Research Items.

Migrations of the Waxwing.—The waxwing, *Ampelis garrulus*, is not a rare visitor to our shores. Seldom a winter passes but one or more is observed in eastern parts of Britain, and occasionally its numbers indicate a very considerable immigration. The largest ever witnessed in Scotland occurred in the late autumn of 1921, and is discussed by Dr. J. Ritchie in the *Scottish Naturalist*, September 1922–February 1923. The immediate cause of Scotland's share in this immigration is due in the first place to the lack of food-supply in Norway. The summer of 1921 in that country has been notorious for the lack of wild berries upon which the waxwings feed. Large flocks of the birds congregated in the southern part of Norway, but, finding insufficient food, took advantage of easterly winds accompanied by a rapidly rising barometer to reach our shores. The meteorological phenomena associated with the migration are complex, and Dr. Ritchie promises to deal with them in a future paper.

Botanical Survey and Ecology in Yorkshire.—Under this title a most valuable and comprehensive account of the development of our knowledge of the Yorkshire flora is given by Dr. T. W. Woodhead in the *Naturalist* for March 1923. The first flora of Yorkshire was published at Halifax in 1840 by Henry Baines, and since then the three Ridings have been more intensively dealt with in the three well-known floras, Baker's "North Yorkshire," Arnold Lee's "Flora of West Yorkshire," and Fraser Robinson's "Flora of the East Riding of Yorkshire." Many other valuable systematic works dealing with the Yorkshire flora are described by Dr. Woodhead, who then proceeds to narrate the development of botanical survey and the mapping of plant associations, under the inspiration of the brothers Robert and William G. Smith. Around these men an active band of workers gathered, and in December 1904 the Central Committee for the Survey and Study of British Vegetation was formed at a meeting held at the house of Dr. W. G. Smith in Leeds; in 1913 this Committee was replaced by the British Ecological Society with its wider membership. Two vegetation formations that have been extensively studied in Yorkshire are the woodlands and the moorlands, and Dr. Woodhead briefly traces the development of our knowledge of these characteristic vegetation features, their distribution, development and occasional retrogression. There is an interesting discussion of the significance of the vegetation found in the peat of the Southern Pennines, and the bearing that the studies have upon persistence of the flora from pre-glacial times. Dr. Woodhead's work upon the relation of vegetation survey to the many other activities and interests of a district was well illustrated by the extraordinarily interesting series of maps of the Huddersfield area that were on view in Hull during the British Association meeting, in the exhibition room of the Yorkshire Naturalists' Union. It is therefore natural to find that the presidential address to the Yorkshire Naturalists' Union closes with the expression of a hope that such ecological studies may extend to man, and that the local museum may enshrine the results of an intensive local survey of plant and animal, including human communities.

A New Process for making Stereoscopic Maps.—A paper read at a recent meeting of the Paris Academy of Sciences (*Comptes rendus*, January 22) described a new method, due to M. G. Poivilliers, for obtaining stereoscopic maps. The various methods proposed hitherto have been based on the use of two conical perspectives, the production of which involves practical difficulties; in M. Poivilliers's method two cylindrical projections are used, one vertical and the other oblique. Referring to the accompanying illustration (Fig. 1), the projection A is an ordinary contour map; the projection B is obtained from A by shifting the contour lines in the direction east-west by an amount proportional to their altitude above an arbitrarily chosen datum line. The resulting stereoscopic view shows theoretically a slight curvature effect which, however, does not alter the relative relief. In examining with a stereoscope even the above reproductions, the result obtained is very striking. The "falsified" map B was in this case drawn by hand with the aid of a tracing of A, but it is easy to imagine a simple apparatus by means of which this can be done semi-automatically. The contour interval is in this case 20 metres, and corresponds to a horizontal shift of 0·5 mm. It is anticipated that M. Poivilliers's method, on account of its simplicity, will tend to generalise the use of stereoscopic maps, especially for purposes of instruction in topographical surveying. It has also been suggested that the process could be usefully applied to geological maps, by making it possible, for example, to visualise the superposition of successive layers inside the earth.

A—Ordinary contour map.

Fig. 1.

B—Complementary map, with contour lines displaced.

Atmospheric Humidity in the United States.—Prof. R. de C. Ward, of Harvard University, is the author of a communication on the above subject in the U.S. *Monthly Weather Review* for November 1922. The communication is admirably illustrated with diagrams; two are given for January, at 8 a.m. and 8 p.m., and two for the corresponding hours in July, showing the relative humidity by lines of equal value over the whole of the United States. The element is a real and definite factor in climate, and especially affects our bodily comfort. The values give the ratio between the amount of moisture in the atmosphere and the amount which could be present without condensation. On the Pacific, Atlantic, and Gulf coasts the lines show a distinct tendency to be parallel to the sea-coast. The distribution is chiefly controlled by temperature, direction of prevailing winds, distance, and direction of the chief source of moisture supply, and general topography. Charts given with the communication are taken from the 'Atlas of American Agriculture." A belt of uniformly high relative humidity along the coasts averages about 75-80 per cent., and at times exceeds 90 per cent. on the Pacific coast. Inland, in parts, the minima relative humidity during the hot summers fall to 30 per cent., and even 20 per cent. over the districts of most extreme aridity. Absolute humidity, which shows the actual amount of water vapour in the air expressed in decimals of inches, and known as vapour pressure, is also dealt with; two charts are given showing the equal pressure lines over the United States in the months of January and July. Temperature is essentially the chief control of absolute humidity; in mid-summer the amount of moisture in the atmosphere is generally from two to four times as great as in mid-winter.

GEOLOGY AND THE ICE-CAP IN NORTHERN GREENLAND.—The interest of Dr. Lauge Koch's geological mapping in Northern Greenland (NATURE, vol. 110, p. 91) is now increased by his preliminary account of Peary Land. His new map (*Am. Journ. Sci.*, vol. 206, p. 190, 1923) shows the continuation of the Caledonian folding through the north of the region, where moraine-matter from the glaciers descending from the south obscures much of a country in any case difficult for research. The ice-cap extended a good deal farther north at the maximum of the Pleistocene ice-age, but did not cover all the coastland. It may be remarked that in this area we have once more evidence of the potency of snow-domes in promoting widely spread glaciation. It seems unnecessary, if unfashionable, to shift the pole to account for every local centre of ice-radiation. The main result of Lauge Koch's recent work is the discovery of a richly fossiliferous Ordovician series far greater in extent and thickness (870 m.) than he could anticipate when he began his arduous explorations in 1917.

PRODUCTION OF LEAD IN BRITAIN.—In the numbers of *Chemistry and Industry* for March 16 and 23, Prof. H. Louis contributes a most interesting and valuable account of the production of lead in Britain. He begins with a clear account of lead in ancient times. The first definite mention of the production of lead in Britain occurs in Pliny (A.D. 77); a pig of lead has been found in the Mendip Hills bearing the name of the Emperor Claudius (A.D. 49), and in A.D. 64 smelting in Flintshire began. Some pigs of Roman lead are stamped *ex arg.*, *i.e.* desilvered—probably by cupellation. The progress made in the Middle Ages is described in detail by Prof. Louis, whose articles have a wide interest.

SUBSTITUTION IN THE BENZENE NUCLEUS.—In the *Chemical News* of March 16, Messrs. R. Fraser and J. E. Humphries discuss the problem of substitution in the benzene nucleus in the light of the Lewis-Langmuir theory of co-valence. They start from three simple postulates related to the octet stability of an atom or group, and discuss in an interesting manner many known results in organic chemistry. In the chaotic mass of unco-ordinated facts which lies heavy on organic chemistry a ferment is evidently moving; in time the material will no doubt be brought into order, and discussions of the type of that mentioned cannot fail to be of service in this direction.

EARLY HISTORY OF THE GAS PROCESS.—The early history of the manufacture and distribution of towns' gas was briefly outlined by Mr. D. Brownlie in a paper read before the Newcomen Society on March 20. Van Helmont, in 1600, observed that "coal did belch forth a wild spirit or breath." Other early pioneers include Thomas Shirley (1667), Robert Boyle (1691), Stephen Hales (1726), J. Clayton (1739), Bishop Watson (1781), the Earl of Dundonald (1781), and Minckelers (1784). William Murdoch lighted his house at Redruth with coal gas in 1792. At first the gas was burned at the open end of an iron pipe, but the accidental use of an old thimble led to the introduction of a burner in which the gas was lit at a number of jets issuing from a perforated thimble. Messrs. Boulton and Watt's works at Soho, Birmingham, were illuminated by gas in 1802. The plant erected by Murdoch for this purpose differed in little but scale from the horizontal settings and gasometers of to-day. Lebon, in France, worked along much the same lines as Murdoch, and illumined his house with coal gas in 1801. Winsor illumined part of Pall Mall with gas in 1807. Samuel Clegg introduced lime purification in 1806, and invented the first gas-meter in 1815. In the early days gas was distributed through lead or wood pipes. Cast-iron pipes were introduced in 1810, and wrought-iron pipes in 1825. John Grafton, in 1820, introduced the use of fireclay instead of iron for retorts. This permitted the temperature of carbonisation being raised from 1400° F. to 2000° F. Clegg patented retorts for continuous carbonisation in 1815. The first vertical gas retort was patented in 1828 by John Brunton.

PHOTOMETRY.—In his annual address before the Philosophical Society of Washington, the retiring president, Mr. E. C. Crittenden, presented an interesting survey of problems involved in the measurement of light. The address has appeared in the Journal of the Washington Academy of Sciences (vol. 13, No. 5, March 4, 1923). In the introduction Mr. Crittenden recalls several notable advances in photometry, such as the adoption of the international unit of candle-power by all leading countries except the Germanic nations. In view of the uncertainties attending the use of flame standards, this unit is now usually preserved by the aid of calibrated electric incandescent lamps; the process is analogous to that adopted for the international ohm, derived from a mercury standard but maintained by means of wire resistances. However, there is this important distinction, that we have as yet no adequate, accurate, and reproducible primary standard of light. One of the most hopeful lines of investigation is that pursued at the U.S. Bureau of Standards, where experiments on a black body maintained at a definite temperature have been made; the black body takes the form of a carbon-tube electric furnace matched in colour by comparison with certain standard incandescent lamps. But further information on the accuracy with which temperature can be maintained is needed. The address also directs attention to the fundamental distinction between conceptions of light as radiation, and as a physiological impression—a distinction that becomes specially important when we have to deal with sources yielding light of different colour. The physiological phenomena affecting such comparisons are discussed, and some remarks are made on the results of "equality of brightness" and "flicker photometer" measurements. The visibility curve, throughout the spectrum, of the normal eye has now been ascertained with fair precision. A knowledge of this should enable us to evaluate the luminous power of any variety of radiant energy; and if, in addition, the primary standard based on the black body at specified temperature should prove satisfactory, considerable progress towards the scientific measurement of light will have been made.