. A continuously recording transparency meter was described. It was shown that in 1958 the quantity of production as measured by 'productive capacity' was different from that in 1954. In reply to a question as to whether there was a correlation between productive capacity and standing stock, Mr. Berge replied that there was, but that the relationship was different in different water masses. Prof. Braarud commented on the marked changes noticed from year to year and their apparent relation to hydrographic processes.

Mr. Vagn Hansen and Prof. E. Steemann Nielsen described carbon-14 measurements and chlorophyll measurements in the North Atlantic and in the Greenland Sea. Mr. Hansen showed that from Cape Farewell to Ireland greater counts of carbon-14 were obtained towards Greenland and above the Reykjanes Ridge. This was associated with greater quantities of chlorophyll. Prof. Steemann Nielsen demonstrated the relationship between carbon-14 counts and quantities of chlorophyll *a*, which was biased by the possible presence of dead chlorophyll. Mr. G. Murphy (U.S.A.) asked whether transparency might not be a better method of measuring productivity if the constants in the equation were known. Prof. Steemann Nielsen replied that this would be a good method in oceanic waters, but in coastal waters the quantity of inorganic material was high. Dr. M. Gillbricht (Federal Republic of Germany) pointed out that only one-third of the turbidity in the Irminger Sea was due to plankton. Mr. Berge said that the quantity of inorganic particles ordinarily was constant and so the variations due to production differences could be estimated.

Biophysics and Biochemistry. Dr. H. Schaefer (Federal Republic of Germany) described the distribution of amino-acids in redfish (*Sebastes*) and certain other fish for a number of stations at sea. It was shown that the variation in relative composition of certain amino-acids was much greater than that which might have been expected from studies in freshwater fish. Mr. Murphy noted that a similar result had appeared in the work on the Californian sardine.

Plankton. Dr. K. F. Wiborg (Norway) described the distribution of zooplankton in the Norwegian Sea. He noticed that the distribution of reverberation on the echo-sounders at full gain corresponded fairly well with the distribution of euphausiids and fish fry. The distribution of copepodite stages bore some relation to hydrographical conditions. In response to a question, Dr. Wiborg said that smaller fish have smaller eggs and spawn later.

Drs. E. A. Pawstiks and L. N. Grutzov (U.S.S.R.) presented a paper on the distribution of plankton in the Norwegian Sea. This distribution corresponded reasonably well with that presented by Dr. Wiborg.

Dr. J. H. Fraser (Britain) described indicator species in the Faroe–Iceland Ridge region and from the presence or absence of certain long-lived animals concluded that the International Geophysical Year was not a normal year. Mr. Lee pointed out that during the first eight months of 1958 the Polar Front lay well to the south, presumably holding back the northward flow of Atlantic water.

Dr. Gillbricht gave a detailed account of the distribution of phytoplankton, zooplankton and organic particles on a section between Newfoundland and the Azores. Counts were made from small water samples of 0·3 ml. for phytoplankton and of 5 ml. for zooplankton. By converting all quantities to total carbon and comparing these with phytoplankton, he was able to distinguish three water masses. Prof. Steemann Nielsen asked whether the organic particles were artefacts, because if the same technique is used in Danish waters many organic particles were derived from the destruction of phytoplankton. Dr. H. Einarsson (Iceland) noticed that the quantity of zooplankton collected with Hardy indicators in the Irminger Sea was roughly similar to that

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collected with a 5-ml. water sample in the same area.

Mr. J. Corlett (Britain) described the zooplankton collected at weather stations *I* and *J* and showed that the total quantities were greater in 1958 than in 1957. Mr. Hansen noticed that *Evadne nordmanni* had also been found in the Norwegian Sea. Dr. Fraser said that *Thalia democratica* found by the Plankton Expedition in 1888 off west Scottish coasts appeared for the first time off west Scottish coasts in 1958.

Dr. W. Höhnck (Federal Republic of Germany) presented an interesting paper on the quantity and types of fungi in the sea and on the sea bed. The majority of samples taken showed development of hyphæ.

Fisheries. Dr. Eggvin presented a paper by Mr. L. Midttun on echo-surveys in the Barents Sea. In general, there was a relationship between the distribution of echo-traces and isotherms in the Barents Sea.

Conclusions. There appeared to be two main conclusions from the biological papers:

(1) The International Geophysical Year differed in two respects from some other years, in indicator species and in quantity of living material.

(2) Three advances in productivity studies were revealed: (*a*) the use of transparency as an index of productivity under certain limited conditions; (*b*) the fairly close relationship between standing stock (as chlorophyll) and productivity (as carbon-14 count); (*c*) the use of very small samples of phytoplankton (0·3 ml.) and zooplankton (5 ml.) to give sensible estimates of carbon in living material.

A. J. LEE
D. H. CUSHING

EFFECTS OF FOREST AREAS ON WATER RESOURCES, AND THE TECHNIQUE OF LYSIMETRY

BETWEEN September 8 and 13, two symposia were held in Germany by the International Association of Scientific Hydrology, at Hannoversch-Münden, where the Forestry School of the University of Göttingen is established.

One symposium concerned the influence of wooded areas on the elements of the water balance. Thirty-five papers were presented, ten from the U.S.S.R., eight from the United States, four from Great Britain, two each from Finland and Poland and one each from the Belgian Congo, Czechoslovakia, Denmark, French Africa, Germany, Holland, Hungary, South Africa and Switzerland.

The other symposium dealt with the technique of lysimetry and the causes of error in results obtained. There were seventeen papers, four from the United States, three from Holland, two each from the Belgian Congo, Germany and the U.S.S.R., and one each from Austria, France, Hungary and Great Britain.

The papers were made available in printed form at the meeting and have since been placed on sale by the Association*. Most of them are written in English, and the few others in French or German.

The symposia were attended by more than a hundred hydrologists, from other countries as well as from those which contributed papers. There was naturally a strong German representation, while both the United States and Great Britain had important teams. It was regretted that, while the U.S.S.R. had sent several valuable papers, their authors were not present to introduce them.

Below is given an appreciation of each of the two symposia and of a two-day visit paid afterwards to German field-stations concerned with one or other of the two subjects that had been discussed.

It is expected that the discussions of the papers will be reported briefly in the quarterly issues of the Association's *Bulletin*, the price of which is 150 Belgian francs yearly.

* Publication No. 48 (Vol. 1: Water and Woodlands). Pp. 340. 300 Belgian francs. Publication No. 49 (Vol. 2: Lysimeters). Pp. 169. 150 Belgian francs. Obtainable from Mr. Arthur F. Bird, 66 Chandos Place, London, W.C.2, or the Secretary of the International Association of Scientific Hydrology, Prof. L. J. Tison, 61 Rue des Ronces, Gentbrugge, Belgium.

Water and Woodlands

In many countries, increasing concern with the provision and maintenance of adequate water supplies in the face of continuously increasing demands has stimulated considerable interest in the scientific management of this most vital of our natural resources. With fuller appreciation of the importance of form of land use in catchment areas, much attention has naturally been directed to the role of a forest cover. Compared with other countries such as the United States and Germany, Britain is a rather late entrant into this field, but within recent years, the problem has come very much to the fore and there can be no doubt, especially in view of the recent drought, that we shall have to devote very much more attention to this important issue. As elsewhere, differences of opinion exist as to whether, from the hydrological point of view, our catchments are better under forest than, say, under pasture. The answer is by no means as clear-cut as some would make out; the hydrological relationships involved are most complicated and objective quantitative assessments beset with considerable practical difficulties. It was therefore most timely that under the auspices of the International Association of Scientific Hydrology much of the experience and present knowledge in this field could be surveyed and discussed.

Almost half the contributions were concerned with investigations on the catchment scale. In principle, these involve the measurement of precipitation and run-off (both surface and subsoil), normally by stream gauging; despite the substantial cost of installation and maintenance, and, very often, difficulties in ensuring absence of leaks and a reasonable standard of precision, this approach is still essential for the provision of the basic hydrological data appropriate to the problem as a whole. As an alternative to the 'straightforward' comparison, say, between forested and non-forested catchments, Idson (U.S.S.R.) preferred continuous measurements on an area under the influence of a varying forest cover. Because of the well-known difficulties in ensuring comparability between catchments, this

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