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The progeess of physical geography

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by an unnamed writer (this and two other chapters on defence are the only anonymous chapters in the series), on Educational Problems of the Empire by E. B. Sargant, on Problems of Health and Acclimatisation by F. M. Sandwith, on the Mapping of British Territories by Colonel C. F. Close, and on Some Aspects of Imperial Commerce and Communication by O. J. R. Howarth, one of the editors.

Of all these chapters one will probably turn in present circumstances with keenest interest to the anonymous one on Imperial Defence, which will be found well worth perusal. Events which have happened since the publication of the volume give peculiar significance to the following extract from it :—

“In addition to the friendships based on common needs and interests arising out of our main policy, we have treaty obligations and alliances, which might compel us to employ force in Europe or elsewhere. In conjunction with all the Great Powers, Britain guarantees the neutrality of Switzerland, Belgium, and Luxemburg, and the integrity of Norway. . . . The Anglo-French Agreement was entered into in 1904, and thereby all serious causes of friction with France were removed, and the way paved for the good understanding that exists at present. As far as Europe is concerned the result is a well-established *entente*, and although no definite obligation exists, the French probably have good grounds for hoping that common interests would compel us to afford them assistance against aggression. . . . Our relations with Germany, Austria, and Italy are individually good, and no questions are pending between us that could conceivably justify war. . . . Danger, if danger exists, arises solely from the possibility of German aspirations developing an aggressive tendency, which might imperil the balance of power in Europe” (pp. 181, 183, 185).

The accompanying illustrations, for which we are indebted to the publishers, may serve to indicate how admirably those in the book represent the scenery and surface features of the different parts of the Empire.

G. G. C.

THE PROGRESS OF PHYSICAL GEOGRAPHY.

By J. D. FALCONER, D.Sc.,

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THERE are still to be found those who dispute with geographers their right to investigate the origin of surface features, and who accuse them of appropriating to themselves a recognised branch of geological inquiry. They claim that geographers should build up the framework of their science upon a purely topographical basis, and that the investigation of the superficial morphology should remain a preserve of the older science. In this view, however, geographers have persistently and for excellent reasons refused to concur.

The scope of geography may be defined in popular language as the

scientific investigation of the surface of the earth as the home of man and the scene of his activities. It is obvious that any such investigation could not be termed scientific if, so far as morphology is concerned, it ended with the work of exploration and the making of topographic maps of the surface of the earth. The discovery of the reasons for the varied architecture of the inhabited and uninhabited regions of the globe is clearly a primary duty, and could be neglected by geographers only if the matter were already adequately treated in text-books of geology.

Now it is true that it is to geological text-books that we turn for the most complete account of the modelling processes. Geographers have never hesitated to admit their indebtedness to those great masters of geology who devoted their attention to the principles of physical geography. To geologists, however, the present is the key to the past. They undertake the discussion of processes with a view to the elucidation of the geological record, and, having found the clues which they seek, they retain only a secondary interest in the processes themselves. The geographical outlook is entirely different. To the geographer the modelling processes are of primary importance as having fashioned and sculptured the home of man. He uses his knowledge of geology and of other sciences in reconstructing the physical character of the habitation into which man entered, but it is the recent changes which the edifice has undergone, the chisellings and the alterations to which it has been subjected in the immediate past, and to which it will be subjected in the future, that interest him most of all. Any hints of the geography of past ages which geologists may discover in the course of their investigations are welcomed by geographers. But while to the geologist interest increases the farther he penetrates into the dark backward and abysm of time, the enthusiasm of the geographer rises and swells as he traces from the dimly lighted past the evolution and elaboration of the present surface of the earth. The investigation of processes is undoubtedly common ground, but from the common standpoint the outlook of the two sciences is almost diametrically opposed.

With regard to the accusation that geography is filching from geology a recognised field of activity, it may fairly be asked on what authority the investigation of surface features is claimed as an essential part of geological science. The great glacialists of the world freely admit that a large part of their work is geographical and not geological. The whole trend of modern geology is increasingly and logically away from the surface, and no better proof of this can be given than the fact that in any recent Survey Memoir the pages assigned to a consideration of the surface features bear a very small proportion to those devoted to petrography, palæontology, and sub-surface structure, while on the other hand, the knowledge of these matters necessary for a geographer is such as can be acquired by a diligent student in half a dozen field and museum demonstrations!

Again, the writers of text-books of modern geology make no attempt to give a systematic scientific account of the superficial features of the earth's crust. Processes are treated in time-honoured fashion, and, as already mentioned, some of the finest descriptions of these processes are

to be found in geological text-books. But where is there to be found in these volumes any evidence of progress in the investigation and classification of surface forms similar to the progress which is to be noted in mineralogy, petrology, palæontology, and stratigraphy? Illustrations of processes may be given from various parts of the world, but there is no attempt at regional treatment, no systematic survey of the physical features of any country or continent. Indeed, so far is this from being the case, that there are not even given concise and readable summaries of the solid geology of continents and regions, from which a geographical student might at times gain some clue to the origin of the relief! Apart from the description of processes, which is common ground, there is in fact no indication of geology showing any exceptional interest in the study of surface features. This study, indeed, represents a separate, though contiguous, field of investigation, and is no more dependent upon modern geology than is geology itself upon chemistry or zoology. And as, on the principle of the partition of Africa by the European powers, an established science has no claim to a contiguous field which it does not actively occupy, geography cannot be justly accused of appropriating a definite branch of geological inquiry.

It is necessary, however, that we should show in turn that geography is actually making definite progress in this very field. In the first place, it is to text-books of modern geography that one turns for summaries of current opinion upon the origin of the major features of the continents and the oceans, and such text-books strive also to give the reader as far as possible a definite and scientific account of the physical characters of the regions and countries of the world. Again, in their account of processes, the writers of these text-books have welcomed the suggestion of "stages" or "phases" in the life history of topographic forms, and are alive to the necessity of a more scientific treatment of surface features. They all recognise that a genetic classification of land forms is one of the desiderata of the science, and emphasise the importance and desirability of discovering a satisfactory system. Various attempts have been made to achieve this end, and one of the most interesting of those hitherto published is that contained in a monograph by Professor Passarge on "*Physiologische Morphologie*," which appeared in Heft 2, Band xxvi. of the *Mitt. des Geog. Gesell. in Hamburg*.

Professor Passarge remarks that the ideal which geographers should set before them is the same as that towards which botanists and zoologists have already progressed, namely, the discovery of a natural genetic classification of surface forms into classes, orders, families, genera and species. He points out, however, that in the case of geography the task is of exceptional difficulty, owing to the fact that so many forms are the result not of the activity of one force only, but of a combination of forces, that is, are not *monodynamic*, but *polydynamic*. In his system of classification of ideal monodynamic forms, he sets up two great types of surface forms, Land Forms and Coastal Forms, which according to him include all the forms occurring within the region of activity of the two greatest force-groups. These major force-groups he subdivides into successively smaller groups, down to single

forces, and corresponding with the force groups he establishes groups of land forms representing orders, families, genera and species or special forms. In the summary here given, only the classes, orders and families are enumerated, the reader being referred to the original monograph for the genera and species of each family.

Type A. Land Forms.

Class A. Endogenous Forms.

Order I. Tectonic Forms.

Family 1. Flexure Forms.

2. Fracture Forms.

3. Fold Forms.

Order II. Volcanic Forms.

Family 1. Intrusive Forms.

2. Eruptive Forms.

Class B. Exogenous Forms.

Order I. Accumulation Forms.

Family 1. Water¹ accumulation Forms.

2. Ice accumulation Forms.

3. Glacier accumulation Forms.

4. Wind accumulation Forms.

5. Sea accumulation Forms.

6. Vegetable accumulation Forms.

7. Animal accumulation Forms.

8. Accumulations due to changes of temperature.

Order II. Denudation Forms.

Family 1. Water¹ excavation Forms.

2. Ice erosion Forms.

3. Wind erosion Forms.

4. Disruption Forms due to temperature changes.

5. Disruption Forms due to the action of lightning.

6. Disruption Forms due to the action of the sea.

7. Disruption Forms due to vegetable action.

8. Removal Forms due to the action of animals.

Landscapes are next classified by Professor Passarge into four types :

A. Tectonic Landscapes,

B. Volcanic Landscapes,

C. Accumulation Landscapes,

D. Denudation Landscapes,

but into their subdivision we need not enter at present.

His second great type of surface features, namely, Coastal Forms, is subdivided into four classes :

Type B. Coastal Forms.

Class 1. Coastal Forms determined by the form of the adjacent land.

2. Coastal Forms determined by the form of the adjacent sea-floor.

¹ Rain and running water.

3. Coastal Forms determined by processes of accumulation now active.

4. Coastal Forms determined by marine erosion now active.

These classes are subdivided into orders, families, and genera, but the principle of subdivision is only in part physiological, and the classification need not therefore be further considered at present.

While recognising the exceptionally suggestive character of this monograph and recommending it for careful perusal by geographers, we may remark that Passarge's primary subdivision of surface features into Land Forms and Coastal Forms does not appear to be fundamental. His detailed treatment of Coastal Forms shows that what he is really classifying is coastlines or coastscapes as compared, not with Land Forms, but with Landscapes. Indeed it is very doubtful whether apart from marine erosion and accumulation forms there is such a thing at all as a coastal form as distinguished from a land form. While therefore Passarge's orders, families, genera and species of land forms may be provisionally accepted, with minor modifications which will suggest themselves at once to the reader, his major subdivision into types cannot be retained. There is in fact no necessity to carry the classification beyond his two classes A and B, exogenous and endogenous forms, and this will be at once clear if it is remembered that the irregularity of the present surface presupposes some kind of primary relief which has been modified in various ways by the superficial agents of erosion and accumulation. The primary relief of the crust is directly due to the action of the internal forces of the earth, while the sculpture and modification of the primary forms is the result of the action of wholly external, superficial, and in a sense secondary forces. If we use for these contrasted groups of forces the terms Endogenetic and Exogenetic, which are more expressive than Passarge's terms endogenous and exogenous, the classification will run as follows:

Surface Forms.

Class A. Endogenetic or Primary Forms.

Order I. Tectonic Forms, etc., etc.

Class B. Exogenetic or Secondary Forms.

Order I. Accumulation Forms, etc., etc.

The terms endogenetic and exogenetic, here used of the geographical processes and their results, have been used recently of geological processes and results by Mr. T. Crook in a paper on "The genetic classification of rocks and ore deposits," published in the *Mineralogical Magazine* for July 1914. Mr. Crook advocates the establishment of a more natural classification of rocks than geologists have hitherto adopted, and especially emphasises the importance of studying rocks in relation to the processes to which they owe their origin. The geological and the geographical processes are the same, although different phases of their activity are studied respectively by geologists and geographers: and it is interesting and satisfactory to note that the results of these processes which fall within the field of observation of the respective sciences may be primarily subdivided in identical terms.

Passarge's classification of Landscapes and Coastscapes will be considered in a future article.

OBITUARY

THE LATE MR. HERBERT B. FINLAY.

By the death of Mr. Herbert B. Finlay, which occurred suddenly at Newtonmore on 21st September, the Society has lost one of its most zealous and useful members. He joined the Society in 1896, and was elected a Member of Council in 1898. Appointed a member of nearly all the Committees of the Council, Mr. Finlay assiduously attended their meetings, and gave to the business before them an attention and devotedness which could not be excelled. Besides this useful work, he was a constant reviewer of books for the Society's *Magazine*. From his long experience of India, he was able to review works on that country in a masterly manner, but his interest in geographical literature was very wide, and he very frequently contributed to the *Magazine*, in addition to reviews, unsigned articles, based upon recent books. He was especially attracted to the history of geographical exploration, of which his knowledge was detailed and comprehensive. The accounts of the volumes issued by the Hakluyt Society, which have been a feature of our pages, are for the most part due to him, and he not infrequently followed up by-paths of the history of exploration in short articles relating to little known regions, associated with some explorer or romantic incident. The Editors of the *Magazine* and its readers will feel his loss greatly, for not only was his personal interest keen, and his willingness to assist in all possible ways very marked, but he urged continually the need for the Society's obtaining as wide a range of geographical books as possible, and for the bringing of these before the notice of its members by lengthy reviews.

Mr. Finlay was educated at the High School of Edinburgh, being a brilliant scholar in the days of Mr. John Carmichael. Passing into the Indian Civil Service, he obtained the position of Collector of Agra, and ultimately rose to be Commissioner. It was on his retirement from service in India that he returned to Edinburgh and joined the Society, which he placed under a special debt of gratitude when, on Colonel Bailey's having to go abroad on account of ill-health, Mr. Finlay acted for him as Secretary from 3rd November 1903 to 11th January 1904, and gave his whole time gratuitously to the official business of the Society.

GEOGRAPHICAL NOTES.

EUROPE.

Ethnology of Austria-Hungary.—In connection with this subject, now of current interest, the attention of members may be drawn to the article by Mr. Ralph Richardson which appeared in this *Magazine* in January 1906 (vol. xxii. p. 1). The map accompanying the article