Holders," illustrated by successful experiments on farms of large extent in Essex and Kent.

The deliberations of the congress reveal the necessity of greater efficiency in the sphere of elementary education, so as to ensure the attendance of all children at school until fourteen years of age and of part time education until at least the age of seventeen. J. H. REYNOLDS.

## FOPTHCOMING BOOKS OF SCIENCE.

Anthropology and Archæology.

Cassell and Co., Ltd.—Woman's Mysteries of a Primitive People, D. A. Talbot, illustrated. Mac-millan and Co., Ltd.—General Index to "The Golden Bough: A Study in Magic and Religion," Sir J. G. Frazer; Ancient Hunters and their Modern Representatives, Prof. W. J. Sollas, second edition, illus-

#### BIOLOGY.

Félix Alcan (Paris).-Evolution des Plantes, N. Bernard; Théorie de la Contre-Evolution, Dr. Larger. A. and C. Black.-The Story of Plant Life, Rev. A. and C. Black.—The Story of Plant Lite, Rev. C. A. Hall, illustrated; Visual Botany, A. Nightingale, illustrated. Cassell and Co., Ltd.—Wonders of Wild Nature, R. Kearton, illustrated; The Book of Hardy Flowers, H. H. Thomas, illustrated. Chapman and Hall, Ltd.—Elements of Forestry, Profs. F. F. Moon and N. C. Brown, illustrated. J. and A. Churchill.—Plant Life in the British Isles, A. R. Horwood, vol. iii. completing the work illustrated. Duckscorth vol. iii., completing the work, illustrated. Duckworth and Co.—A Glossary of Botanic Terms, B. Daydon Jackson, new edition; Birds and Man, W. H. Hudson, new and enlarged edition. Hutchinson and Co. -Insect Artisans and their Work, E. Step, illustrated. Charles H. Kelly.—Woodland Trees and How to Identify Them, J. H. Crabtree, illustrated. Longmans and Co.—British Birds, written and illustrated by A. Thorburn, in four volumes (vols. i. and ii.); Wild Animals of the Empire, E. H. Fisher (pictures in colours). Methuen and Co., Ltd.—Diversions of a Naturalist, Sir E. Ray Lankester, illustrated. John Murray.—Life-Histories of African Game Animals, T. Roosevelt and E. Heller, two vols., illustrated. L. Reeve and Co., Ltd.—The Potamogetons (Pond Weeds) of the British Isles, with Descriptions of all the Species Varieties, and Hybrids, by A. Fryer, illustrated by A. H. Brane, and concluded by A. Bennett, George A. H. Evans, and concluded by A. Bennett. George Routledge and Sons, Ltd., and Kegan Paul and Co., Ltd.—My Week-end Garden, E. L. Fox, illustrated. Smith, Elder and Co.—The Minor Horrors of War, Dr. A. E. Shipley, illustrated (dealing with various insect and other pests which cause disgust, disconfort, and often disease amongst our troops now fighting in all quarters of the globe). The University Tutorial Press, Ltd.—Junior Botany, Prof. F. Cavers. T. Fisher Unwin.—Chinese Forest Trees, Norman Shaw.

#### CHEMISTRY.

Baillière, Tindall and Cox.-Muter's Short Manual of Analytical Chemistry, new edition, illustrated, edited by J. Thomas. The general character and scope of the work remain unaltered; the changes and addiof the work remain unaltered; the changes and additions made have mainly been necessitated by alterations in the British Pharmacopæia, 1914. G. Bell and Sons, Ltd.—Quantitative Laws in Biological Chemistry, Prof. Svante Arrhenius, with diagrams. J. and A. Churchill.—Exposives: Their Manufacture, Properties, Tests, and History, A. Marshall, illustrated. Constable and Co., Ltd.—Text-Book of Elementary Chemistry, Dr. F. M. Perkin and E. M.

Jaggers, illustrated; Life and Letters of Joseph Black. M.D., Sir W. Ramsay, illustrated; The Hydrogenation of Oils, C. Ellis, illustrated; Ine Hydrogenation of Oils, C. Ellis, illustrated; Industrial Chemistry, A. Rogers and A. B. Aubert, new and revised edition, illustrated. C. Griffin and Co., Ltd.—A Text-Book of Inorganic Chemistry (in nine volumes), edited by Dr. J. Newton Friend, vol. ii., The Alkali Metals and their Congeners (Group I.), Dr. A. Jamieson Walker; vol. iii., The Alkaline Earth Metals and their Associates (Group II.), H. V. Briscoe and E. Sinkinson; vol. iv. Aluminium and its Congeners including the vol. iv., Aluminium and its Congeners, including the Rare Earth Metals (Group III.), H. F. Little; vol. v., Carbon and its Allies (Group IV.), Dr. R. M. Caven; vol. vi., Nitrogen and its Congeners (Group V.), Drs. J. C. Withers and H. F. V. Little; vol. vii., Sulphur and its Congeners (Group VII.), Dr. D. F. Twiss and A. V. Eldridge; vol. viii., The Halogens and their Allies (Group VII.), Dr. G. Martin and E. A. Dancaster; vol. ix., Iron and the Transitional Elements (Group VIII.), Drs. J. Newton Friend and W. E. S. Turner. Longmans and Co.—An Amateur's Introduction to Crystallography (from Morphological Observations), Sir W. P. Beale. Macmillan and Co., Ltd.—Chemical Technology and Analysis of Oils, Fats, and Waxes, Dr. J. Lewkowitsch, vol. iii, fifth dition on tirely required to the control of the co edition, entirely rewritten and enlarged, edited by G. H. Warburton, illustrated. Methuen and Co., Ltd.
—Practical Physical Chemistry, J. B. Firth. Williams
and Norgate.—Food Industries: an Elementary Text-Book on the Production and Manufacture of Staple Foods, Dr. H. T. Vulte and S. B. Vanderbilt; Examination of Lubricating Oils, Dr. T. Stillman; A Popular Treatise on the Colloids in Industrial Art, Prof. K. Arndt.

## ENGINEERING.

Chapman and Hall, Ltd .- Surveying Manual, Prof. H. C. Ives, illustrated. Constable and Co., Ltd.—Mechanical Technology, Prof. G. F. Charnock, illustrated; Internal Combustion Engine, H. E. Wimperis, new, revised, and enlarged edition, illustrated; Gas, Gasoline, and Oil Engines, by G. D. Hiscox, new edition, edited and brought up to date by V. W. Page, illustrated; Letters and Journals of F. B. Morse, edited and supplemented by E. L. Morse, two vols., illustrated; Ship Form Resistance and Screw Propulsion, G. S. Baker, illustrated; Practical Design of Steel Framed Sheds, A. S. Spencer, illustrated; Surveying, J. Williamson, illustrated; Continuous Current English illustrated, Manual Reject of Practical Continuous Current English illustrated Manual Reject of Practical Continuous Current English illustrated Manual Reject of Continuous Current English illustrated in Continuous Current English in Cont revised edition, illustrated; Manual of Reinforced Concrete, C. F. Marsh and W. Dunn, new, revised, and enlarged edition; Single Phase Electric Railways, E. Austin, illustrated; Overhead Transmission Lines, F. Kapper, translated by P. R. Friedlaender, illustrated. Crosby Lockwood and Son .- Civil Engineering Types Crosby Lockwood and Son.—CIVII Engineering Types and Devices, T. W. Barber, illustrated; The Principles of Urban Traffic, H. W. D. Schmidt, illustrated; Concrete for House, Farm and Estate, F. Ballard, illustrated. Scott, Greenwood and Son.—Steam Boilers and Combustion, J. Batey; Lathes, G. W. Burley; Reinforced Concrete in Practice. G. W. Burley; Reinforced Concrete in Practice, A. A. H. Scott. The University Tutorial Press, Ltd.—A First Course in Engineering Science, P. J. Haler and A. H. Stuart; Electrical Engineering, W. T. Maccall.

## GEOGRAPHY AND TRAVEL.

A. and C. Black .-- The Three Southern Continents, J. B. Reynolds, illustrated. Cassell and Co., Ltd.— Through Central Africa from East to West, C. Kearton and J. Barnes, illustrated. Macmillan and Co., Ltd.—Arabia Infelix, or, the Turks in Yamen, G. W. Bury, illustrated. Methuen and Co., Ltd.—Brazil and the Brazilians, G. J. Bruce, illustrated. John Murray.—Adventures in Africa, J. B. Thornhill, with map; Hunting Pygmies, Dr. W. E. Geil, illustrated. G. Philip and Son., Ltd.—The Human Geographies, E. Young and J. Fairgrieve, six books, illustrated:—Book I., Children Far Away; Book II., Homes Far Away; Book III., In the British Isles; Book IV., In the New World; Book V., In the Old World; Book VI., In Europe and Britain; Synthetic Atlas of Comparative Geography, E. G. R. Taylor, in eight parts. George Routledge and Sons, Ltd., and Kegan Paul and Co., Ltd.—Alone in the Sleeping-Sickness Country, Dr. F. Oswald, illustrated. Smith, Elder and Co.—With Scott: The Silver Lining, T. Griffith Taylor, illustrated.

## GEOLOGY.

Félix Alcan (Paris).—La Géologie biologique, S. Meunier. Armand Colin (Paris).—Les grands tremblements de terre: Sismologie géologique, Montessus de Ballore, illustrated; La Face de la Terre (Das Antlitz der Erde), E. Suess, translated under the direction of Emm. de Margerie, tome iii., illustrated.

MATHEMATICAL AND PHYSICAL SCIENCES.

G. Bell and Sons, Ltd.—X Rays and Crystal Structure, Prof. W. H. Bragg and W. L. Bragg, illustrated. Longmans and Co.—Elements of Optics, G. W. Parker. Mills and Boon, Ltd.—An Introduction to Heat, A. R. Laws and Dr. G. W. Todd, illustrated. The Open Court Company.—In "Classics of Science and Philosophy" an annotated translation by P. E. B. Jourdain of Georg Cantor's classical papers on transfinite numbers, and extracts from the Scottish Philosophers—Reid, Beattie, and Stewart—by Prof. G. A. Johnston. A supplementary volume to Prof. Mach's Mechanics; a new edition in two vols. of De Morgan's Budget of Paradoxes, with notes by Prof. D. E. Smith. The University Tutorial Press, Ltd.—Rural Arithmetic, A. G. Ruston; Text-Book of Magnetism and Electricity, A. W. Hutchinson.

## MEDICAL SCIENCE.

Félix Alcan (Paris).—Thérapeutique de la Circulation, Dr. Françon; Le Thorax et l'Emphyseme, la Chondrectomie, Dr. E. Douai. Baillière, Tindall, and Cox.—Krause's Aids to Physiology, revised edition, illustrated. Cassell and Co., Ltd.—A Manual of Bacteriology, Drs. G. Dreyer and E. W. A. Walker, illustrated; Diseases of the Nervous System, Dr. H. Campbell Thomson, new edition, illustrated. J. and A. Churchill.—Malay Poisons and Charm Cures, Dr. Gimlette; A Treatise on Human Anatomy, edited by Prof. C. M. Jackson, revised edition, illustrated; A Text Book of Diseases of the Skin, Dr. J. H. Sequeira, new edition, illustrated; Materia Medica, Dr. W. Hale White, new edition, based on the new (1914) British Pharmacopæia; Domestic Hygiene for Nurses, with some Physics and Chemistry, Dr. F. J. Smith, new edition. H. Kimpton.—A Textbook of Radiology, Dr. E. R. Morton, illustrated. H. K. Lewis.—The Extra Pharmacopæia, W. H. Martindale and Dr. Wynn Westcott, revised edition, containing, among other additions, a syllabus of the aciditions, deletions, and alterations in the new British Pharmacopæia; Swanzy's Handbook of Diseases of the Eye, new edition, revised and edited by Dr. Louis Werner; Occupational Diseases of the Skin, Dr. R. Prosser White; Delorme's Surgery in War, translated by Dr. H. de Meric; Diseases of the Nose and Throat, Dr. H. Tilley, new edition, illustrated. J. B. Lippincott Company.—The Diseases of Children, edited by Drs. M. Pfaundler and A. Schlossmann, English translation with an introduction by Dr. L. E. Holt: vol. vii., Diseases of the Eye in Infancy and Childhood

and Disorders of Speech and Phonation in Childhood, illustrated. *Macmillan and Co., Ltd.*—Human Physiology, Prof. Luigi Luciani, translated by Frances A. Welby, with a preface by Dr. 'J. N. Langley, in five vols., illustrated, vol. iii., Muscular and Nervous Systems. *Methuen and Co., Ltd.*—Methuen's Health Series:—Throat and Ear Troubles, M. Yearsley; Health for the Middle-Aged, Dr. S. Taylor; The Care of the Teeth, A. T. Pitts; The Eyes of our Children, N. B. Harman.

## METALLURGY.

Macmillan and Co., Ltd.—A Handbook of Metallurgy, Dr. C. Schnabel, translated by Prof. H. Louis, illustrated, third edition, vol. i. Williams and Norgate.—Metallurgy, H. Wysor, revised and enlarged edition.

#### TECHNOLOGY.

A. and C. Black.—The World's Cotton Crops, Prof. J. A. Todd, illustrated; The Development and Properties of Raw Cotton, W. L. Balls, illustrated. The "Electrician" Company, Ltd.—The Manufacture of Electric Arc Carbons; Theory of the Submarine Telegraph Cable, Dr. H. W. Malcolm; Wireless Telegraphy and Telephony, Dr. W. H. Eccles; Electric Switch and Controlling Gear, Dr. C. C. Garrard; Primary Batteries: Their Construction and Use, W. R. Cooper, new edition; The Localisation of Faults in Electric Light Mains, F. C. Raphael, new edition. George Routledge and Sons, Ltd., and Kegan Paul and Co., Ltd.—Applied Mechanics, H. Aughtie; The Science of Building and Building Materials; Mechanics for Textile Students. The University Tutorial Press, Ltd.—Manual Training, A. H. Jenkins. Whittaker and Co.—Electrical Instruments in Theory and Practice, W. H. F. Murdoch and U. A. Oschwald; Modern Illuminants and Illuminating Engineering, L. Gaster and J. S. Dow; Alternating Current Work, W. P. Maycock; Handrailing for Geometrical Staircases, W. A. Scott; Arithmetic of Alternating Currents, E. H. Crapper.

## MISCELLANEOUS.

Félix Alcan (Paris).—Traité de Psychologie, edited by Prof. G. Dumas; Les Asthenies Psychiques, Dr. Deschamps; La Survivance de l'Ame, Cornillier. Cassell and Co., Ltd.—Chinese Pottery and Porcelain, R. L. Hobson, two vols., illustrated; Reminiscences and Letters of Sir Robert Ball, edited by W. Valentine Ball, illustrated; Rifles and Ammunition, H. Ommundsen and E. H. Robinson, illustrated; Modern Horse Management, Lieut. R. S. Timmis, illustrated. Constable and Co., Ltd.—Mithraism, W. J. Phythian Adams, illustrated. Duckworth and Co.—Foundations of Normal and Abnormal Psychology, Dr. B. Sidis. Methuen and Co., Ltd.—My Life, by Sir Hiram S. Maxim, illustrated. Macmillan and Co., Ltd.—A History of Persia, Lieut. Col. P. M. Sykes, two vols., with maps and illustrations; What is Living and what is Dead of the Philosophy of Hegel, Benedetto Croce, translated by D. Ainslie; Modern Philosophers: Lectures delivered at the University of Copenhagen during the Autumn of 1902; and Lectures on Bergson delivered in 1913, Prof. H. Höffding, translated by A. C. Mason; The British Empire, Sir C. P. Lucas; The Statesman's Year Book: Statistical and Historical Annual of the States of the World for the Year 1915, revised after official returns, edited by Dr. J. Scott Keltie, assisted by Dr. M. Epstein; Elementary Principles of Economics, Drs. R. T. Ely and G. R. Wicker, new edition, adapted for English students, by L. L. F. R. Price. John Murray.—Emma Darwin: A Century of Family Letters, 1792–1896, edited

by her daughter, Henrietta Litchfield, two vols., illustrated; The Place-Names of England and Wales, Rev. J. B. Johnston; A History of the Gold Coast and Ashanti, from the Earliest Times to the Beginning of the Twentieth Century, W. W. Claridge, two vols., with map. George Routledge and Sons, Ltd., and Kegan Paul and Co., Ltd.—A Dictionary of Occultism, L. Spence; Giordano Bruno: his Life, Thought, and Martyrdom, W. Boulting; Best Books, part iii. (Classes F-K), W. Swan Sonnenschein. Williams and Norgate.—On the Cosmic Relations: Being an Outline of the Evolution of the Relations between the Soul and the External Universe, and a Summary of the Recognised Relations that are still so immaturely evolved as to be little understood, H. Holt, two vols.

# THE BRONZE-AGE INVADERS OF BRITAIN.1

SOMEWHERE about the year 2000 B.C., when the peoples of Western Europe were beginning to learn the uses of bronze and to alter the style of their pottery, a race of invaders began to reach our shores who were totally different from any race which had lived in Britain before that time. The ancient British, although of various strains, were all of them of the long-headed type; they had projecting occiputs; their heads appeared as if compressed from side to side. But those Bronze age invaders had rounded heads, with flat occiputs; their heads had the appearance of having been compressed from back to front. European anthropologists name this round-head type of man "Celtic"; they regard him as an offshoot from the racial type which now attains its greatest purity in the mountainous countries of Central Europe-the "Alpine" type of race. We may take the Bavarian or Savoyard as good modern representatives of the ancient Celtic or Alpine type. They are usually men of short stature, with dark hair and skins, with short and wide faces, regularly modelled features, and rounded heads. The men who invaded England early in the Bronze age and buried their dead in round barrows, were of a different build of body; they were strong, tall, and muscular; they had long faces, rugged features, prominent noses, over-hanging eyebrow ridges; we have reason to believe they were fair in hair and complexion. Although these early invaders of Britain had the "Alpine" form of head, it is not among the modern inhabitants of Savoy or of Bavaria that we can hope to find their ancestral stock. We are all agreed that they were continental in origin. Those who have studied our Bronze-age invaders—who have investigated their physical characters, their methods of burial, their domestic animals, their pottery, their weapons and ornaments, are almost unanimously of opinion that we must seek their ancestral home somewhere in that part of Europe which now lies within the bounds of the German Empire. Every year our knowledge of Europe during pre-Roman times becomes more exact, and I propose, once again, in the light of more recent discoveries, and particularly from the point of view of one who is a student of the human body, to seek for the origin of our round-headed ancestry. We shall find that this early invasion of England was but a side eddy of a racial movement which affected almost the whole population of Europe.

How far the British people were exterminated and replaced during the invasions which took place after Roman domination had come to an end is not easily decided. If the Anglo-Saxons brought a new tongue to

<sup>1</sup> Presidential Address delivered to the Royal Anthropological Institute of Great Britain and Ireland, on January 26, by Prof. Arthur Keith, F.R.S.

England they brought no new physical type; in stature and in head form we cannot distinguish them with certainty from the Britons of the period of Roman occupation, nor from the older pre-Roman population. But in this earlier invasion, which began 2000 years before the Roman legions crossed the Straits of Dover, we have not the same difficulty; so distinctive is the head-form of the Bronze-age or "roundbarrow" men that we recognise the type at a glance; the type was then new to England. Along all the counties on our eastern seaboard, from Caithness in the north to Dorset in the south, we have found the graves of this distinctive round-headed race. The Hon. John Abercromby, who is our leading authority on British pottery, weapons, and ornaments of the Bronze age, is of opinion that the round-headed invaders were few in number, and that, after gaining a foothold in Kent, they gradually spread northwards and westwards throughout our country. With that conception I cannot agree. The south-eastern part of England was apparently only one of the landing places; the researches which were carried out by Canon Greenwell and Mr. Mortimer leave us in no doubt as to their arrival in eastern Yorkshire; the round-heads became masters of it. The counties which bound the Firth of Forth formed another centre of the invasion; the round-heads conquered that part of Scotland. For our present purpose their extensive settlement in the lowlands of Aberdeenshire and along the southern shores of the Moray Firth are the most important. In recent years Prof. Reid and Dr. Alex. Low, of the University of Aberdeen, have made us familiar with the Bronze-age men of the northeast of Scotland. These more northern invaders had their own peculiar kind of round-headedness, a kind remarkably flat on the crown-just as they had their own kind of graves, their own kind of pottery and ornaments. Sixty years ago that pioneer of anthro-pology—Prof. Anders Retzius, of Stockholm—identified a certain physical type in Aberdeenshire as similar to that which he had seen amongst the peoples in some of the Baltic provinces of Russia. The invaders who settled on the shores of the Firth of Forth, in Yorkshire, and in the south-eastern part of England have, like their more northern allies, their own dis-tinctive traits in form of head, and in fashions of weapons and pottery. We find a difficulty in explaining the distribution and characters of the "round-head" invasion, if we suppose, as Mr. Abercromby does, that there was only one point of landing, but all our facts find an easy solution if we suppose that the invasion which occurred in the Bronze age, was similar in character and in extent to that which took place in Anglo-Saxon times.

We must presume, then, that those round-headed people, like the Anglo-Saxons, crossed the North Sea; we must presume further that the "round-heads" were then the dominant power in the North Sea. There are certain considerations which make such a presumption difficult to accept. Then, as now, the Continental shores of the North Sea were inhabited chiefly by long-headed peoples. We do know, however, that before the beginning of the Bronze age the "round-heads" had broken through from the hinterlands of Germany and had reached the coast at various points between Scandinavia in the north and Brittany in the south. It is somewhat difficult to believe that a round-headed people were master mariners; seapower has usually been the appanage of long-headed nationalities; the Spaniards, the Portuguese, the Dutch, Norwegians, and British were, and are, predominantly long-headed. However that may be, we know the round-heads reached the Orkneys, the Hebrides, and the western shores. They spread across the lowlands of Scotland and crossed over to