and Dr. J. C. Jungers have succeeded in preparing the three ammonias containing, respectively, 1, 2 and 3 deuterium atoms, NH_2D, NHD_2 and ND_3. Their existence is revealed in their characteristic absorption bands in the ultra-violet, each distinct and different from that of ordinary ammonia NH_3. Their stabilities, when bombarded with atoms of excited mercury, are all markedly superior to that of ordinary ammonia. Professor G. Dougherty has similarly prepared a derivative of ordinary benzol in which one atom of hydrogen is replaced by one atom of deuterium to give the compound C_6H_5D. Professor R. N. Pease has prepared a derivative of the petroleum hydrocarbon, ethane, in which two atoms are of deuterium, the compound being $C_2H_4D_2$, whilst Professor Taylor and Mr. Smith have synthesized heavy methane CD_4, in which all the atoms attached to carbon are deuterium atoms. This product has a density 25 per cent. greater than that of ordinary methane. The spectroscopy of all these compounds is of considerable interest.

A recent research by Rollefson in California indicates that chlorine atoms react about ten times more slowly with deuterium molecules than with hydrogen molecules. In contrast with this result, data obtained by Dr. M. G. Evans in Princeton indicate that atomic deuterium and atom hydrogen react equally rapidly with oxygen to produce deuterium and hydrogen peroxides under the influence of excited mercury. The California results are in best agreement with Eyring's theoretical calculations of the effect of zero point energies of the two hydrogens on the rates of reaction. The results obtained by Evans permit a definite decision with regard to the mechanism of the reaction with oxygen. It is as an indicator in problems of reaction mechanism that deuterium is of the greatest utility in the field of reaction kinetics.

Professor R. W. Ladenburg, of the department of physics, has examined the heavy water for evidences of radioactivity. No positive evidence for such was found. The significance of this observation is that the smaller value for the mass of the neutron, as deduced from experiments in the University of California, would suggest that the deuterium atom was perhaps an unstable atomic system which might be liable to undergo spontaneous disintegration. The negative result favors therefore the higher value assigned to the mass of the neutron.

A MONUMENTAL REFERENCE WORK ON GEOGRAPHY

By Professor DOUGLAS JOHNSON

COLUMBIA UNIVERSITY

FOR some years there has been appearing in the French language a series of quarto volumes which should prove useful to a very wide circle of scientists and laymen. When the series is completed, it will constitute the great "Géographie Universelle," some twenty-two volumes grouped under fifteen titles, projected by the distinguished founder of the French school of geography, Vidal de la Blache, and published under the direction of the scholarly authority on historical geography, Lucien Gallois, of the University of Paris. It possesses importance for every man who would turn quickly to an authoritative, up-to-date, condensed account of the varied aspects—geological, geographical, climatic, botanical, zoological, economic and political—of different regions of the world.

NATURE OF THE ENTERPRISE

The undertaking, of which these volumes are the fruit, is admirable from every point of view. The conception of giving to the world a work which should replace the old "Géographie Universelle" of Réclus with a series of monographs not merely brought up to date but based on the modern scientific treatment of geography, is in itself excellent. It makes the enterprise something wholly new, instead of a mere revision of something old. The work is now far enough advanced to permit a judgment as to the manner in which the original conception is being executed.

The authorship of the various volumes is sufficient guarantee of the high quality of the work. The most distinguished leaders of the French school, some of them disciples of Vidal de la Blache himself, are cooperating to make the texts truly authoritative. For this task both the French conception of geography and the training of French geographers render these authors peculiarly competent. In the French view, geography is a synthesis of all the elements which give character and individuality to the various regions of the earth. To picture such a synthesis the French geographer must range widely in the fields of geology, climatology, botany, zoology, history, politics, sociology, economics. He specializes less narrowly and reads more broadly than is usually the case with his American geographical colleague. The French university system, with three lectures a week as the normal assignment of formal class instruction, and with less laboratory and other work than his American confrère performs, leaves the French professor leisure for study; while the practical necessity

of giving, from time to time, courses on regions or topics outside his specialty, if his students are to compete successfully in certain of the state examinations, impels him to a wider range of preparation than he might otherwise make. These may not be the best conditions under which to prosecute the most profound researches in a narrow field; but unquestionably they favor in high degree that breadth of knowledge essential to the most skilful painting of synthetic pictures of regional geography.

The publisher of the work, Armand Colin, has left nothing undone which could aid in presenting the geographic pictures effectively. The type is of good size and clear, while the larger quarto pages offer maximum advantage for all kinds of illustrations. Maps, both in black line and in color, sections, profiles, diagrams and photographs are abundantly used; and what is more important, all are good and many are superb. The best products of the photographer in all parts of the world, as well as the skill of the draughtsman, the engraver and the book-maker, have been laid under tribute to produce, in a time of unprecedented world-wide economic depression, volumes which are in every respect artistic and dignified.

The task of keeping authors' manuscripts within due bounds, of preserving reasonable balance throughout the work while permitting to each author some emphasis on those phases of his subject he is best prepared to treat, must have been truly formidable. Yet the success attained by Professor Gallois, and whoever of his colleagues may have been associated with him in accomplishing this task, is an outstanding feature of the work. To treat so illimitable a subject as world geography, severe condensation in every part must be practised. The smoothly written yet meaty chapters of these volumes must in more than one case represent the compression of many pages of manuscript into fewer. For the unremitting editorial labors bearing fruit in a series of volumes which, while inevitably varying somewhat in style and stress, are nevertheless all excellent in method, substance and dress, a heavy debt of gratitude is due Professor Gallois.

"Central Europe" as a Type Example

It would not be possible, even were it desirable, to review here the twelve volumes which have thus far appeared in the projected series of twenty-two constituting the "Géographie Universelle." Reviews of individual volumes have appeared in various periodicals from time to time. But it is desirable, in this more general discussion of the series, to give the reader some conception of the method of treatment adopted for the work as a whole. This can best be done by example, and for the purpose we select the two large quarto volumes devoted to Central Europe. In 1914, if not before, the world at large became acutely conscious of the fact that there was a Central Europe, a *Mitteleuropa,* where the "Central Powers" seemed striving to weld topographic and racial diversity into political and economic unity. For a striking picture of the elements of diversity and the elements of unity of this all-important old-world region, the reader may turn to the two volumes here described.

For the author of these volumes the choice fell upon Emmanuel DeMartonne, professor of geography at the Sorbonne. No better selection could have been made. Disciple of Vidal de la Blache (and also his son-in-law), DeMartonne followed to its logical conclusion the precept of his master that the geographer of the future must prepare himself on the physical side of his subject as well as on the human or organic side. After taking his doctorate in letters, in the fields of geography and history, he crossed the traditional barrier which in France separates the Faculté des Lettres from the Faculté des Sciences, and took another doctorate in science, in the field of geology. On the basis of this broad and solid foundation, he soon rose, by virtue of brilliant achievements in the fields of geography and geomorphology, to a place of international eminence. His own disciples fill chairs in a number of the French universities, while his "Traité de Géographie Physique" is a standard work, both in France and abroad. To his wide interests and rare organizing ability was due the outstanding success of the International Geographical Congress held in Paris two years ago. The man who undertook to portray in two volumes the geography of Central Europe brought to that difficult and delicate task a breadth of knowledge which had previously made him a valued adviser of his government during the Peace Conference at Paris, and which has won for him high honors from foreign governments, universities and scientific societies. To that task he brought also a special acquaintance with the geography of Central Europe which he began to acquire when a student of von Richthofen in Berlin, Ratzel at Leipzig and Penck at Vienna, and which he has enriched throughout the years by frequent visits and prolonged study.

General Aspects of Central Europe

DeMartonne devotes 130 pages of the first volume to general considerations affecting Central Europe. Among the generalities discussed, climate takes first place. With the aid of charts of isotherms, rainfall, cyclonic storm paths and types of winter weather, the character of the several climatic provinces is described. The topographic relief of Central Europe next claims attention, and here the American geolo-

gist and geographer will find condensed into a few pages an excellent summary of the outstanding geomorphic features of the region. The student of Appalachian forms feels himself on familiar ground when he reads that in the Alps the longitudinal valleys are expressive of structure; whereas the transverse valleys, cutting across the folds, are due to events the "nature and importance of which have long been discussed." The "nappes de charriage," of which he has heard much, seem less strange when described in terms of recumbent folds shoved one over the other by pressure coming from the zone of ancient crystalline massifs and directed toward a great geosynclinal depression filled with sediments. This is alpine structure described in language almost Appalachian. In the Alps, as in the Appalachians, present drainage patterns may be related to structures formerly existing above the present visible forms, but now completely eroded away; while removal of six miles or more of overlying beds reduced the Alps, like the Appalachians, to an almost plane surface, a fact still made evident by the rough accordance of summit heights, although uparching of the area in Pliocene time has permitted the leveled mass to become deeply dissected by streams.

There are, however, important points of difference between the Alps and our Appalachians, among which the difference in geologic age is by no means the most striking. The under sides of recumbent alpine folds are described as stretched out thin instead of being faulted. In the Alps glaciation profoundly modified the river valleys and gave the ranges the spectacular forms we now describe as "alpine." In his interpretation of glacial forms DeMartonne recognizes, as have most American students of mountain glaciation, that the ice flowed through and effectively modified preexisting river valleys; but he places somewhat greater emphasis on the part played by the earlier streams in producing the present topography. Thus hanging side valleys, in his view, are not solely the result of the greater thickness of trunk glaciers as compared with that of tributary glaciers. Before the ice came there were discordant valley junctions, due to recent rejuvenation of the drainage; and the ice has in part perpetuated or emphasized such preglacial discordance. The rock steps in both main and tributary valleys represent "waves of (stream) erosion" which were being propagated headward before the ice accentuated their steep slopes. Glacial troughs are V-gorges of rejuvenated streams modified by ice. There were interglacial periods longer than the periods of ice occupation; and during interglacial times streams accomplished much work. Thus, in DeMartonne's view, alpine erosion forms should be called "fluvio-glacial" rather than glacial, just as deposits made by the combined work of water and ice have long been called fluvio-glacial.

Given the preglacial forms believed by DeMartonne to have existed, glaciation would undoubtedly produce the present topography. But it is equally possible to account for hanging valleys, troughs, rock steps and other alpine forms by vigorous glaciation of drainage systems in late youth and early maturity, quite free from discordant junctions and other abnormal features. What was the history in the Alps is a question requiring critical and detailed analysis which would be quite inappropriate in such a work as the "Géographie Universelle." For this one quite properly must turn to other works by the same author, where his views are ably set forth. In the present volumes he attributes the large subalpine lakes to glacial erosion, and says "it is here that the word 'over-deepening,' invented by the *théoriciens* of glacial erosion to explain the basins and hanging valleys, seems to find its true application." DeMartonne, like all other students of land forms, can only theorize about the causes of things no man ever saw produced. He postulates (correctly, we believe) some overdeepening by glaciers in forming hanging valleys farther up in the mountains, as well as in producing closed basins back of rock bars. It is difficult, therefore, to understand why he is quite ready to apply the term "overdeepening" in the lower end of the trough, yet hesitates to use it where the full vigor of the ice stream would lead us to anticipate its maximum efficiency in deepening.

It is not our intention to discuss in detail the particular views expressed by the author, but rather to show the scope of his treatment. The question of glacial erosion has been stressed to illustrate the fact that we have in these two volumes no mere mosaic of facts arranged by some good artisan in stipulated pattern, but a painting into which the artist has put not only the skill of his brush, but much of himself. Even where one may differ from the author in interpretation, one must admit that the picture of facts is accurately and ably drawn. DeMartonne knows his Central Europe, has labored intensively on a variety of its geomorphic and geographic problems and writes as one having authority.

After discussing the Alps the author devotes several chapters to the structure and relief of the Carpathians; to the Hercynian folded zone with its recent and ancient erosion surfaces now deeply dissected by stream erosion, its elevated blocks of massive crystallines and its depressed sedimentary basins; and to the vast low plains, where a rise of sea-level sufficient to bring the waters one quarter of the way up the Empire State Building in New York City would completely submerge almost all northern Germany, three

quarters of Poland, much of Roumania and the broad Hungarian lowland.

Like the Hebrew deity of old, DeMartonne lets the waters under the heaven be gathered together in one place, treating them in Chapter VI. He shows that the ratio of runoff to precipitation must vary widely with differences in several factors, especially climate. On the basis of this ratio he divides Central Europe into four great hydrographic regions—the northern plains, the lower mountains (principally the Hercynian region), the alpine zone and the eastern or Danubian region. Since the larger rivers traverse more than one of these regions, special discussion is accorded the Rhine, Elbe, Vistula and Danube. It is shown that great contrasts in hydrographic conditions exist even in Central Europe and that the geographic consequences of this fact are far reaching. The geographic rôle played by the varying quantity of water in the soil, the limited use of large rivers as boundary lines, their extended utilization as commercial routes and the great influence they have exerted on the migrations of peoples and on the political history of the region are discussed.

To complete the picture of the natural environment, the stage on which the human drama has been played in Central Europe, DeMartonne last turns to the vegetable and animal life of the region. While man has, indeed, changed both these elements of his habitat, he has merely modified their aspect and composition. He has not altered the major contrasts in fauna and flora which he found existing between different regions, and he has had to shape his own activities with respect to those contrasts. In our author's opinion the relations between what he calls biologic geography and human geography are rarely more intimate and more complex than in Central Europe; and he essays to analyze the natural living world, especially the plant world, to give us a background for better understanding of the human geography.

The Peopling of Central Europe

With the picture of the natural environment of man thus complete—climate, relief, hydrography, plant and animal life—DeMartonne next proceeds to discuss the origin and evolution of the peopling of Central Europe. Here the reader's attention is directed to contrasts in the densities of populations and in their manner of living, and to those contrasts in races or nationalities which eventuated in a bloody conflict and the remaking of the map of Europe. The influence of climate, of topography and especially of types of vegetation on the concentration of man in certain areas is emphasized. Even in Neolithic time can one detect the grouping of men on the karst plateaus, on areas of loess, or continental dunes and in the zones bordering the sea and larger lakes; all areas where primitive man did not have to contend with a heavy forest cover. Despite changes of climate, and despite the waves of migrating peoples which have swept over Central Europe, these areas have remained to our day places of human concentration. The type of human agglomeration in each habitat; the influence of mineral deposits (greatest in modern times but not negligible in the most ancient); the effect of great commercial routes on human migrations; these and other cognate subjects receive due consideration. We have a striking picture of the historic pathway of the Danube, its vast plains opening more and more amply toward the east, there gathering the currents of commerce and directing them up its valley to flow through Central Europe to the lands of the extreme west. Here also flowed the ancient tides of migration, and the Celtic names of rivers abounding in the upper basins of the Danube and Rhine mark the passage of that ancient Celtic wave which was stopped only on the rocky coasts overlooking the Atlantic. The influence of the pathway of the Rhine, the origins of the great currents of population, the later invasions of the barbarians into a Romanized world, all find place in this discussion.

A last chapter in the series devoted to "General Considerations" sets forth the author's ideas on nationalities, political states and economic groupings. The recent rise of nationalism, founded especially on language and spread by the wide diffusion of primary education in the nineteenth century, is traced; and account is taken of the powerful impulse which nationalism received from the ideas of political liberty and social emancipation associated with it. Geography registers the results of these forces, and the Germanic, Slavic, Roumanian and Hungarian groups, the chief nationalities of Central Europe, are described.

Next the states are considered. The destruction in 1919 of frontiers which had evolved during long centuries according to one set of principles, and their reconstruction on a different basis, gave us the new political map of Europe. In the evolution of the old Europe the principle of imperialism had dominated, the memory of the Roman Empire being a potent force actuating many later rulers. The transformation of many small states of 1789 into a few larger and more powerful, then the breaking up of some of the latter in 1919 along lines of nationality, are touched upon briefly. We get some idea of the French geographer's point of view when he says: "One may prefer stability to artificial concentration; one may find more security in a group of well built

houses than in a single proud edifice built on uncertain foundations."

Finally, the rôle of economic forces is recognized as one destined to be increasingly greater in the future. "After the idea of nationalism, the repression of which caused an explosion, nothing more striking has been revealed in the contemporary period than the idea of economic power." The progress of industrialism and intensive commerce, which transformed Great Britain, has already gained possession of a great part of Central Europe.

Extended Account of Central European States

So closes the general discussion, in which the major lines of the picture of Central Europe are sketched with a master hand. Henceforth, for the remaining two thirds of the first volume and for all the second volume, the treatment is regional, by states. Germany comes first, and receives, as is its due, by far the most extended consideration. The nature of the German political state and of the people is first discussed. Then in turn the regional subdivisions of Germany are described, the general method being to present for each an account of its geologic structure and topographic relief, followed by discussions of the evolution of the population and its modes of life as affected by relief, climate, vegetation and other factors, with some account of the resulting regional types. The method is not rigidly the same for every subdivision, but is adapted to the needs of each. When the parts of Germany have been described in sufficient fulness, including an account of the chief seaports and great cities of the northern plain, there follow two chapters on the general character of the economic life of the people, one consecrated to agriculture and industry, the other to German commerce.

Such is the broad plan of regional treatment. It is followed, with minor modifications appropriate to special cases, in the less extended treatments of Switzerland, Austria, Hungary, Czechoslovakia, Poland and Roumania, constituting the second volume. Space forbids further review, but special mention should be made of the admirable illustrations which adorn the two volumes. The block diagrams are of great value in enabling the reader to visualize the regions described, while the maps are of the high excellence one has learned to expect from DeMartonne. Attention may be directed to the beautiful map of Switzerland in colors and hachures combined, and to the population map of the eastern portion of Central Europe, where colors for ethnic varieties are skilfully combined with symbols, faintly indicated in black line, to show density of population.

DeMartonne's Central Europe is something more than a scholarly production. In conception and method of exposition, in breadth of scope and wealth of detail, in clarity of text and excellence of illustration, it is in the truest sense a masterly work.

Other Volumes and Their Authors

We can here but briefly notice other volumes of the series although their worth amply merits full review. Professor Albert Demangeon, of the University of Paris, contributes one volume on "The British Isles" and another on "Belgium, the Netherlands, and Luxembourg." Distinguished student of economic conditions in Europe as affected by the rise of American financial power, Demangeon is well known in this country for his thought-provoking volume on "Le Déclin de l'Europe," published in English translation under the title, "America and the Race for World Dominion." From this productive author have come also, among other important works, a study in colonial geography entitled "L'Empire Britannique," of which an English translation is likewise available, and a treatise on the regional geography of Picardy and adjacent regions. Demangeon's special fitness to give us illuminating discussions of the geography of the British Isles and the adjacent low countries of western Europe must be evident. The reader of his two volumes will find that in addition to scientific competence he possesses a graceful yet graphic style which makes the perusal of his pages as delightful as it is profitable.

To "Russia and the Baltic States" is devoted a large volume by Professor Pierre Camena d'Almeida of the University of Bordeaux. The quality of the man and the breadth of his information are partially indicated by the fact that during the great world conflict, seated in an office in the Ministry of War at Paris and subjecting to scrutiny the German notebooks and other material collected from the battlefields, he was able, by his amazing acquaintance with the geographic distribution and character of the German population and its troops, to keep the Allied armies informed of the rise and fall of German man power. Since the war he has published a valuable work on the organization of the German armies. In the field of historical geography he has given us a scholarly volume on the development of geographic knowledge concerning the Pyrenees. To the present task he brings familiarity with the Russian tongue and unusual acquaintance with Russian geography. The result is a most valuable picture of a region on which the eyes of the world have long been turned, and about which authoritative information is much in demand.

"Western Asia," and the central Asiatic Highlands, or "High Asia," are jointly treated in a volume by Professor Raoul Blanchard of the University of

Grenoble, and Fernand Grenard, minister plenipotentiary of the French Government. Professor Blanchard, able and energetic founder and director of the Institute of Alpine Geography at Grenoble, is well known to his American colleagues. He has more than once come as visiting professor to American universities, and for some years has been resident professor of geography at Harvard University during the fall semester. One of the most distinguished of French geographers, Blanchard's high competence is attested by the steady succession of quarterly volumes of the "Revue de Géographie Alpine" containing the fruits of his own labors and those of his disciples; by his treatise on the regional geography of Flanders; and by briefer volumes on the urban geography of Grenoble, and on the general geography of France (translated into English by Millicent Todd); and by his recent researches in the geography of southeastern Canada. Gifted with a forceful and piquant style, and fortified by personal acquaintance with parts of the regions described, Blanchard presents in nearly two thirds of the Asiatic volume a series of images of western Asia which easily live in the reader's memory. Grenard's "High Asia" is accorded somewhat less space, but gives the reader an effective picture of the most imposing mountain highland in the world. To the task of preparing this picture the author brought experience in the field of political science, and extended personal contact with the regions described during service on scientific missions in Turkestan, Thibet, Mongolia and China, and during residence in Asia as consular officer for his government. Prior to undertaking the work for the "Géographie Universelle," he had published the results of his scientific studies in these regions, and a general work entitled "Le Tibet: le Pays et les Habitants."

Jules Sion, professor at the University of Montpellier, is author of the two large volumes devoted to "Asia of the Monsoons." Sion is a distinguished specialist in the geography of rural regions, and the author of an important work on the peasants of eastern Normandy; but his capacity for the broader treatment required in synthetic geographic composition is well demonstrated in his geomorphic study of the Upper Var Valley. Perhaps it was his experience in the field of rural geography which dictated his selection as author of the volumes describing such countries as India, China, Indo-China and Japan. His authoritative account of the geographic background of these countries, charmingly written and beautifully illustrated, should be most welcome to all concerned with the peculiarly difficult problems presented by the Orient.

The volume consecrated to "Oceania and the South Polar Regions" has been prepared by two specialists in the field of colonial geography: Paul Privat-Deschanel, professor at the Lycée Condorcet and the École Coloniale; and Maurice Zimmerman, chargé de cours at the University of Lyon. The larger part of the volume consists of the text by the first author, describing Australia and the islands of Oceania in language that is notably clear and readable in spite of the great condensation required. Privat-Deschanel has sojourned long in Oceania and is well known for his writings on the economic geography of Australia and adjacent regions. Zimmerman's facile pen has long made him a welcome contributor to the French press on subjects of general scientific interest, while his excellent reviews of the progress of polar exploration have been a feature of the "Annales de Géographie." His portion of the volume is comparatively short, but ably presented.

Maximilien Sorre is the author of the volume on "Mexico and Central America." Formerly professor of geography and dean of the Faculté des Lettres at the University of Lille, his high administrative abilities recently led to his selection as Recteur of the University of Clermont-Ferrand. But before his entrance into the field of university administration he had gained a sure place for himself in the field of geography. To him we owe economic discussions of the coal mines and quarries of northern France, and a critical study of viticulture and of the commerce in wines in Bas-Languedoc during the eighteenth century. A specialist in the field of biogeography, particularly plant geography, Sorre is not altogether a stranger to the treatment of Spanish countries. From his able pen we have previously had two volumes on the Pyrenees of southwestern France and northern Spain. American students will follow with interest his portrayal of the geographic setting of our southern neighbors.

The two volumes devoted to "South America" have been written by Pierre Denis, whose volumes on Brazil and the Argentine Republic, published in both French and English editions, bear witness to his acquaintance with this part of the world. A residence of two years in the Argentine, a long voyage in Brazil and visits to Chile and Peru, coupled with a knowledge of the Spanish and Portuguese languages, qualify him to speak authoritatively on South American problems. Students of these problems have found in Denis's earlier works a valuable source of aid, and will welcome his contribution to the "Géographie Universelle." The text of the two volumes is very concise, perhaps almost too much so; the photographic illustrations, like those of other volumes of the series, are altogether admirable.

Students in this country will be particularly inter-

ested in the selection of the author for those volumes, two in number, which are to describe the United States and Canada. While the volumes are not yet published, it is announced that their preparation has been entrusted to Professor Henri Baulig of the University of Strasbourg. It is from his pen that has recently come one of the most scholarly monographs on European geomorphology published for many years: his study of "Le Plateau Central." Baulig is not only familiar with the English language and with American geographic and geologic literature, but has studied and traveled in this country. To the competence thus gained for handling American geographic subjects he adds a keenness in logical reasoning and a forceful style which should make his descriptions of our country peculiarly valuable.

Among other volumes not yet published are the following: "Scandinavian Countries and the North Polar Regions," by Maurice Zimmerman; "France" (in two volumes), by Lucien Gallois; "The Mediterranean and Mediterranean Peninsulas" (two volumes), by Max Sorre, Jules Sion and Y. Chataigneau; "Northern and Western Africa" (two volumes), by Augustin Bernard; and "Eastern Equatorial and Southern Africa," by Fernand Maurette.

CONCLUSION

Such, then, is the "Géographie Universelle." To it the geologist and geographer, the botanist and the zoologist, the meteorologist and climatologist, the economist, the sociologist, the historian and the student of political science may turn, assured of finding condensed yet readable matter germane to certain phases of their several subjects, often with citations of authoritative works in different fields. It is not, and could not be, an exhaustive reference work for specialists in so many branches; yet it contains much of interest for both the specialist and the layman. All who delight in books well written, handsomely printed and beautifully illustrated, and who find profit in condensed accounts of the salient features of regions and their peoples, will not be disappointed in the "Géographie Universelle." Into its preparation has gone a prodigious amount of competent labor. The result is a work which can, without exaggeration, be called truly monumental.

SCIENTIFIC EVENTS

BRITISH INDUSTRIES FAIR

THE twentieth British Industries Fair which was held from February 19 to March 2, is said to be the largest national trade fair in the world. Only goods manufactured or produced within the British Empire are permitted to be displayed and no exhibitor may show articles other than those of his own manufacture. The three principal sections of the fair were held at Olympia and the White City in London, and Castle Bromwich, Birmingham. *Nature* describes the exhibits in part as follows:

At Olympia the lighter industries were represented, while the furniture and textile industries had their displays at the White City. The Birmingham (Castle Bromwich) Section was devoted to the "heavy" industries, such as hardware, sanitary ware, gas plant for industrial and domestic use, building, electricity, engineering, metals, mining and railway equipment.

One interesting feature to be noticed each year at the fair is the extent to which new scientific ideas, discoveries and inventions are being applied industrially. Sir Josiah Stamp and other writers have directed attention to the "lag" between the completion of an invention or discovery, on the laboratory scale, and its routine incorporation, in applied form, in large-scale industrial operations. The annual exhibition of the Physical Society always has some feature or features of novel scientific interest: how long is it before such a new scientific idea becomes routine practise in the workshop? One may get some indication of the lag by noticing how long it is before the same idea is embodied in some industrial product exhibited at the British Industries Fair.

In the hardware, ironmongery and brass-foundry group of exhibits at Castle Bromwich, the number of chromium-plated products shown indicates how greatly the improved technique of the electro-chemical deposition of chromium is being applied industrially—repeating, it may perhaps be said, in this connection the older story of stainless steel. At Birmingham the latest scientific improvements in equipment for general heating and cooking, and in furnaces for the metallurgical industries were exemplified in numerous exhibits. In the exhibition of electrical plant and accessories there were new and interesting features in generators, motors, transformers, rectifiers, condensers, accumulators and switchgear. Recent developments in electrification have called for high-speed rotary machines; and the comparatively new industry—that of plastic moulding—has had its repercussions on the engineering industry by giving an impetus to the production of special presses. Similarly, the demands of motor and aircraft engineering have led to the evolution of acid-resisting and rustless steels and of new light-weight alloys having great tensile strength. All these and many other developments were to be seen in the exhibits at Castle Bromwich.

At Olympia an exhibit of special scientific interest was the United Scientific Instrument Exhibit. Among the cinematograph machines shown, both for taking and for projecting, was a pocket cinematograph camera which, by the turn of a switch, can be converted into a cinema-