kind and serve as types." When this suggestion is well carried into practise, geography will have made a great advance.

W. M. D.

SYSTEMATIC PHYSIOGRAPHY

A SERVICEABLE article by Hettner, professor of geography at Heidelberg, on 'Das Wesen und die Methode der Geographie' (*Geogr. Zft.*, XI., 1905, 545–564, 615–629, 671–686), revives Ritter's conception of geography as the science that is concerned with the material filling of terrestrial spaces—'die dingliche Erfüllung der Erdräume'—and emphasizes the importance of the causal notion which has been coming into greater and greater prominence in the last half century, as fuller explanation has been found for the earth's physical features, and as fuller meaning has been given to the distribution and behavior of plants, animals and man by the philosophy of evolution. He recognizes also the advantage that comes from a scientific terminology in making short and clear descriptions possible; yet he expresses a doubt as to the possibility of describing various geographical features such as valleys and towns, in generic terms, because such features possess so many details which can be portrayed only by individual description. The Neckar Valley is taken as an example to illustrate this conclusion; it is briefly described as 'a *Durchbruchstal* formed in a climate without the cooperation of ice action; we can perhaps still find even a few more generic features, but everything else is individual.' This is hardly more than begging the question, for the possibility of giving an adequate account of the Neckar Valley in terms of generic features can not be so lightly tested. The study of the development of generic features in the class of incised meandering valleys, to which the Neckar Valley belongs, has already proved the repeated or systematic occurrence of various minor elements whose recognition greatly increases the power of description. (See an article by the undersigned on 'Incised Meandering Valleys,' *Bull. Geogr. Soc. Phila.*, July, 1906.) In view of the notable progress of this kind in recent years there is every reason to expect a still greater progress in the years to come: there is indeed no direction in which a physiographer may labor more profitably than in contributing to this progress. Instead of practically giving up the problem, and abandoning the method of systematic or generic description of geographical features as impracticable because insufficient, as Hettner suggests, it is our plain duty to make every effort to develop it farther than its present stage, in the manner suggested by Russell in the preceding note; and there is good ground for hope that systematic description may yet be so far advanced, especially if carefully chosen adjectives are consistently used to modify the generic nouns which represent standardized type forms, that whatever local supplement is needed will be not so well given by an unsystematic verbal account of individual features as by reference to a good map, where many items that are fatiguingly represented in words are very easily shown graphically.

W. M. D.

THE NEW GEOLOGICAL SURVEY OF BRAZIL

The Diario Official, the official organ of the federal government of Brazil published at Rio de Janeiro, in its issue of January 22, 1907, prints the text of the decree establishing the Brazilian Geological Survey or, as it is called officially, the 'Serviço Geologico e Mineralogico do Brazil' (the geological and mineralogical service of Brazil). This decree was approved January 10, 1907, by the president of the republic, Affonso Augusto Moreira Penna, and by the minister of industry and public works, Miguel Calmon du Pin e Almeida, and has already gone into effect.

The following instructions are translated from the same issue of the *Diario Official:*

Instructions for the Operations of the Serviço Geologico e Mineralogico do Brazil

Article I.—The following are the principal objects of the geological service:

1. To carry on a scientific study of the geological structure, mineralogy and mineral resources of the territory of the republic, having

especially in view the development of the mineral resources and of the surface and underground waters and the collection of such information regarding the geologic and physiographic nature of the country as may serve as a basis for the determination of routes of communication and other public enterprises, especially such as may tend to relieve the effects of drouths.

2. To maintain a laboratory and museum of geology and mineralogy and to collect, classify and arrange for exposition in this country and in the chief foreign centers specimens accompanied by proper information suitable to give those who may be interested as complete knowledge as possible concerning the geology, mineralogy and mineral resources of Brazil; and to have made such chemical, paleontological and other investigations as may tend to the fulfillment of the principal objects of the service.

3. To prepare and publish maps, plans, diagrams and drawings or photographs for the illustration and elucidation of the investigations, reports and other publications of the service.

4. To organize and publish statistics of the mineral production and of the mining and metallurgical industry of the country; to study facts relating to water-supply both for irrigation and for domestic and industrial purposes; to study the question of artesian and other wells, and also matters relating to the mines and mining enterprises in the country and systematically to make known its mineral wealth.

5. To furnish data and information upon questions relating to lands and mines and also upon all questions concerning the mining industry and other objects of the service whenever called upon by the federal government, or, with the government's authorization, when called upon by the state governments or by private parties.

Article II.—The appointment of the technical and administrative assistants of the service, with the exception of the chief, will be made by the minister.

The chief of the geological and mineralogical service will be appointed by decree.

Article III.—It shall be the duty of the chief of the service:

1. To appoint and dismiss such assistants as are not subject to appointment by the minister, to indicate their salaries and to fix the wages of technical assistants.

2. To organize, direct and fiscalize the work of the service and to assign the duties of the assistants.

3. To call upon the proper authorities either personally or through his representatives for whatever may be necessary in the prosecution of the work.

4. To furnish, whenever required to the ministry, information regarding expenses incurred and results accomplished, and to make an annual detailed report regarding the affairs of the service.

5. To make provisions in urgent cases for any omissions in the present instructions, and subsequently to submit his act for the approval of the government; also to indicate who shall act in his stead in cases of impediment.

Article IV.—The technical personnel composed of specialists of recognized fitness shall carry on the studies and work of the service in accordance with the expressed instructions of the chief.

Article V.—The secretary together with the clerk shall do the writing and keep the accounts of the service and of such other work relating to it as the chief may direct.

Articles VI., VII. and VIII. relate to expenses and the salaries, while article IX. provides for the further development of the service.

Under this decree Professor Orville A. Derby was appointed chief of the service, and the chief has asked for the appointment as assistants of the following Brazilian geologists:

Dr. Miguel Arrojado R. Lisboa, to have charge of the investigation of the gold, iron and manganese deposits in the state of Minas.

Dr. Luiz Filippe Gonzaga de Campos, who will probably undertake geological studies on the Rio Purus in the Estado do Amazonas.

Dr. Francisco de Paula Oliveira will proceed with his studies of the coal deposits of Santa Catharina and Rio Grande do Sul.

Professor O. A. Derby, the chief of the service, is a native of the state of New York, having been born at Kelloggsville in 1851. He entered Cornell University in 1869, graduated in 1873, and took his master's degree in 1874. He accompanied Professor Hartt to Brazil in 1870, 1871 and again in 1872. In 1874 Professor Hartt went to Brazil, leaving Mr. Derby as assistant in charge of the department of geology at Cornell. A geological survey of Brazil (Commissão Geologica do Brazil) was inaugurated in 1875 with Professor Hartt as chief, and on this Mr. Derby was appointed assistant geologist. He reached Rio de Janeiro in 1875, and he has lived in Brazil ever since. He was connected with the geological commission as long as it lasted; upon its suspension and after the death of Professor Hartt he was appointed director of the geological section of the national museum in Rio de Janeiro. In 1886 he was made director of the geological and geographical survey of the state of São Paulo, a position which he retained until 1905, when he resigned.

Among the authorities upon Brazilian geology Professor Derby is *facile princeps*. His papers on the subject number something over one hundred, and other writers upon Brazilian geology have also drawn largely upon his rich store of information. In addition to his own direct contributions he has been instrumental in getting the cooperation of many of the best specialists in the world to work up and describe special collections. For example, the 'Cretaceous Paleontology' of Brazil by Dr. C. A. White and the 'Paleozoic Faunas of Pará' by Dr. John M. Clarke are monumental contributions to the geology of Brazil that were made possible by Mr. Derby's efforts and cooperation. The well-known writings upon Brazilian mineralogy and petrography by Dr. E. Hussak were also made possible by Professor Derby's appointment of that able geologist to a position on the São Paulo survey. Among Mr. Derby's most noteworthy direct contributions to geological literature are his papers on the origin of diamonds, on the nephelene rocks of Brazil, and on the geology of the lower Amazonas.

Dr. Gonzaga de Campos is a native of the state of Maranhão, where he was born in 1857. After completing the preparatory course in the Polytechnic School of Rio de Janeiro, he entered the newly established School of Mines at Ouro Preto as one of its first students, graduating with honors in 1880. He did private work for a year, when he was called as assistant to the geological Survey of the state of São Paulo, then being carried on under the direction of Professor Derby. He has published ten important papers upon Brazilian geology. Of these papers, one upon the coal deposits of Santa Catharina, another upon the diamond deposits of Agua Suja of Minas, and a third upon the bituminous shales of Marahú in Bahia are especially worthy of mention.

Dr. Miguel Arrojado R. Lisboa is a native of the city of Rio de Janeiro, where he was born in 1872. He is the grandson of the Baron of Japurú, who was some time Brazilian minister at Washington. His technical training was received at the School of Mines at Ouro Preto, where he graduated in 1894. After graduation he was employed as geologist by Barão de Capanema and later he entered the topographic corps engaged in mapping the state of Rio de Janeiro. From 1898 to 1900 he studied at the University of Berlin and in Paris and, returning to Brazil, opened an office as mining engineer and consulting geologist in Rio de Janeiro. Dr. Lisboa is the author of about a dozen papers upon the geology and mining industries of Brazil. The most important of these are upon the Brazilian manganese deposits, the monazite sands, and the iron industry of Brazil. The January, 1907, number of the *American Journal of Science* contains an article by Dr. Lisboa upon facetted pebbles found by him in the interior of Brazil.

The other assistant, Dr. Francisco de Paula Oliveira, is also a native Brazilian, and a graduate of the School of Mines at Ouro Preto. He is an active and prolific writer, being the author of seventeen papers upon the

geology and mineralogy of Brazil. It is expected that additional assistants will be appointed in the near future.

The Brazilian people are to be congratulated upon the establishment of this important service. The development of the great mineral resources of that country and the growth of a healthy, hopeful and helpful interest in geology may now be looked for with confidence.

The character, the professional high standing and the unselfish patriotism of the men entrusted with the survey are a guarantee of the abundant and trustworthy results to be expected.

J. C. BRANNER
STANFORD UNIVERSITY, CALIFORNIA,
March 7, 1907

THE FAYÛM EXPEDITION OF THE AMERICAN MUSEUM

IN the Middle and Upper Eocene fluvio-marine formation of Northern Egypt most important paleontological discoveries were made between 1902 and 1905 by Mr. Beadnell, of the Egyptian Geological Survey, and Mr. C. W. Andrews, of the British Museum of Natural History. From being the terra incognita of paleontology Northern Africa suddenly sprang into prominence as the center of origin and evolution during the Eocene and Oligocene periods of four great groups of mammalia whose early history had previously been entirely unknown. These were, in order of importance, the Proboscidia or mastodons and elephants, the Sirenia or manatees and dugongs, the Hyracoidea or tree and rock conies and the Zeuglodontia or Archæoceti, or primitive toothed whales. Together with the primitive, or rather the early forms of these mammals, because certain of them are already highly specialized, occur a few members of two other faunæ, namely, of the upper Eocene of France, and secondly a purely African contingent including chiefly the giant horned quadruped appropriately named *Arsinoïtherium*. This animal held an adaptive position in the faunæ complex somewhat similar to that of *Dinoceras* in our western tertiaries. Large collections of these mammals were made by the Egyptian Survey for the Cairo Museum and by the British Museum, on which was based the admirable memoir by Dr. C. W. Andrews published by the British Museum some months ago.

This fauna has a peculiar interest for the department of vertebrate paleontology in the American Museum because three of these great African or Ethiopian groups of mammals sooner or later reached North America, namely, the Zeuglodontia in the Eocene of Alabama and Georgia, the Sirenia in the Miocene of the western coast, the Proboscidea in the Middle Miocene of the western tertiaries. The subsequent American phases are all represented in the museum collections, and it was obviously desirable to trace the ancestry back to the earliest known stages. A further cause of personal interest to Professor Osborn was the fact that in an address before the New York Academy of Sciences in 1900 he had predicted that three or more of these groups would most probably be discovered in Africa. The publication of Andrews's memoir made the field and the subject free for scientific research by other workers and after considerable correspondence and inquiry into the probabilities of success the project of an expedition was approved by the president and by the director of the American Museum. With his usual liberality President Morris K. Jesup decided to defray the chief expenses of a three or four months' expedition, and preparations were made to leave New York on January 5 and to begin work in the Fayûm as early as possible in order to take advantage of the cool months of the Egyptian winter. Professor Osborn selected as his assistants Mr. Walter Granger and Mr. George Olsen, of the museum staff. President Roosevelt, Mr. Joseph H. Choate and Director Charles D. Walcott sent letters to Lord Cromer and other officials of the English protectorate supporting the chief objects of the expedition.

The party reached Cairo on January 24, expecting to occupy ten days or more in outfitting with camels, water tanks, supplies and men. But Director H. G. Lyons, of the Egyptian Geological Survey, entirely altered this estimate by most liberally placing all the necessary equipment from the survey at Pro-