

down resins into identifiable crystalline compounds—the Continental work has been mainly of a synthetic type involving identification of materials produced during resinification of such active compounds as phenolic alcohols.

Dr. K. Hultsch's book is the first real attempt to correlate the available information. It constitutes an effort to review critically and comprehensively the considerable literature and diverse views accumulated over many years. Dr. Hultsch has included a historical survey, an account of the condensation of phenols with aldehydes and other compounds on the basis of modern electronic ideas, a critical review of existing chemical knowledge, and chapters on the technology of a wide range of phenolic resins and on their testing. The book includes author and subject indexes, as well as 376 separate references to papers published up to 1948. Comparatively little of significance has been omitted, although a few papers of perhaps minor importance appear to have been overlooked. If the chemist has been catered for more fully than the technologist, the fact must be accounted a good fault, in view of the practical trend of so many plastics books produced hitherto.

Controversy will still continue on the mechanism of the phenol-formaldehyde reaction despite Dr. Hultsch's attempt at clarification, while few will agree with his contention that little more now remains to be done on the chemistry of the subject. There is likely to be still greater disagreement with his emphasis on the quinone methide structure as an essential feature of the heat-hardening of phenolic resins; most workers are likely to take the view that the evidence is as yet insufficient. Nevertheless, the author deserves gratitude for stimulating curiosity in a difficult field of work, and his monograph can be recommended unhesitatingly as essential to all workers on polymers, particularly at this time, when the organic approach tends to be neglected in favour of the more popular physico-chemical method of attack.

Students and advanced research workers will equally welcome this publication, so long as they can cope with the none too easy style of German writing adopted by the author.

N. J. L. MEGSON

AN ORNITHOLOGICAL PIONEER

Studies in Bird Migration

Being the Collected Papers of H. Chr. C. Mortensen, 1856–1921. Edited by Poul Jespersen and Å. Vedel Tåning. (Published by Dansk Ornithologisk Forening.) Pp. 272. (Copenhagen: Ejnar Munksgaard, 1950.) 18 kr.

THE method of studying the movements and life-histories of birds by marking them with light metal rings on the feet is now used in many parts of the world and in some of them on a substantial scale; it has yielded results of great value and its possibilities are very far from exhausted. Bird-ringing of a cruder sort had been tried in a small way before; but it was not until 1899 that rings of various sizes with serial numbers and adequate addresses were introduced. This development was due to a Danish schoolmaster, Hans Christian Cornelius Mortensen (1856–1921), whose collected papers on the subject are now republished in an

English translation. This suitably marks the jubilee of his pioneer effort; and it also makes more accessible the results of his work, which are still of intrinsic scientific value.

Not many more than five thousand birds were ringed under Mortensen's own scheme (as compared with about one million in the British Isles alone during the past forty years); but he had either the foresight or the good fortune to concentrate largely on interesting species yielding a remunerative percentage of recovery records. Thus, after an initial disappointing experience with ringing starlings on an inadequate scale, he obtained excellent results with the white stork, the heron and various species of ducks, gulls and birds-of-prey.

With the white stork, Mortensen was able to show that those bred in Denmark usually migrate south-eastwards across Europe, around the Levant and through East Africa to the extreme south—but sometimes south-westwards to North Africa. The more numerous records from German and Hungarian ringing have amplified the picture.

More than three hundred pintail caught during autumn migration at a duck-decoy on the island of Fanø, off the west coast of Jutland, were purchased, ringed and released. The recovery records, about 20 per cent of the number of birds ringed, showed that ducks of this species passing through Denmark in autumn come from a summer area which extends to northern Russia as far as the White Sea and the Arctic Ocean; and that in winter they reach the British Isles, Holland, France, Spain, Italy and the eastern side of the Adriatic Sea. This finding still stands for comparison with results obtained from subsequent ringing elsewhere, and it forms an essential part of the general picture that is being built up of the seasonal movements of the pintail.

Reconciled as one is to recovery-rates as low as a fraction of one per cent for small passerine species, one may well be envious of such figures as 28 recoveries out of 65 ringed in the case of the common buzzard, and 10 out of 13 in the case of the goshawk. These spectacular rewards for a relatively small effort showed the value of the method, although with the less remunerative species similar information can be acquired only gradually by organized ringing on a scale of which the pioneer possibly did not even dream.

A. LANDSBOROUGH THOMSON

THEORY OF FUNCTIONS

Funktionentheorie

Von Prof. Constantin Carathéodory. (Lehrbücher und Monographien aus dem Gebiete der exakten Wissenschaften: Mathematische Reihe, Bände 8 und 9.) Band 1. Pp. 288. 36 Swiss francs. Band 2. Pp. 194. 24.50 Swiss francs. (Basel: Verlag Birkhäuser, 1950.)

THE title of this work is perhaps a little misleading, as suggesting a treatise on all the main aspects of the theory of functions; but it would be unreasonable to expect, even in two volumes, a full account of such an extensive subject, which can be approached in several different ways. Cauchy's method was based on integration around a contour, Riemann's on intuitive ideas derived from physics and geometry, and Weierstrass's on the power series.