

1945. One advantage of the analysis is that it allows the immediate detection of the low long swell which travels fastest and is the first to arrive from a distant storm area. This is probably never possible by visual observation of the waves or records, because the long swell is obscured by short waves. An example showed the detection of swell, which when it first arrived was only a few inches high, with a period of 24 sec., from a depression 500 miles south-east of Newfoundland. It is hoped to make frequency analyses of waves in mid-Atlantic, for comparison with the subsequent analysis of the resulting swell in Cornwall, before the summer.

Most of the recent work described was done by the Oceanographical Group at the Admiralty Research Laboratory, Teddington. The paper will be published as the first number of a new series, the "Occasional Papers of the Challenger Society".

The Committee of the Challenger Society wishes to direct attention to its publication "The Science of the Sea", described in its sub-title as the Society's "Elementary Handbook of Practical Oceanography for Travellers, Sailors and Yachtsmen" (Clarendon Press, Oxford). This standard work was revised and published under the editorship of the late Dr. E. J. Allen of Plymouth in 1928, and a recent marked increase of sales of the book in the United States is thought to reflect a growing American interest in oceanography, particularly in the Pacific. Since the opportunity of producing a new edition is not likely to offer itself for some time to come and the study of the sea is of prime importance to countries of the British Commonwealth, the attention of British oceanographers, professional and amateur, is directed to this work before the stock is exhausted. The sub-title quoted above may suggest that the work is intended more particularly for amateurs, but it is of equal value to professional marine biologists. It includes chapters on the air, the water, and the sea floor, which give the physical background to other sections on plant and animal life in the varied habitats afforded by the sea. The methods of collecting, the equipment necessary, and the means of preserving and recording catches are also described.

GENETICS AND TAXONOMY IN INDIA

DURING the last fifteen years geneticists have been displaying an increasing interest in the problems of wild populations—with, in fact, the problems of the systematist, the ecologist and the student of evolution. The results of this activity, which are familiar from many publications, bear ample testimony to the power of genetical methods and ideas in this joint field. In taking "Genetics, Taxonomy and Ecology" as the subject of his presidential address, delivered in February 1944 to the Indian Society of Genetics and Plant Breeding (*Indian J. Genetics*, 4, 2; 1944), Dr. W. Burns has therefore been concerned less to justify such work than to consider the opportunities afforded for it by the plants of India.

Dr. Burns addresses himself especially to plant breeders, whose training in the perception of fine differences and in the genetical manipulation of cultivated plants should also enable them to add much to our knowledge of wild ones. While recognizing the value of adequate herbaria in aiding identification, and

incidentally regretting the paucity of such facilities in India, Burns emphasizes the essential need for observing the wild plant in its natural habitat supplemented by the experimental garden. Turning to the material which India offers, he cites many examples of natural variation which might well repay further study. A number of these are cases of polymorphism, a phenomenon studied less in plants than in animals so far; but attention is also directed to cases of foreign weeds introduced into India. The centres, directions and rates of spread of these weeds are unknown, as are the natures of the changes in their genotypes which have occurred in response to and which have fitted them for, their new living conditions. Nor are the agencies determining the limits and changes in distribution of any of the native plants known with much certainty, though these can sometimes be related to geological boundaries. A combination of botanical surveying with systematic, genetical and cytological work, paying special attention to clines and to the behaviour of plants at the margins of their distribution, is needed for the better understanding of all these questions.

With the growth of active interest in such problems it is well to have the attention of Indian botanists and geneticists directed to the scope afforded by the flora of their own land. The opportunities offered to them are second to none, and, if these opportunities are taken, we may be confident that the outcome will be confined in value neither to India nor to wild plants.

K. MATHER.

RADIO AIDS TO NAVIGATION

THE meeting of the Institution of Electrical Engineers held in London on January 26 marked a historic occasion in so far as part of the proceedings took the form of a joint meeting with the Institute of Radio Engineers in New York, the two audiences being connected by a trans-Atlantic radiotelephone link. The American Institute was holding its first post-war winter technical meeting, at which several papers dealing with such subjects as broadcasting, navigational aids, radar, industrial electronics and radio wave propagation were being presented. The particular paper selected for the joint meeting of the two bodies was entitled "An Introduction to Hyperbolic Navigation", and was read in New York by Mr. J. A. Pierce, who has played a large part in the successful development in the United States of the radio navigational system known as *Loran* (LONg RANge Navigation) [see p. 152 of this issue].

The author defined hyperbolic navigation as the use of synchronized signals, having a known velocity of propagation, transmitted from at least three fixed points, and the measurement of the relative times of arrival at a receiving point, the position of which it is required to determine. If a navigator receives simultaneously signals from two such fixed and synchronized stations, he knows that his position is somewhere along the perpendicular bisector of the line joining the transmitting stations. If one signal arrives before the other, a measurement of the time-difference identifies some other line of position on which the navigator must be. These lines of position are approximately spherical hyperbolæ.

This hyperbolic principle is at present used in at least four existing systems. Two of these use pulse-modulated signals: the *Loran* system referred to

above, and the *Gee* system developed and applied so successfully in Britain for aerial navigation over Europe and the precision bombing of enemy targets. Of the other two systems, both developed in Britain, one uses continuous wave technique and is known as the Decca Navigator system (see *Nature*, Nov. 3, 1945, p. 542); while the other, operating on somewhat similar principles, uses modulated continuous waves and has been developed by engineers of the British Post Office.

Reverting to Mr. Pierce's paper, the standard *Loran* system was developed primarily for over-water navigation, and thus operates on medium frequencies between 1,700 and 2,000 kc./s. The modulating pulses are some 50 micro-seconds in duration, and the signals from several stations may be interspersed in the same radio-frequency channel. The time-difference between signals arriving at a receiver can be measured to an accuracy of 1 micro-second or less, corresponding to a distance of 300 metres. With transmitters radiating about 100 kW., a reliable ground-wave range over sea-water of about 700 nautical miles is achieved; at this and greater distances, however, the accuracy of observation deteriorates due to the reception of both ground and ionospheric waves. In these circumstances the total error has an average value of about 8 μ -sec. for a single reading; the corresponding minimum average error of position-fix is rather less than one nautical mile. Later developments include the use of lower radio frequencies to extend the ground-wave range, and the improvement of accuracy by comparing the phases of the radio-frequency oscillations within the pulse-modulation envelopes.

After the presentation of the paper by Mr. Pierce, the presidents of the two institutions exchanged cordial greetings, and expressed the wish that this might be the forerunner of a series of such meetings. The chairman of the Radio Section of the London Institution then commented on some technical points in the paper presented, and the author replied to these from New York. The radio link between the two meetings was then disconnected, and the London meeting proceeded with a more detailed technical discussion of Mr. Pierce's paper.

JOHANN PHARAMUND RHUMELIUS

By DR. M. NIERENSTEIN

SOME years ago I spent several days at Everglades in Florida botanizing in the Cypress Swamps, visiting some of the Thousand Islands, the two Seminole Indian Reserves and the ruins of Sam Jones' Old Town. While at Everglades, I bought a copy of the "Opuscula Chémico-Magico-Médica" (Noremburgæ, 1635) by Rhumelius, described by Ferguson¹. From Everglades, I went to Moore Haven on Lake Okeechobee and from there to Okeechobee itself, a small town where I made the acquaintance of a farmer who told me that he had an old medical book, bought several years ago at Baton Rouge in Louisiana. It proved, on examination, to be the same book by Rhumelius, and I therefore asked my American friend for the address of the bookseller at Baton Rouge.

On my arrival at Baton Rouge I was offered a

copy of the "Medicina Spagyrica" (Noremburgæ, 1657), also described by Ferguson, which I declined; but I bought two rare works by Rhumelius, namely, the "Bibliotheca ophthalmica", 2 vols. (Argentoratæ, 1648), and the "Die Schliessung aller Hurhäuser in Nürnberg" (Strassburg, 1637).

According to Ferguson¹, Rhumelius was the younger son of Johann Conrad Rhumelius, and lived between 1574 and 1630. He settled in general practice at Neumark², but had to leave as he was a Roman Catholic and went to Nuremberg, where he died³. As the "Bibliotheca ophthalmica" is prefaced February 17, 1648, he was obviously alive in 1648. He was, however, still alive in 1657, since among his letters given to me by my friend the bookseller at Baton Rouge I found two letters addressed to his cousin Conrad Rhumelius, dated 1657.

Many years later, when I was at San-Juan-de-los-Morros in Venezuela, I saw a copy of the "Opuscula" (Temixtitana, 1703), the original name of Mexico⁴. In this edition all the magical and alechemical parts had been removed, and a list of South American therapeutically useful plants inserted⁵.

Both the "Opuscula" and the "Medicina Spagyrica" are written in German and as vulgar as any work of Paracelsus. They deal with the usual pharmaceutical and medical topics of the time. Both these works are fairly common and they do not require further analysis.

The title "Bibliotheca ophthalmica"⁶ is misleading, as it is a well-reasoned history of ophthalmology one never sees mentioned⁷. As regards the "Schliessung aller Hurhäuser in Nürnberg" the methods of closing these institutions proposed by Rhumelius are drastic, but well in keeping with the time he lived in. He explains in the preface that, as councillor of the city of Nuremberg, he had attempted in council to stamp out vice, but all his attempts were in vain, since the city derived too good an income from licences granted to keepers of brothels. That he is strongly of the opinion that it is his duty to bring matters to a head, and he is therefore publishing his book in Strasbourg as he feels certain that Nuremberg would suppress publication. The methods suggested by him are frequent raids, branding men and women found in brothels, and imprisonment for brothel owners—a year for every year they had been licensed. He remarked: "there is a hag in Nuremberg who has had a licence for 26 years and she will have plenty of time in prison to think and brood over the harm she has done to mankind".

Although drastic, Rhumelius's recommendations were not as severe as those that had from time to time been in force against brothel keepers and prostitutes⁸, especially prostitutes suffering from venereal diseases⁹.

¹ Ferguson, "Bibliotheca Chémica", 2 vols. (Glasgow, 1906).

² Jöcher, "Allgemeines Gelehrten-Lexicon", 4 vols. (Leipzig, 1750-51).

³ Gerding, "Geschichte der Chemie" (Leipzig, 1869). Meyer, "Geschichte der Chemie" (Leipzig, 1895). Ferguson, *loc. cit.*, Hiordahl, "Fremstilling a Kenica Historie", 2 vols. (Christiana, 1906).

⁴ Prescott, "History of the Conquest of Mexico" (London, 1878).

There was also an 1843 Philadelphia edition which I have not seen.

⁵ Some of the plants inserted in this edition are still listed in the "Farmacopea Mexicana" (Mexico, 1925).

⁶ The "Catalogus Librorum . . ." of W. M. Enter's Library (1695). Noremburgæ lists a copy of the "Bibliotheca ophthalmica", 1677, also printed in Strassburg.

⁷ Neither Sorsby's "A Short History of Ophthalmology" (1945) London, nor some of the larger works listed by him (pp. 93-94) I have had the opportunity to consult, mention the "Bibliotheca ophthalmica" by Rhumelius.

⁸ Wrede, "Die Körperstrafen bei allen Völkern von den ältesten Zeiten bis auf die Gegenwart" (Dresden, 1898).

⁹ Dufour, "Histoire de la prostitution chez toutes les peuples du monde", 6 vols. (Paris: 1851-1854).