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On the Scope and Methods of Geography

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*On the Scope and Methods of Geography.*

By H. J. MACKINDER, B.A.

(An Address delivered at the Evening Meeting, January 31st, 1887.)

WHAT is geography? This seems a strange question to address to a Geographical Society, yet there are at least two reasons why it should be answered, and answered now. In the first place geographers have been active of late in pressing the claims of their science to a more honoured position in the curriculum of our schools and Universities. The world, and especially the teaching world, replies with the question, "What is geography?" There is a touch of irony in the tone. The educational battle now being fought will turn on the answer which can be given to this question, Can geography be rendered a discipline instead of a mere body of information? This is but a rider on the larger question of the scope and methods of our science.

The other reason for now pressing this matter on your notice comes from within. For half a century several societies, and most of all our own, have been active in promoting the exploration of the world. The natural result is that we are now near the end of the roll of great discoveries. The Polar regions are the only large blanks remaining on our maps. A Stanley can never again reveal a Congo to the delighted world. For a time good work will be done in New Guinea, in Africa, in Central Asia, and along the boundaries of the frozen regions. For a time a Greely will now and again receive the old ringing welcome, and will prove that it is not heroes that are wanting. But as tales of adventure grow fewer and fewer, as their place is more and more taken by the details of Ordnance Surveys, even Fellows of Geographical Societies will despondently ask, "What is geography?"

It is needless to say that this paper would not be written were it my belief that the Royal Geographical Society must shortly close its history—a corporate Alexander weeping because it has no more worlds to conquer. Our future work is foreshadowed by papers such as those

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by Mr. Wells on Brazil, Mr. Buchanan on the Oceans, and Mr. Bryce on the Relation of History and Geography. Nevertheless, there will be great advantages in guiding our way into the new groove with our eyes to some extent, at any rate, open. A discussion of the question at the present moment will probably have the further incidental advantage of giving us new weapons in our educational struggle.

The first inquiry to which we must turn our attention is this: Is geography one, or is it several subjects? More precisely, Are physical and political geography two stages of one investigation, or are they separate subjects to be studied by different methods, the one an appendix of geology, the other of history? Great prominence has recently been given to this question by the President of the Geographical Section of the British Association. In his address at Birmingham he took up a very definite position. He said,—

“It is difficult to reconcile the amalgamation of what may be considered ‘scientific’ geography with history. One is as thoroughly apart from the other as geology is from astronomy.”

It is with great reluctance and diffidence that I venture to oppose so justly esteemed an authority as Sir Frederic Goldsmid. I do so only because it is my firm conviction that the position taken up at Birmingham is fatal to the best prospects of geography. I take notice, moreover, of Sir Frederic Goldsmid’s declaration that he is quite ready to abandon the conclusion at which he has arrived, before the arguments of sounder reason. In so difficult a discussion it would be extremely presumptuous, were I to assume that *mine* are arguments of sounder reason. I put them forward only because so far as I can see, they have not been met and overthrown in the address in question. Perhaps Sir Frederic Goldsmid has but expressed the vague views of the subject current in most men’s minds. This is the more probable, because in his own statement he has used arguments going to support a view opposed to that which he himself formulates.\*

On the same page as that from which our quotation is taken will be found a paragraph expressing the highest approval of Mr. Bryce’s “Geography in its relation to History.” The central proposition of Mr. Bryce’s lecture is that man is largely “the creature of his environment.” The function of political geography is to trace the interaction between man and his environment. Sir Frederic Goldsmid requires of political geography that it shall impart to our future statesmen a “full grasp” of “geographical conditions.” So far no exception can be taken to his views. But he seems to imagine that the “full grasp” of which

\* Sir Frederic Goldsmid has written a very courteous answer to this paragraph. From it I gather that I have not attached the meaning to his words which he intended. For that I am sorry. I leave the paragraph standing, however, as I believe that *mine* is not an unnatural meaning to attach to the words. They might easily be quoted against the geographers, and with the more weight because they come from a known friend of geography.

he speaks may be obtained from what remains after "physical and scientific" geography have been eliminated.

Before proceeding further, it will be well to see whether we cannot refine on our definition with advantage. Physiology would answer to the definition of the science which traces the interaction of man and his environment. It is the function of physiology, of physics, and of chemistry to trace the action of forces irrespective for the most part of precise locality. It is especially characteristic of geography that it traces the influence of locality, that is, of environment varying locally. So far as it does not do this it is merely physiography, and the essential topographical element has been omitted. I propose therefore to define geography as the science whose main function is to trace the interaction of man in society and so much of his environment as varies locally.\*

Before the interaction can be considered, the elements which are to interact must be analysed. One of these elements † is the varying environment, and the analysis of this is, I hold, the function of physical geography. Thus we are driven to a position in direct antagonism to current notions. We hold that no *rational* political geography can exist which is not built upon and subsequent to physical geography. At the present moment we are suffering under the effects of an irrational political geography, one, that is, whose main function is not to trace causal relations, and which must therefore remain a body of isolated data to be committed to memory. Such a geography can never be a discipline, can never, therefore, be honoured by the teacher, and must always fail to attract minds of an amplitude fitting them to be rulers of men.

But it may be retorted—For the purposes of political geography cannot you rest satisfied with a more superficial and more easily learned analysis than that furnished by physical geography? In reply, we take up our lowest position. Such analyses have been tried, and have been found wanting. It is practically easier to learn the profound analysis of science, raising and satisfying as it does at every point the instincts which drive us for ever to ask the question "why?" than to acquire a sufficient amount of information from the name-lists of the old school-books or the descriptions of so-called descriptive geography. Topography, which is geography with the "reasons why" eliminated, is almost unanimously rejected both by masters and pupils.

There are other reasons for our position of even higher importance than practical convenience in teaching. I will mention three. The

\* For another definition from a rather different standpoint see my speech in opening the discussion, *infra*, p. 160.

† The other element is, of course, man in society. The analysis of this will be shorter than that of the environment. It may best be considered on the lines of Bagehot's 'Physics and Politics.' The communities of men should be looked on as units in the struggle for existence, more or less favoured by their several environments. See p. 11 for definition of "community" and "environment."

first is this. If you learn what the old geographers term "the physical features" in their causal relations, advance becomes ever easier and easier. New facts fit in an orderly way into the general scheme. They throw a new light on to all previously obtained knowledge, and that knowledge in turn illuminates them from many points. When, however, the method of description has been adopted, and still more that of enumeration, each additional fact adds an ever-increasing amount to the burden to be borne by the memory. It is like throwing another pebble on to a heap of gravel. It is like learning mathematics by trying to remember formulæ instead of grasping principles.

Our second reason is shortly this. A superficial analysis is likely to lead into error: on the one hand by failing to go beneath the superficial similarity of things essentially differing; on the other hand by failing to detect the essential similarity of things superficially unlike.

The third reason is this. The mind which has vividly grasped in their true relations the factors of the environment is likely to be fertile in the suggestion of new relations between the environment and man. Even if there be no design of advancing the science, the same conditions will lead to a rapid, a vivid, and therefore a lasting appreciation of the relations which have been detected by others.

It will be well here to pause and to sum up our position in a series of propositions.

1. It is agreed that the function of political geography is to detect and demonstrate the relations subsisting between man in society and so much of his environment as varies locally.

2. As a preliminary to this the two factors must be analysed.

3. It is the function of physical geography to analyse one of these factors, the varying environment.

4. Nothing else can adequately perform this function.

Because—

No other analysis can exhibit the facts in their causal relations and in their true perspective.

Therefore—

No other analysis will—

Firstly, Serve the teacher as a discipline;

Secondly, Attract the higher minds among the pupils;

Thirdly, Economise the limited power of memory;

Fourthly, Be equally trustworthy; and

Fifthly, Be equally suggestive.

Here we must expect the observation that, granting the desirability of what we ask, we are none the less asking what is impossible. Our reply will be that it has not been tried. Physical geography has usually been undertaken by those already burdened with geology, political geography by those laden with history. We have yet to see the man who taking up the central, the geographical position, shall look

equally on such parts of science and such parts of history as are pertinent to his inquiry. Knowledge is, after all, one, but the extreme specialism of the present day seems to hide the fact from a certain class of minds. The more we specialise the more room and the more necessity is there for students whose constant aim it shall be to bring out the relations of the special subjects. One of the greatest of all gaps lies between the natural sciences and the study of humanity. It is the duty of the geographer to build one bridge over an abyss which in the opinion of many is upsetting the equilibrium of our culture. Lop off either limb of geography and you maim it in its noblest part.

In speaking thus we are not blind to the necessity of specialism within geography itself. If you would do original work in the science you must specialise. But for this purpose either physical or political geography would be as unwieldy as the entire subject. Moreover, your special subject need not fall entirely within the realm of one or other branch; it may lie across the frontier. Geography is like a tree which early divides into two great branches, whose twigs may none the less be inextricably interwoven. You select a few adjacent twigs, but they may spring from different branches. As a subject of education, however, and as a basis for all fruitful specialism within the subject, we insist on the teaching and the grasping of geography as a whole.

This question of possibility leads us naturally into an inquiry as to the relations of geography to its neighbour sciences. We cannot do better than adopt Mr. Bryce's rough classification of the environment. First, we have the influences due to the configuration of the earth's surface; secondly, those belonging to meteorology and climate; and thirdly, the products which a country offers to human industry.

First, then, as to the configuration of the earth's surface. We have here a bone of contention between the geographers and the geologists. The latter hold that the causes which have determined the form of the lithosphere are dealt with by their science, and that there is neither room nor necessity for the physical geographer. The geographer has in consequence damaged his science by refusing to include among his data any but the barest results of geology. The rivalry must be well known to all here present. It has been productive of nothing but evil to geography. Two sciences may have data in part identical, yet there ought to be no bickering in consequence, for the data, though identical, are looked at from different points of view. They are grouped differently. Least of all should the geologist exhibit such weakness. At every step in his own department he is dependent on his scientific brethren. Palæontology is the key to the relative age of strata, but it is irrational apart from biology. Some of the most difficult problems of physics and chemistry lie within the realm of mineralogy, especially, for instance, the causes and methods of metamorphism. The best attempt to find a common measure of geological and historical time lies



in Dr. Croll's astronomical interpretation of recurrent glacial epochs. But enough of this. The true distinction between geology and geography seems to me to lie in this: the geologist looks at the present that he may interpret the past; the geographer looks at the past that he may interpret the present. This line has already been traced for us by one of the greatest of the geologists.

In his 'Text-book of Geology,' Dr. Archibald Geikie gives the following lucid determination of it: \*—

“An investigation of the geological history of a country involves two distinct lines of inquiry. We may first consider the nature and arrangement of the rocks that underlie the surface, with a view to ascertaining from them the successive changes in physical geography and in plant and animal life which they chronicle. But besides the story of the rocks, we may try to trace that of the surface itself, the origin and vicissitudes of the mountains and plains, valleys and ravines, peaks, passes, and lake basins, which have been formed out of the rocks. The two inquiries traced backwards merge into each other, but they become more and more distinct as they are pursued towards later times. It is obvious, for instance, that a mass of marine limestone which rises into groups of hills, trenched by river gorges and traversed by valleys, presents two sharply contrasted pictures to the mind. Looked at from the side of its origin, the rock brings before us a sea-bottom over which the relics of generations of a luxuriant marine calcareous fauna accumulated. We may be able to trace every bed, to mark with precision its organic contents, and to establish the zoological succession of which these superimposed sea-bottoms are the records. But we may be quite unable to explain how such sea-formed limestone came to stand as it now does, here towering into hills, and there sinking into valleys. The rocks and their contents form one subject of study, the history of their present scenery another.”

The same idea is indorsed by Professor Moseley in his lecture on “The Scientific Aspects of Geographical Education.” We quote the following passage from among many others in the same strain: †—

“Regarding physical geography as a part of geology to be separated from it:—The reason why such a separation should be effected is that there is thus formed and brought together for special treatment a subject which is far more necessary and suitable for general educational purposes than the whole of geology itself, which will attract far more students and act as a lever for promoting the study of other branches of science as special studies, and certainly of geology itself.

“The principal argument that is always brought against the establishment of professorships of physical geography at the Universities is that the subject is already covered by the professors of geology; but

\* Archibald Geikie, 'Text-book of Geology,' 1882, p. 910.

† 'R. G. S. Educational Reports,' 1886, p. 228, Professor Moseley.

Prof. Geikie evidently does not take that view, and points out in his letter already referred to, 'Geology is every day increasing in its scope, which is already too vast for the physical powers of even the most indefatigable teacher.'

In this passage Prof. Moseley advocates the establishment of a chair of physical geography. It must not be concluded from this that he is opposed to the unity of geography. This is made clear by other portions of his lecture.

"Possibly, although at the present moment it may not be possible to secure the representation of geography as a whole, because of the apparent vagueness of its bounds and the attacks on all sides to which it is in consequence liable, there may be a chance of success if the attempt be made to press the claims of physical geography."

And again:—

"Ought not physical geography to form part of every liberal education as being a subject specially adapted for purposes of general learning, and as the only true basis on which can be founded a knowledge of what is termed political geography?"

Perhaps nowhere is the damage done to geography by the theory which denies its unity better seen than in the case of physical geography. The subject has been abandoned to the geologists, and has in consequence a geological bias. Phenomena such as volcanoes, hot springs, and glaciers, have been grouped into chapters, irrespective of the regions in which they occur. From the geologist's point of view this is sufficient—he is looking at his Rosetta stone; the understanding of the individual hieroglyphics is of great importance, but the meaning of the entire passage, the account of the event recorded, is, for the purpose of interpreting other records, unimportant. But such a science is not really physical geography, and Dr. Archibald Geikie tells us plainly in his 'Elements of Physical Geography' \* that he is using the words as equivalent to physiography. True physical geography aims at giving us a causal description of the distribution of the features of the earth's surface. The data must be regrouped on a topographical basis. If I may venture to put the matter somewhat abruptly—Physiography asks of a given feature, "Why is it?" Topography, "Where is it?" Physical geography, "Why is it there?" Political geography, "How does it act on man in society, and how does he react on it?" Geology asks, "What riddle of the past does it help to solve?" Physiography is common ground to the geologist and the geographer. The first four subjects are the realm of the geographer. The questions come in sequence. You may stop short of any one of them, but it is my contention that you cannot with advantage answer a later one unless you have answered those which precede it. Geology proper, in its strict sense, is unnecessary to the sequence of the argument.

\* New edition, 1884, p. 3.



We will give two illustrations of the inadequacy for geographical purposes of the present (geological) physical geographies even when considered as physiographies.

The first is the undue prominence given to such subjects as volcanoes and glaciers. To this my attention has been several times drawn by your Assistant-Secretary, Mr. Bates. It is perfectly natural in books written by geologists. Volcanoes and glaciers are phenomena which leave most marked and characteristic traces behind them. Therefore, from a geological point of view they are most important, and are worthy of special study. But the result resembles a book on biology written by a palæontologist. In it we should expect to find the snail's shell, for instance, described in the greatest detail, but to the comparative neglect of the far more important soft parts within.

My other illustration is a practical one, which must appeal to the experience of all thoughtful travellers. Let us say that you go for a trip up the Rhine; you must be strangely wanting in curiosity if you do not ask yourself such questions as the following:—Why is it that after passing over many miles of flat land through which the Rhine meanders almost on a level with the surrounding country, we come suddenly to a part of its course in which it passes through a gorge? Why, when we reach Bingen, does that gorge still more suddenly cease, its place taken by a lake-like valley bounded by parallel ranges of mountains? No ordinary physical geography that I have seen adequately answers such questions as these. If you happen to have a special knowledge of the subject, you may know that if you look into the 'Journal of the Geological Society \*' you will find a delightful paper on this subject by Sir Andrew Ramsay. But this implies the time and opportunity for research among original authorities, and even then your reward will be slight. It is only a few isolated regions which have been so treated.

I will close this portion of the subject with a constructive attempt. I shall select a region familiar to all, that your attention may be concentrated on the method rather than the matter. Let us take the south-east of England. The usual method of treating the geography of such a region would be to describe from a physical point of view first the coast and then the surface. The capes and inlets of the one and the hills and valleys of the other would be enumerated in order. You would then have a list of the political divisions, and a further list of the chief towns, stating the rivers on whose banks they stand. In some cases a few interesting but isolated facts would be added, mental pegs on which to hang the names. The political portion of such a work even at best rises no higher than to the rank of a good system of mnemonics. As for the physical portion, all the text-books agree in committing what is, from my point of view, a fundamental error. They separate the descriptions of the coast and the surface. This is fatal to

\* 1874.

the demonstration in due perspective of the chain of causes and effects. The accidents of the surface and of the coast are alike the results of the interaction of two forces, the varying resistance of the rock strata and the varying erosive powers of atmosphere and sea. The erosive powers, whether superficial or marginal, act on one and the same set of rocks. Why should there be a Flamborough Head? Why should there be a Yorkshire Wold? They are but two edges of the rim of one and the same mass of uptilted chalk-strata.

Let us try to construct a geography of South-eastern England which shall exhibit a continuous series of causal relations. Imagine thrown over the land like a white tablecloth over a table, a great sheet of chalk. Let the sheet be creased with a few simple folds, like a tablecloth laid by a careless hand. A line of furrow\* runs down the Kennet to Reading, and then follows the Thames out to sea. A line of ridge passes eastward through Salisbury Plain and then down the centre of the Weald. A second line of furrow follows the valley of the Frome and its submarine continuations, the Solent and Spithead. Finally, yet a second line of ridge is carried through the Isle of Purbeck and its now detached member the Isle of Wight. Imagine these ridges and furrows untouched by the erosive forces. The curves of the strata would be parallel with the curves of the surface. The ridges would be flat-topped and broad. The furrows would be flat-bottomed and broad. The Kennet-Thames furrow would be characterised by increasing width as it advanced eastward. The slopes joining the furrow-bottom to the ridge-top would vary in steepness. It is not pretended that the land ever exhibited such a picture. The upheaving and the erosive forces have always acted simultaneously. As with the Houses of Parliament, the process of ruin commenced before the building was complete. The elimination of erosion is merely an expedient to show the simple arrangement of the rocks, which simplicity is masked by the apparent confusion of the ruin. Add one more fact, that above and below the hard chalk lie strata of soft clay, and we have drawn on geology for all that we require.

The moulder's work is complete; the chisel must now be applied. The powers of air and sea tear our cloth to tatters. But as though the cloth had been stiffened with starch as it lay creased on the table, the furrows and ridges we have described have not fallen in. Their ruined edges and ends project stiffly as hill ranges and capes. The furrow-bottoms, buried beneath the superincumbent clay, produce lines of valley along the London and Hampshire basins. Into the soft clay the sea has eaten, producing the great inlet of the Thames mouth, and the narrower but more intricate sea-channels which extend from Poole Harbour through

\* Furrow and ridge are here used in the sense of syncline and anticline. They must be carefully distinguished from valley and hill. The two are often causally related, as I point out in this paper, but they are far from identical.

the Solent to Spithead, and which ramify into Southampton Water and Portsmouth, Langstone, and Chichester Harbours. The upturned edge of the chalk-sheet produces the long range of hills, which, under the various names of Berkshire Downs, Chiltern, and Gogmagog Hills, and East Anglian Heights, bounds the Kennet-Thames basin to the north-west. The North and South Downs stand up facing each other, the springs of an arch from which the key-stone has been removed. The same arch forms Salisbury Plain, and its eastward prolongation in the chalk uplands of Hampshire; but here the key-stone, though damaged, has not been completely worn through. Beachy Head and the North and South Forelands are but the seaward projections of the Down ranges. The fact that the North Downs end not in a single promontory, like Beachy Head, but in a long line of cliff, the two ends of which are marked by the North and South Forelands, may serve to draw attention to a relation which frequently exists between the slope of the surface and the dip of the strata. A few sentences back, we mentioned the fact, that if our simple ridge and furrow system really obtained, the slopes connecting the ridge-tops and the furrow bottoms would vary in steepness. By remembering the position of a hill-range in the "restored" ruin, we shall remember not merely its direction, but also the relative steepness of its two faces. One will be produced by the dipping strata, the other will be the escarpment where the strata have been cut short. On the dip of the strata will depend very much whether when we have climbed the escarpment, we see in front of us a sharp descent or an undulating upland. Contrast in this respect the two chalk uplands which form the broad projections of East Anglia and Kent with the narrow ridges, the Chilterns and the Hog's Back. The north-west escarpment of the Chilterns is continuous with the western scarped face of East Anglia. The south-eastern dip-slope of the Chilterns is continuous with the dip-slope which forms the broad uplands of Norfolk. The dip is steep in the case of the Chilterns, slight in that of Norfolk. Similarly the Kentish uplands are a prolongation of the Hog's Back. The southern scarped faces differ but little, whereas the northern dip-slope of the Hog's Back is steep, though its continuation in Kent is only gently inclined. This terminal expansion of the hill-ranges has been of great importance in English history, as will be seen presently. The expansions may be considered as dependent on the eastward widening of the Kennet-Thames basin. It will be noticed that the shores of the Thames estuary are on the whole parallel with the hill-ranges which mark the lips of the basin, the northern shore parallel with the curve traced by the hills from Hunstanton Point to the Chilterns, the southern parallel with the straighter range of the North Downs.

The rivers of the district fall naturally into three classes. First, we have those which flow down the dip-slope of East Anglia. As a consequence, they are numerous and roughly parallel. They do not combine

to form one large stream presenting a tree-like appearance on the map. Secondly, we have those which flow down the great furrows, the Kennet and the Thames below Reading on the one hand, the Frome with its submarine prolongation by the Solent and Spithead on the other. The many tributaries of the Thames are obvious, but the tree-like character of the Frome is not obvious unless its submarine continuation be taken into account. Then the Frome, the Stour, the Avon, the Test, the Itchen, and the Medina, would combine to form one great stream, having its mouth east of the Isle of Wight. Such a river may very probably have actually existed. Lastly, there are the streams which pass by ravines right through the chalk ranges, the Thames above Reading, and the various small rivers of the Weald. This circumstance is incomprehensible, unless we suppose that the strata arches were formerly complete. Then these streams would flow down the even slope of the ridge, following the ordinary hydrostatic laws. The only prominent feature of our area which would require a special explanation apart from the flexure of the rocks is the shingle bank which forms Dungeness.\*

This being the general anatomy of the land, what has been its influence on man? In the midst of forest and marsh three broad uplands stood out in early days, great openings in which man could establish himself with the least resistance from nature. In the language of the Celts they were known as "Gwents," a name corrupted by the Latin conquerors into "Ventæ." They were the chalk uplands with which we were familiar, the arch-top of Salisbury Plain and Hampshire, and the terminal expansions of the chalk ranges in East Anglia and Kent. In East Anglia was Venta Icenorum; in Kent and Canterbury † we still have relics of another Gwent. The first syllable of Winchester ‡ completes the triplet. In later, but still early times, they were the first nests of the three races which composed the German host. The Angles settled in Norfolk and Suffolk, the Jutes in Kent, the Saxons in Hampshire. In still later England, Winchester, Canterbury, and Norwich were among the chief of mediæval cities. To this day the isolation of two of these regions at least has left its traces in the marked characteristics of their populations. The Fens cut off Norfolk, the Weald forests shut in Kent. Their people have taken distinct positions in our history. The "men of Norfolk" and the "men of Kent" have been of a remarkably rebellious disposition.

\* I have omitted in this sketch to account for Leith Hill and the Forest Range of Sussex. They, too, depend on the flexure of the rocks; but to explain their cause would take up too much space in a paper which purports only to indicate methods, and not to exhaust its topic.

† So J. R. Green would have it, 'Making of England,' 1882, p. 9. But Isaac Taylor derives Kent from *Cenn*, a Gadhelic form of the Cymric *Pen* = a head, a projection—'Words and Places,' 1885, p. 148.

‡ Venta Belgarum.

There were four great cities in the east and south; we have mentioned three. The fourth was London. Geographical conditions have determined the greatness of the metropolis. The map will make it clear at once, that the Fens and the Weald would compel the lines of communication from Norfolk and Kent on the one hand, and the rest of England on the other to pass in the general direction of London. Kent lies nearest to the Continent, and hence Watling Street was not merely the Kentish road, but also the road to Flanders. Where the hills narrow the Thames marshes most there is the natural crossing of Watling Street, first a ferry, then a bridge. This point lies between Tower Hill and the heights of Dulwich and Sydenham. Bermondsey, the isle of Bermond, was a dry spot, rising like a stepping-stone from among the surrounding marshes. The existence of solid ground on the immediate banks of the deep water, which is necessary, as the "take-off" for a bridge or ferry, is also necessary for a landing-place. Here then we have a crossing of natural ways on a spot which is a natural halting-place for both, hence a point at which a city is certain to rise. That city will be the more important if one way is by land and the other by water, for it is then a place of transshipment. It will be still more important if it is the necessary meeting-point of river and sea traffic. Even more pregnant with meaning is the position of the Thames mouth relatively to that of the Scheldt. It determines the linked greatness of London and Antwerp, and also much of the Continental policy of England. Thus many causes conspire to maintain the greatness of London. This is a fact to be marked. It is the secret of its persistent growth from the earliest times. The importance of a given geographical feature varies with the degree of man's civilisation. A city which depends on one physical advantage may fall at any moment. A single mechanical discovery may effect the change.\*

So much for the cities. Lastly as to the political divisions. There are two types of political divisions, natural and arbitrary. The contrast presented by the old division of France into provinces and the revolutionary division into departments will serve to indicate the distinction. The one is the result of an unconscious process, such as the accretion of smaller states to a larger state. The other is the product of conscious legislation. In England we have the two kinds side by side. In the midlands we have arbitrary divisions, counties named after their chief towns, and supposed to have originated from the partition of Mercia.† In the east and south, on the other hand, the counties are of natural growth, and bear names indicating their distinct origin. In the case of

\* In this account of the "greatness" of London I have not indicated the full significance of Tower Hill. The "dun" or hill-fort no doubt decided the precise locality of London; but other causes, as given above, have determined its greatness.

† Consider J. R. Green, 'Conquest of England,' 1883, p. 141, note. But compare Isaac Taylor, 'Words and Places,' 1885, p. 179.

arbitrary divisions the frontiers are also likely to be arbitrary. The frontiers of natural divisions will usually be natural, and may be of two kinds. Immigrants spread from a centre, either until they meet physical obstacles or until they meet with the opposition of other centrifugal settlements. In the region we are dealing with we see some excellent examples of this last. The inhabitants of Surrey, Kent, and Sussex would establish themselves on the chalk hills and uplands, and then push slowly into the forest until their advanced guards met in the centre. The frontier-lines of those counties are exactly what we should expect under these circumstances. With this we may compare the frontier dividing Berkshire and Hampshire from Surrey and Sussex. It crosses a region of commons, lying largely on the Bagshot sands. Such sterile land would be unworthy of occupation until the better land had been filled up. Take again the region of the Fens. Five counties send tongues into these marshes.

Time forbids our going further into this subject. The broad results are these. From a consideration of the folding of the chalk and of its hardness as compared with the strata above and below it, may be demonstrated the causes of the two great promontories, the two great inlets, and the three great upland openings which have determined the positions, the number, and the importance of the chief cities and divisions of South-eastern England. The same processes of reasoning might be continued to any required degree of detail. The geography of any other region might be treated in a similar way. Further, having once mastered the few simple geological ideas involved, a graphic and precise conception of a land may be conveyed in a few sentences. The effort required to grasp the first application of the method may be greater than that called for by the older methods. Its beauty lies in the fact that every fresh conquest gives increased ease of acquisition.

We will sum up our results bearing on the relation of geology to geography in the form of propositions:—

1. It is essential to know the form of the lithosphere.
2. This can only be accurately and vividly remembered by grasping the causes which have determined it.
3. One of these causes is the relative hardness and arrangement of the rocks.
4. But no geological data or reasoning must be admitted unless it be pertinent to the geographical argument. It must help to answer the question, "Why is a given feature where it is?"

Mr. Bryce's two remaining classes of environment factors call for less remark. The distinction between meteorology and geography must be a practical one. So much of meteorology, and it is much, as deals with weather-forecasting cannot be required by the geographer. Average or recurrent climatic conditions alone come within his ken. Even here he must be content very often to adopt the results of meteorology as



data, just as meteorology itself accepts the results of physics. It is a mistake, especially of the Germans, that they include too much in geography. Geography has bearings on many subjects, but it does not bodily include those subjects. Even the great Peschel includes in his 'Physische Erdkunde' \* a discussion on the barometer and a demonstration of the formulæ needed in barometric corrections. Such digressions are the cause of the often repeated charge that geographers are merely dabblers in all the sciences. It is our contention that geography has a separate sphere of work. Its data may overlap those of other sciences, but its function is to point out certain new relations between those data. Geography must be a continuous argument, and the test of whether a given point is to be included or not must be this—Is it pertinent to the main line of argument? How far digressions with the view of proving data are allowable must of course be a practical question. As a rule they should be excluded if it is the function of any other science to prove them.

Mr. Bryce's last category includes the productions of a region. The distribution of minerals is obviously incidental to the rock-structure, and we need refer to it only to give another tap to the nail at which we have been hammering previously. As regards the distribution of animals and plants, we must apply the test to which we referred in the last paragraph—How far is it pertinent to the main line of geographical argument? So far as the animals and plants in question form an appreciable factor in man's environment, so far their distribution is very pertinent. So far also as that distribution gives evidence of geographical changes, such as the separation of islands from continents or a retirement of the snow-line, so far it is also pertinent. But the study of the distribution of animals and plants in detail and as an aid to the understanding of the evolution of those beings, is in no sense a part of geography. It is a part of zoology or botany, for the proper study of which a preliminary study of geography is necessary.

The truth of the matter is that the bounds of all the sciences must naturally be compromises. Knowledge, as we have said before, is one. Its division into subjects is a concession to human weakness. As a final example of this we will deal with the relation of geography to history. In their elementary stages they must obviously go hand in hand. In their higher stages they diverge. The historian finds full occupation in the critical and comparative study of original documents. He has neither the time nor usually the turn of mind to scan science for himself with a view to selecting the facts and ideas which he requires. It is the function of the geographer to do this for him. On the other hand, the geographer must go to history for the verification of the relations which he suggests. The body of laws governing those relations, which might in time be evolved, would render possible the writing of much

\* Vol. ii. pp. 118-127, 2nd edit.

“prehistoric” history. John Richard Green’s ‘Making of England’ is largely a deduction from geographical conditions of what must have been the course of history.

It remains that I should set out what I conceive to be the main line of geographical argument. I will do this in two stages. The first will be general, such as might be gathered from the syllabus of a university course of lectures or from the table of contents at the beginning of a text-book. The second will be a special application of this to the solution of a definite problem—the reasons why Delhi and Calcutta should have been respectively the old and the new capitals of India.

We presuppose a knowledge of physiography. We would then start from the idea of a landless globe, and build up a conception of the earth on the analogy of mechanics. First, the laws of Newton are demonstrated in their ideal simplicity on the hypothesis of absolute rigidity. It is not until these are fixed in the mind that the counteracting tendencies of elasticity and friction are introduced. So would we attack the study of geography. Imagine our globe in a landless condition, composed that is of three concentric spheroids—atmosphere, hydrosphere, and lithosphere. Two great world-wide forces would be in action—the sun’s heat and the earth’s rotation on its axis. Obviously the trade-wind system would have unimpeded sway. Next introduce the third set of world-wide forces—the inclination of the earth’s axis to the plane of its orbit and the revolution of the earth round the sun. The result would be an annual march from tropic to tropic of the calm zone separating the trades. The fourth and last of the causes which we have termed world-wide would be the secular variation in the ellipticity of the earth’s orbit and in the obliquity of its axis. This would produce similar variations in the annual march and in the intensity of the trade-wind system.

Thus far we have steered clear of longitudinal variations. Given the latitude, the altitude, the season of year, and the year in the secular period, and the climatic conditions are deducible from very few data. Now we abandon our primary hypothesis. Conceive the world as it is, as heated, as cooling, as shrinking, as wrinkling. It was heated, it is cooling, therefore it is shrinking, and the outer more chilled crust is in consequence wrinkling. The lithosphere is no longer concentric with the atmosphere and the hydrosphere. The bed of the ocean is thrown into ridges and furrows. The ridges project into the hydrosphere, and through the hydrosphere into the atmosphere. They act as obstacles in the way of the world-currents. They may be compared to the stones in the bed of a rapid stream on which the currents impinge and are diverted. They either leap over them or are split upon them. This purely mechanical action is well seen in the splitting of the Southern Equatorial Drift on Cape San Roque. Cape San Roque has a distinct influence on the climate of England. The “leaping-over” action is visible in the

case of winds rising over mountain-chains, and as a consequence covering their slopes with moisture. But, in addition to the mechanical, there are thermal causes of variation, due mainly to the different specific heats of land and water—hence the monsoons. The lie of the great wrinkles has a special meaning. Were the continents extended east and west instead of in three great bands across the Equator, climate would be approximately indexed by latitude.

Thus may we steadily progress in the analysis of the world's surface. Conceive the world as landless, and you will see the motor-powers of air- and water-circulation. Replace your conception by one of a wrinkled world, and you will grasp how by mechanical obstruction and thermal irregularity your simple currents are differentiated into currents of almost infinite but still orderly complexity.

But we must advance a stage further. The form of the lithosphere is not fixed. The shrinkage is still in progress. Old wrinkles are raised and new wrinkles come into existence. As they rise their destruction commences. The currents ever work at the removal of the obstacles which obstruct their course. They tend to achieve the ideal simplicity of circulation. Thus the features of the earth's surface are constantly changing. Their precise form is determined by their past history as well as by their present conditions. Recent changes are the subject of one of the most fascinating chapters in geography. Plains are built by the accumulation of débris. Continents give birth to islands. The evidence is drawn from a hundred sources—from the lines of migration of birds, the distribution of animals, or the depths of the neighbouring seas.

Each successive chapter postulates what has gone before. The sequence of argument is unbroken. From the position of the obstacles and the course of the winds may be deduced the distribution of rain. From the form and distribution of the wrinkle-slopes and from the distribution of the rainfall follows the explanation of the drainage-system. The distribution of soils is mainly dependent on the rock-structure, and on a consideration of soil and climate follows the division of the world into natural regions based on vegetation. I am not here referring to the distribution of botanical species, but to that of the broad types of what may be called the vegetable clothing of the world—the polar and tropical deserts, the temperate and tropical forests, and the regions which may be grouped together as grass-plains.

Passing now to the second stage of the investigation, it will be well to make use of two technical terms. "An environment" is a natural region. The smaller the area included the greater tends to be the number of conditions uniform or nearly uniform throughout the area. Thus we have environments of different orders, whose extension and intension, to borrow a logical phrase, vary inversely. So with communities. "A community" is a group of men having certain characteristics

in common. The smaller the community, the greater tends to be the number of common characteristics. Communities are of different orders—races, nations, provinces, towns—the last two expressions used in the sense of corporate groups of men. By the use of these two terms precision can be given to such discussions as the effects of exposing two communities to one environment, and one community to two environments. For instance, this—How have geographical conditions differentiated the English race in the three environments, Britain, America, and Australia?

Everywhere political questions will depend on the results of the physical inquiry. Certain conditions of climate and soil are needed for the aggregation of dense populations. A certain density of population seems necessary to the development of civilisation. In the light of such principles would be discussed such problems as the contrast between the ancient upland civilisations of the New World, Peru and Mexico, and the ancient lowland civilisations of the Old World, Egypt and Babylon. Again, comparatively undisturbed strata usually underlie wide plains, and wide plains seem specially favourable to the development of homogeneous races, like the Russians and the Chinese. Yet again, the distribution of animal, vegetable, and mineral products has done much to determine the local characteristics of civilisation. Consider in this respect the series presented by the Old World, the New World, and Australia in the matter of comparative wealth in cereals and beasts of burden.

One of the most interesting chapters would deal with the reaction of man on nature. Man alters his environment, and the action of that environment on his posterity is changed in consequence. The relative importance of physical features varies from age to age according to the state of knowledge and of material civilisation. The improvement of artificial lighting has rendered possible the existence of a great community at St. Petersburg. The discovery of the Cape route to India and of the New World led to the fall of Venice. The invention of the steam engine and the electric telegraph have rendered possible the great size of modern States. We might multiply such instances greatly. We might group them into categories, but our object to-day is merely to indicate the possibilities of the subject. One thing, however, must always be borne in mind. The course of history at a given moment, whether in politics, society, or any other sphere of human activity, is the product not only of environment but also of the momentum acquired in the past. The fact that man is mainly a creature of habit must be recognised. The Englishman, for instance, will put up with many anomalies until they become nuisances of a certain degree of virulence. The influence of this tendency must always be kept in mind in geography. Milford Haven, in the present state of things, offers far greater physical advantages than Liverpool for the

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American trade; yet it is improbable that Liverpool will have to give way to Milford Haven, at any rate in the immediate future. It is a case of *vis inertiae*.

We propose passing now to the special illustration which we have promised. We will start from the fountain-head. From the sun's heat and the earth's rotation we demonstrate the trade-wind system. From the influence of that heat on the vast mass of Asia we deduce the monsoon variation of the system. Within the monsoon area are collected some seven hundred out of the eight hundred millions of Asia. Right athwart the south-west monsoon extends the Himalaya. The moisture of the Indian Ocean in consequence deluges its southern face. Thus the full importance of the direction of the mountain-chain is brought out. The rains have washed down from the mountains the débris which forms the fertile plain at their base. Hence, along the southern foot of the Himalaya we have a belt of country possessing the conditions of climate and soil needed to sustain a large population. In effect we find two-fifths of the population of the entire peninsula concentrated in the provinces of Bengal, the North-west, and the Punjab, although these three provinces have but little more than one-sixth the area. Moreover, the abundant moisture of the monsoon coupled with the height of the Himalaya (the height is a consequence of the comparative newness of the wrinkle) produce an abundant glacial system from above the snowline. One result of this is that the rivers of the plain are perennial, and constantly navigable. Thus we have two conditions favourable to the development of civilisation, density of population, and ease of communication.

A wealthy civilised community is a region tempting to the conqueror. Now conquerors are of two kinds—land-wolves and sea-wolves. How would these respectively gain access to their prey in the Ganges valley? Consider first the landward frontier of India. On the north-east the Himalaya is practically impassable to a host.\* On the north-west is the Sulaiman range, pierced by many passes. From the Iranian uplands of which this range is the boundary wall have swept down successive waves of conquerors. But within the mountain line is a far more effective obstacle, the Thar or great Indian desert, with its continuation the Rann of Katch. This barrier extends parallel to the Sulaiman Mountains from the sea almost to the Himalaya. Between the desert and the foot of the Himalaya the fertile belt is narrowest. Through that gate must pass whoever would gain access to the Ganges valley. Alexander advanced to its entrance. When he swerved to the right and followed the Indus, India was saved. Close to the eastern end of the pass is Delhi. It stands at the head of the Jumna-Ganges navigation, the place of transshipment from land to water carriage. It is therefore a

\* Only one exception is recorded by history. A Chinese army once succeeded in reaching Nepal.

natural centre of commerce. It is also the natural base of operations for the Asiatic conqueror, his left flanked by the mountains, his right by the desert, his line of communications secure to the rear. The strategic importance of the region has not escaped the British. Here is Simla, the summer capital of India. Here also the army cantonments are most thickly sown. Here are the fields of many battles. So much for Delhi. Now for Calcutta. From the sea India is singularly inaccessible. The eastern shore is beaten by a heavy surf. We have had to construct a harbour at Madras at great expense. The western coast has many good harbours, but in its rear rises the steep slope of the Western Ghats. Drenched by the monsoon, they are densely clothed with forests, which to this day are the abode of some of the most savage races of the world. Behind Bombay railways have now been carried over the mountains, but until recently they must have been a most effectual barrier to communication. The Portuguese settled at Goa, and could not advance. The English possession at Bombay was our earliest in India,\* yet the Presidency of Bombay was the last to grow. The one great natural water-gate is by the mouth of the Ganges. Here, on the Hoogly, the British established themselves at Calcutta. It is the place of junction of river and sea shipping, and therefore a commercial centre. It is also the natural basis of operations for the conquerors from over the sea. From it they have extended their influence far and wide. The old presidencies of Bombay and Madras have each been succeeded by a single province, but the Presidency of Bengal has begotten Bengal, the North-west, the Punjab, and the Central Provinces; we might almost add Assam and Burma. Thus, to sum up, at the two ends of the fertile belt are the two gates of India—the Khaibar Pass and the Hoogly. Along that belt the great highway is the Jumna-Ganges. At either end of the river navigation stands a strategical and commercial capital, Delhi on the one hand, Calcutta † on the other.

Thus we complete our survey of the methods and scope of geography. I believe that on lines such as I have sketched a geography may be worked out which shall satisfy at once the practical requirements of the statesman and the merchant, the theoretical requirements of the historian and the scientist, and the intellectual requirements of the teacher. Its inherent breadth and manysidedness should be claimed as its chief merit. At the same time we have to recognise that these are the very qualities which will render it “suspect” to an age of specialists. It would be a standing protest against the disintegration of culture with

\* Our earliest possession. We had factories at Surat and at Fort St. George somewhat earlier.

† Calcutta=Kali Katta—the village of the goddess Kali. This suggests the question, Why should this particular village have risen to be a metropolis rather than any other village? I would propose the term “geographical selection” for the process on the analogy of “natural selection.”



which we are threatened. In the days of our fathers the ancient classics were the common element in the culture of all men, a ground on which the specialists could meet. The world is changing, and it would seem that the classics are also becoming a speciality. Whether we regret the turn which things have taken or whether we rejoice at it, it is equally our duty to find a substitute. To me it seems that geography combines some of the requisite qualities. To the practical man, whether he aim at distinction in the State or at the amassing of wealth, it is a store of invaluable information; to the student it is a stimulating basis from which to set out along a hundred special lines; to the teacher it would be an implement for the calling out of the powers of the intellect, unless indeed to that old-world class of schoolmaster who measure the disciplinary value of a subject by the repugnance with which it inspires the pupil. All this we say on the assumption of the unity of the subject. The alternative is to divide the scientific from the practical. The result of its adoption will be the ruin of both. The practical will be rejected by the teacher, and will be found indigestible in after life. The scientific will be neglected by most men, because it lacks the element of utility in every-day life. The man of the world and the student, the scientist and the historian, will lose their common platform. The world will be the poorer.

The discussion on the foregoing paper was adjourned to the next following meeting, February 14th.

On that evening (General R. STRACHEY, Vice-President, in the chair) the discussion was opened by Mr. MACKINDER as follows:—

Mr. Chairman, I am asked to say a few words to you by way of analysis of the paper which I laid before you on the last occasion. It is obviously impossible for me to give you an exhaustive analysis, because the paper itself, in spite of its length, was necessarily more or less of the nature of an epitome. I think, however, it will be possible for me by grouping the ideas, such as they are, in a somewhat different way, to place the salient points almost in a nutshell. If I were asked to describe geography roughly I should venture on the assertion that it is the science of distribution, the science, that is, which traces the arrangement of things in general on the earth's surface. Since it is a science it is not sufficient to rest content with recording, however accurately and skilfully, the places of things on the earth's surface. After using our various observing instruments, after making maps as carefully as ever you will, it is necessary that we should pass on to consider what relations hold between the distributions of various sets of features on the earth's surface, and what are the causes of those distributions. Let me give a comparison with some other science. Take that of astronomy. I will ask you to remember that the astronomer spends a very large portion of his time in using the telescope, in minutely observing and recording facts with regard to the heavenly bodies, but you would not say that a science of the heavenly bodies existed unless you showed that there were laws governing their movements and great forces holding the solar systems together. If we apply these ideas to geography I think we shall see how the various chapters may be strung together in natural sequence. I do not pretend that these suggestions are new. My aim is simply to show a method which some little experience in teaching has proved to be available—such as will be fitted to

the higher classes in Universities and sufficiently dignified for men to make the subject their life study.

We start with the conception of the world as a landless globe. I believe that a useful expedient for this reason—that there are some phenomena, such as the trade winds, which are more or less independent of the distribution of land and water. On the principle that a person who has an untrained ear for music would prefer hearing “Home, Sweet Home” on a flute, to hearing it with full orchestral accompaniment, so we prefer clearing away many sets of causes when we first approach the consideration of the earth. Then we go on to consider the land and sea distributed as they are. Just as, in the case of a stone standing in the way of a stream going down a hill, the stream has to split upon it, go round it, or go over it, so in the same way the great currents impinging on the land, either swerve to right or to left, or split upon it, or in the case of winds have to leap over it, and therefore we get a complex state of affairs out of a simple set of causes. Therefore we see that precise topography is a necessary thing if we are to have a proper explanation of the actually observed distributions of currents both in the air and water.

Passing from that, if I look at a headland projecting into the sea, I cannot help feeling that there must be some cause for the place which that headland holds, and for its shape, and I cannot help feeling, from the analogy of other sciences, that if I knew that cause and compared it with the causes of other things, I should be able to see that they were related, and so should be able to work out a law of considerable simplicity where apparently we have great irregularity of distribution. Geologists seem to be agreed on this, that the shape of the earth’s surface is due to the interaction of two sets of causes—upheaval and ruin. The forces of upheaval, even so conservative a geologist as Sir William Dawson agrees, are the result of the gradual shrinking of this earth, producing what I call wrinkling, and others folding or corrugation in the earth’s surface. Then we have the forces of ruin—frost, wind, rain and so forth, brought to bear upon it, chiselling it. When you look at a ruin it is at first sight exceedingly disorderly, and until you have seen what were the relations of its parts in the past, that disorder continues. So with this earth. If you understand the arrangement of the rock-folds you are in a position to understand the actual distribution of the present features. There is in this month’s ‘Proceedings’ (February No.) a most excellent application of this method of describing the features of a country by means of the wrinkles. The paper by Dr. Naumann, on Japan, which has been so generally praised, contains a passage which runs as follows: “The study of geology is just as indispensable to the orographer as the study of anatomy is to the sculptor. No clever artist would think of representing the beauties of the human form as those of a hollow figure. The physical features of Japan present a fine example for the verification of the intimate and mutual dependence of those sciences whose object is our globe. After having made ourselves acquainted with the general laws of geological structure we shall be better enabled to understand the language of the external features of that part of the surface we are at present dealing with.” He practically applies his idea and gives a map on which he shows the “Line of folds.” Having got the distribution of the earth’s surface we come to work out the distribution of other things. The rainfall obviously depends on the profile of the earth’s surface, the soils on the distribution of climates and rainfall. Then the general vegetable clothing of the earth—forests, grass lands, and such like—all follow on what we have previously studied. So with regard to man, the same laws apply, only the applications are more complicated, because we have to study the distribution not only of races, but also of numerous attributes of man, languages, religions, political organisations and forms of civilisation. Again, since man is a moving creature we have to study physical features, not only as

determining whether the region in which he dwells shall be favourable or not, but also as impediments in his way, whether he passes as an army, in migration, or as a nomad.

From all this it will be seen that it is necessary to do two things—to base our physical geography to a great extent on geology, and to combine physical and political geography together. I have defined geography in the way which I have for the following reasons. I believe that nine out of ten students who approach geography will necessarily approach it from the human standpoint. They wish to study the world as man's environment. I use the word environment, because Mr. Bryce has made that term a received one in geography. In order to understand the distribution of man it is necessary to understand that of the physical features. We have thus a science in which essentially the same methods are applied from beginning to end. But it is the culminating stage which postulates all that has gone before that has a general interest. I do not mean to say that for purposes of original investigation some people will not choose to confine themselves to inanimate nature, but I say that for a general basis it is necessary to study the physical features in order chiefly to understand the distribution of man. I believe that a considerable number of those who will take part in the discussion this evening have seen my ideas set out in print in a more connected form than it was possible for me to show them on the last occasion or would be on the present. I will therefore only say in reply to a criticism which has been current, to the effect that whatever value my ideas may have from a theoretical point of view, they are impracticable for teaching purposes, that since last October, I have had an opportunity of lecturing to 1200 people, and I find that even elementary lectures, set out on the plan I have suggested, have been more or less successful in interesting people. In conclusion, if the ideas I have put forward, however much criticised (and I hope they will be criticised), result in our arriving at a more or less general opinion as to what the scope of geography is, I shall be amply gratified for any trouble I have taken.

Sir FREDERIC GOLDSMID wished to explain in a few words the reason of his coming before the meeting. Hearing that a paper about to be read in these rooms contained something in the form of onslaught on a position taken up by himself in an address to the Geographical Section of the British Association at Birmingham in September last—and finding that other engagements would prevent his attendance at the meeting—he procured a copy of the paper aforesaid, and wrote down some hurried remarks to be read on the occasion by a kind substitute. It so happened that when the lecturer's task was completed, no time for discussion was available, and his notes were returned. Now that they were met to discuss the last meeting's paper, and that the reading of these notes would spare the audience perhaps a more rambling statement and economise time, he ventured to recur to them in fulfilment of the object for which they were originally designed.

The passage quoted in proof of his (Sir Frederic's) tripping was this: "It is difficult to reconcile the amalgamation of what may be considered 'scientific geography' with history. One is as thoroughly apart from the other as geology is from astronomy." Presently he would quote another passage in which the offence is even greater, and defined with like precision. But he (Sir Frederic) was speaking of geography in the sense of what may be called its mathematical treatment, and his critic took him as referring to scientific theory and deduction. He (Sir Frederic) was in the material world with the practical surveyor and his outdoor apparatus. His critic pictured him in the world of speculation in which historian and geographer find a common ground. It was a misconception of meaning, a confusion of terms—in fact, of theories with theodolites.

Setting aside the actual charge of making proposals "fatal to the best prospects

of geography," it might seem unwarrantable on his (Sir Frederic's) part, after the able and exhaustive discourse delivered a fortnight ago, to take up the time of the meeting with an answer to a personal allusion expressed in the briefest of terms. But as the discourse itself bears, as it were, almost wholly upon that personal allusion, and is in fact one expansive comment on an individual utterance for which he was held responsible, a reply of some kind would be admitted to be necessary.

He was not going to disavow the words which had been quoted from his address to the Geographical Section at Birmingham, though he could not help regretting that the passage selected for objection was not one more expressive of the general tendency and manifest object of that address. Indeed, had it been considered in reference to the remainder, it would have been evident that his meaning in showing a complete separation between history and "scientific geography," was to indicate what he might call the comprehensive "unity" of the latter branch of study, and to suggest the incorporation into history of a newly constituted "political geography" containing, he might add, very much the kind of teaching which has been aptly illustrated by the present lecturer. Questions such as density or sparseness of population, and contrast between upland and lowland civilisations—all these matters naturally appertain to history. Nor would he pronounce as foreign to the same sphere of teaching that eloquent paragraph of theoretical topography which, in the paper read at the last meeting, accounts for the growth and greatness of London. In fact, when speaking of "political geography stripped of its purely scientific belongings," he (Sir Frederic) made no reference to those broad lines of "science," the value of which in historical research no true student of history can deny, nor to that light of "science" which gives a reality to the historical page—but to those belongings which imply rather practice than theory, and the presence of the surveyor and engineer than of the geographer *en grand*. Let his words be analysed:—"The meaning of the verbal combination 'political geography' requires some kind of analysis. Conventionally, and in an educational sense, it is the description of the political or arbitrary divisions and limits of empires, kingdoms, and states; their inhabitants, towns, natural productions, agriculture, manufactures, and commerce, as well as laws, modes of government and social organisation—everything being viewed with reference to the artificial divisions and works made by man. Accepting this interpretation of its objects, who can hesitate to admit its palpable and immediate relation to history? The mathematical science which investigates the physical character of territory and territorial boundaries is in this case but a secondary requirement and can be always fairly disposed of in the recognition of results." Need he add that the question of "man's environment," on Mr. Bryce's conception of which he had occasion to speak a little later, was not for a moment contemplated as one of the "secondary requirements" here noted. He was told by those who had taken the trouble to consider his address in its entirety, that, in the view taken, he dwelt too much on the "fieldwork of geography," the results of which are seldom, if ever, questioned by the reading public and are accepted by the writer of history as he accepts the journeys and researches in libraries. If, indeed, his argument be weak, he admitted that it is in this particular aspect it shows its most vulnerable point; but he was prepared to defend the position by the teaching of his own experience. This, however, was not the point on which he was now assailed; he was supposed to apply the word "scientific" to that which comprehends the physical causes and connections of the earth's features, and such was not in this instance his intention. He referred to that branch of geography which, to be duly apprehended, demands in the student a mathematical rather than a theoretical turn of mind. To this head belong much that comes within the purport of topography, physiography, cartography, trigonometrical survey, and the mechanism which necessitates acquaintance with the instruments and appliances of geography,

and their respective uses. Physical geography, and the thousand and one theories involved in its consideration, belong undoubtedly to history, and cannot be excluded from the programme of study prepared for the use of advanced historical classes.

But the gist of his argument was this. To popularise geography, the method of study must be such as to suit the mental bias of the pupil. Call the principle advocated "a concession to human weakness" if you will; but so long as human nature *is* weak, the fact must be acknowledged, and treatment regulated accordingly. There may be present at the ordinary meetings of the Royal Geographical Society those who appreciate and enjoy "travellers' tales" more than "travellers' geography." They may be weak, but their weakness must be admitted as a factor in the matter of providing the public with popular papers.

A story had been related to him which illustrates the case. Some years past, a gentleman well known to the Society was about to read a paper, with one of our most esteemed Presidents in the chair. The latter remarked on its length. "What shall I leave out?" asked the reader: "the adventures?" "No," was the ready reply: "the geography; you can print *that* afterwards." So is it with the outside world, and those classes whom it is wished to attract towards a neglected study.

It is not, then, the "division of the scientific from the practical" which he ventured to recommend; but the creation of a chair for geography in its most comprehensive form, combining the scientific and the practical, or what is theoretical with what is material, matter-of-fact, or perhaps mechanical. On the other hand, he would combine with history—for which chairs exist—certain elements of this "scientific" or universal geography, such as are rather included in the term "political" than under any other now recognised head,—"irrational," he granted, in failing "to trace causal relations," but subject, in this as in other respects, to recast and revision. This, it will be found, was precisely the course which he before proposed—not as the result of any intricate investigation, but the natural outcome of personal observation.

He submitted, with all deference, that scientific geography, as taught from the chair, should make the accomplished geographer, historian, and man of science combined: history, with its geographical supplement, the diplomatist. There is no clashing here, and no danger that I can see to the cause of science. To those who did him the honour of reading, or listening to the Birmingham address, his object will be evident. It is set forth in the following paragraph:—

"It must be borne in mind that our governments or geographical societies, our boards or our Universities—whichever distinguished body takes the matter in hand, separately, it may be, or in concert—will have to cater for a multitude of pupils, and that, whatever change eventually takes place in the programmes of study, the division of school teaching into two great representative branches, classics and mathematics, is a practice which has hitherto, at most public schools, resisted the shock of innovation. The maintenance of this time-honoured custom is not so much, to my mind, an illustration of conservative principle—*that*, we all know, is powerless against national progress—as the assertion of a profound truth, similar to that which in the region of language separates the Semitic from the Aryan category of tongues. It is a recognition of the distinction which exists in the human organisation between mind and mind—a distinction apparent in the boy as in the man, at school as at college—in the battle of life itself, as in the period of preparation for battle. I do not mean to imply that all school studies fall essentially under one or other of these divisions; but I do believe that the student's progress will be in accordance with his idiosyncrasies; that the student's taste should be considered in the master's system; and that, in dealing with geography, we ought not to throw it wholesale into the hands of the professor or reader, but separate it to suit



the capacity of the classical as of the mathematical intelligence, so that the one part come within the province of history and art, the other within the limits of unadulterated science. Attention to both sections should be imperative, so far as attention to classics and mathematics is imperative, but the standard of competence attained in either must depend on the mind and bent of the pupil who might readily excel in one but fall short in the other, not being even distinguished if the subject of study were undivided."

Plainly and finally. Establish a chair for geography, *pur et simple*. The professor occupying it may be left to impart to his teaching as much history as he pleases: there is no rule or compulsion here. On the other hand, history *is* more or less dependent on geography, and it were well to define precisely what and how much of the science it should borrow from the geographical chair. His own impression had been that "political geography" should meet all its possible requirements; but, unfortunately, political geography, as now understood, would have to be reconsidered and recast. Here, then, is the separation—or one separation—he would especially advocate, and for this reason. There are many pupils whose minds are so constituted that, while content to study both sciences with ardour, they are likely to attain excellence in one only, and where that one is history, the supplement of geography included in it, if carefully chosen, might impart that very essential qualification for the higher services of State, which is the real cause of political usefulness and undying reputation.

Mr. FRANCIS GALTON said the word "geography," like many others, was used in different senses, so they ought to be grateful to Mr. Mackinder for the effort he had made to frame a definition that should combine the suffrages of most people. For his own part he thought that an even simpler definition was possible, namely, that the art of geography was to give a vivid and connected account of the more interesting characteristics of specified districts. The art of giving a vivid account was an extremely rare one. He was sure they must have heard in that room many eminent travellers who read accounts of their journeys, and yet the meeting obtained from them but a very slight idea of the country they had visited. It was extraordinary how weak ordinary language was in expressing visual objects. Who could describe a face in that room in such a way that another person who had never seen it before, should recognise it when seen? The same remark applied to countries. They read books about a country and then they went there, and found it to be entirely different from what they expected. Now one of the arts of the geographical teacher was to bring vividly before the mind of the learner what he wished to convey, so as to put the learner as far as possible in the position of one who had actually been to the country. That art was somewhat developed, but needed to be developed a great deal more by illustrations, photographs, &c. Another art of the geographical teacher was to give a connected or rational account. He did not himself think so much as others of the possibilities of geography as a science; it was well to have a high project, but when they endeavoured to reason out the conditions of a country, they found that at the present time they knew very little about the interaction of the various forces of nature. They could go a certain distance; they could easily follow as far as a shrewd intelligent man could go, who had at the same time a little more than a smattering of the principal sciences; but to suppose that any one could really reason out a geographical problem in all its completeness in the same way that he could a mechanical or a mathematical one, seemed to him to be supposing a great deal too much. To recur to the definition, what were the interesting characteristics of a country? There were different people to be interested; that which interested the strategist did not interest the artist or the merchant; so the geographical teacher had to consider the main wants and wishes of



mankind, and to frame his book or teaching accordingly. At the present time the hopes for the better teaching of geography seemed to be in a critical stage. Last week a deputation of three members of the council met the committee appointed by the governing body of the University of Oxford, consisting of the present Vice-Chancellor, the late Vice-Chancellor, and three other distinguished members of the University, and that committee manifested, so far as they were individually concerned, a sympathy and a desire to help the objects of the deputation. During the present week another deputation would go down to Cambridge to have an interview with the authorities there. Both Universities were at length clearly waking up, and beginning to practically throw themselves into the cause of geography. At this critical time it was a great thing to have a gentleman like Mr. Mackinder, of University distinction, who knew his own mind, who had attracted large audiences in the provinces, who was enthusiastic in geography, a believer in his cause, and who, he was sure, would leave no stone unturned to further the interests of geography—it was a great thing to have such a man taking so prominent a part, and he had very little doubt that however much Mr. Mackinder's theories might be criticised, or whatever mistakes he might make, he was destined to leave his mark on geographical education.

Mr. T. W. DUNN (Head Master, Bath College) said his presence at the meeting was accounted for by a very paradoxical reason, namely, that he was very ignorant of the science of geography, and wanted to say that the very fact of his ignorance was some reproach against the present state of geographical teaching in the land. It had failed to attract him throughout a life devoted to many branches of learning. It had not commended itself to him in its present form as an instrument of instruction. He had observed that both teachers and learners of the better order of mind found the subject of geography uninviting, and would have as little of it as they possibly could. He found also that those minds to whom it did recommend itself were of the order of those who were content to rest in facts without rising into principles. He must demur to the view that Sir Frederic Goldsmid set forth that the subjects taught to the young should humour their weaknesses and idiosyncrasies. It seemed to him that if a boy had an imperfect organisation, and a faulty physical development, it became gymnastic not to let him move in those modes which were easy to him, but to adopt those modes which were most helpful for him when he had overcome the preliminary difficulties of being set right. Among his own boys, some few years ago, two, in almost successive years, obtained the Society's medal, but they were boys of singular inaptitude for studies of a nobler sort, and he could not but think, from what he saw of them, that he had been indulging them in their devotion to a catalogue of topographical facts—in a weakness that he ought to have corrected. It was his fortune to have the conduct of a school which was distributed under two heads, the classical and the modern side. The modern side, where geography was chiefly taught, laboured under the great difficulty, that there was no centre, no backbone to the studies that the boys pursued; consequently they were disintegrated. Their minds were in no way instructed and built up, and it occurred to him that this science of geography, if it were established on some such basis as his friend Mr. Mackinder had sketched, would serve schools in excellent stead. It was not his purpose to start a new definition of geography, but it seemed to him that geography was very well defined in Mr. Mackinder's language as the science of distributions. It would occur to every one that there was nothing which was not distributed on the earth's surface, and, therefore, if geography was a science of things distributed there was nothing which did not come under the science. It was a science primarily of the distribution of the air, which was meteorology; it was a science of the distribution of land and water; it was a science of the distribution of

animals, which was zoology—of plants, which was botany—of minerals, which was mineralogy—moreover, it was a science of military posts, and then it was military geography; and, indeed, a German of curious inquiry had been mapping out the locality of genius of different kinds, so that it was also the science of human faculties. It was past hope that any man could be found to combine all those various elements. But if so defined, geography helped to teach the interdependence of knowledge, and in all schools there was great danger of breaking up the minds of the boys in special subjects; but geography, founded on its new basis, would afford a common meeting ground, on which all the sciences were heard, and a boy who read his history by the light of geography would be tempted to take to geography in the form of history with delight. A boy who learnt the distribution of plants, learnt much geography incidentally; a boy who learnt zoology would take interest in the geographical aspect of the distribution of animals; and so geography was fitted to bring all these sciences face to face, and to teach much of their interdependence, and give the boy that unity of knowledge which was so much required. It appeared to him to be much as though a man should profess general medicine and not be a specialist in practice. They might go to the general practitioner for advice with regard to any common ailment, and so they could go to a geographer for general information with regard to any part of the face of the globe. Geography, taught on the principle which Mr. Mackinder advocated, would tend to induce in the minds of the boys in the modern sides of schools a disposition to regard knowledge as a whole. He would be extremely grateful to any professor at either or both of the Universities who would put into the hands of schoolmasters some text-book which would combine so much of all these sciences as might be taught to schoolboys under the head of geography. It would be useful to the botanist, to the military student, and to every student, but they must look for such generalisation to somebody who would make a departure on the lines advocated by Mr. Mackinder.

Rev. Canon DANIEL (Principal, Battersea Training College) said that he had not had the pleasure of hearing Mr. Mackinder read his paper, but he had perused it with very much delight, finding it eminently suggestive and full of practical value. He would venture to differ from Mr. Mackinder with regard to some of the conclusions that had been arrived at. He would not stop to discuss the definition of geography, for that was a mere matter of words. The province of geography would depend very much upon the curriculum of which it formed a part. If geology was already very well provided for, it would be a great mistake to include geology as part of a geographical course. If on the other hand geology had no independent place in the curriculum, so much of it should be taught as had a practical bearing on geography. He agreed with several of the speakers that geography was mainly a science of distribution; it aimed at accounting for the distribution of man, pre-eminently by the conditions under which he lived, and anybody who looked at the maps exhibited on the wall would see how very close the connection was. There were three maps of Hindostan exhibited. One gave the population, another the rainfall, and the third the mountain and river system. Clearly there was a very close interdependence between the three, for the density of population corresponded very closely with the amount of rainfall. Any one who noticed the density of population in the valley of the Ganges and the rainfall there, would see that there was more or less a correspondence between the two, and also a correspondence between the rainfall and the mountain and river system of the peninsula. He did not say that, given the physical facts, they could in all cases reason out the political facts, but he did say that when they had the political facts they might find physical facts to account for them. There was an interdependence between the facts of physical geography in the first place and

a closer connection between political and physical facts in the second. It was only when Mr. Mackinder came to the methods of teaching that he was disposed to disagree with him. He was astonished that Mr. Mackinder should place geography in a category by itself. Why should it be treated differently from any other inductive science? Surely the reasonable probability was that, so far as it was an inductive science, it should be treated like any other. What was the method of any inductive science? Was it to start with an hypothesis, with a succession of hypotheses, and then to account for the facts? Or was it not rather to start with the facts themselves, to collect them, to classify them, then to form hypotheses that would account for them, and then to verify the hypotheses? That was just what Mr. Mackinder had not done. He had very graphically and forcibly illustrated his position with regard to the south-eastern portion of England, and as he spoke to an audience already familiar with the facts of political and physical geography, no doubt his argument was very much enjoyed. But if he had been speaking to a class ignorant of physical geography, and of the political facts which he constantly assumed, then his theories and hypotheses would have been absolutely meaningless. To those who were already familiar with the details, such a generalisation was helpful, but to those who were not familiar with the details, the generalisation, instead of being a help, was a hindrance. He could not but think that, although many of Mr. Mackinder's audiences had followed him with very much interest, yet it was doubtful whether, if they had been examined at the end of his lectures, the results would have been eminently satisfactory. If they had been, then his audiences must have differed from the rest of mankind, for inductive science was much the same to an adult as to a child. They all began with facts rather than with generalisations, and in proportion as geography was a science of generalisations it must start with the accumulation and classification of facts. He did not distinctly understand from Mr. Mackinder to what class and what age and state of development his method of teaching was applicable. Was it to be followed in the teaching of children, or in the teaching of adults? It might be an admirable method for University men, assuming that when they were children they had been thoroughly grounded in the elementary facts of physical and political geography, but if they did not know where the Thames rose, or the Kennet ran, or where Dungeness was, or what relation the Isle of Wight bore to the mainland, then all his generalisations would fall meaninglessly on the ear. His contention was that the proper course of teaching geography was to begin, not where Mr. Mackinder began, but at the other end, not build the facts on theory, but the theory on facts. The great mistake that had been made was not that they had begun with the accumulation of facts, but had stopped there. They had done very little indeed towards classifying the facts and showing their interdependence, and whatever improvements were likely to be made in the teaching of geography, would mainly consist in bringing out very clearly the interdependence of the physical facts in the first place, and the connection between the political facts and the physical facts on which they were dependent in the next place.

Prof. H. G. SEELEY (Professor of Geography, King's College) said it was somewhat reluctantly that he rose to speak upon the subject of geography, because it was extremely difficult to say anything wisely in the ten or fifteen minutes at his disposal, which should afterwards bear fruit. It was only because he wished to express his agreement in the main with the views which Mr. Mackinder had put forward that he rose at all. For eleven years in King's College he had publicly taught geography, and delivered regular courses of lectures in the morning and evening classes; but it required many years of study before he ventured to undertake that chair. The results at which he had arrived had enabled him to treat geography as a science, and to meet most of the difficulties which speakers

had raised at that meeting, because they were not familiar with the methods which were followed in teaching. He objected altogether to the idea that geography was a meeting ground for the sciences. Any one who attempted to comprehend the phenomena of geography must look at man as in nature; and therefore looking backward the vista carried them into a remote past, in which they found that the phenomena were in no way to be separated from those with which the geologist dealt. Very many of the familiar features of our own country were originated in remote geological periods, or dependent upon the geological structure of the country. On the other hand, when they conceived of man as placed in a world in which these varied physical phenomena influenced him, they must discover what those influences were. Granted that it was not an easy matter to disentangle them, yet they could be taken one by one and examined by various methods. He had thus disentangled them and tested the effects produced by comparison with the peoples of the various countries of Europe; and he had found that the same laws which held true for the determination of the main moral and mental characteristics of the inhabitants of the various districts of England, operated also in France, Germany, and the main portions of the world in which laws could be determined on the basis of similar facts. It would be readily comprehended that when a subject reached over such a wide field it was extremely difficult to say in a few minutes anything of a general nature which would make its scope clear. He would limit himself to the remark that he entirely agreed with Canon Daniel, that if geography was to be taught to young people the condition must be considered that the reasoning powers, which were necessary to deal with such aspects of the subject as he had referred to, were not developed until the age of somewhere about fourteen was reached; and therefore, in the earlier period of life, although a few of the larger aspects in which law manifested itself in connection with geography might be taught, teachers must limit themselves to teaching the larger order of facts rather than their explanation. The thing which had retarded the scientific teaching of geography was the examination system with which it was clogged. The examiners were not themselves educated into an appreciation of the large philosophical bearings of the subject, and they had been so saturated with the facts that they had prevented the students from acquiring a philosophical conception of the reasons for the collocation of those facts, by insisting mainly upon the obvious facts being stated in examination papers. So long as this prevailed, so long would it be perfectly hopeless to expect geography to be taught in the schools in a scientific way. He would, however, take exception to Canon Daniel's remark that geography was to be defined by the curriculum of which it formed a part. It was perfectly independent of all curricula; it was a beginning and an end; and although its foundation was based on geology, its end became the philosophy of history. It was true that a broad glance and grasp might be taken which would include the whole world; or they might limit themselves to the geography of a region such as Europe, or to the geography of England, each of those subjects being complete in itself; but whether they took the largest or the smallest view, they found man influenced by nature in various ways, and the teaching of this relation required varied knowledge and varied power in proportion to the field which it included. But there was a definite beginning, and that beginning was most certainly a geological one. He ventured to say that there was not a contour of coast-line which was not determined by law, and which the geologist did not easily and perfectly explain the existence of. He referred not merely to the main general directions of land, but also to the existence of the inlets into the land. They were all in positions which could not be varied, and until a man or a boy was familiarised with the principles which governed these things it was perfectly gratuitous to rest content with

the idea that he knew the position of the Wash, when he did not know why it was there. He (Professor Seeley) would therefore not be content with any description, no matter how vivid it might be. A description of geographical phenomena was necessarily vivid when it carried with it the reasons for the existence of the phenomena; and the moment it was realised that the various features of nature, whether they referred to the earth or to man, admitted of being explained, and that it was the duty of the geographer to explain them, then they were placed on a special ground. At present they must be content, so far as schools were concerned, to teach facts mainly. It would probably be a long time before teachers were sufficiently educated to teach geography wisely, so that the student was taught to think on every subject, and would get in his training the same mental development as he would get from the more severe mathematical and other technical studies. The training, however, was to be got, and it depended entirely on the teacher whether it was obtained or not.

Mr. J. BRYCE, M.P., said he felt a great deal of difficulty in venturing to make any observations, because he had not the advantage of having been present when the paper was read, though he had seen it since, and he did not know what were the issues raised in the discussion and which the members of the Society had chiefly before their minds. The speeches just delivered had, however, given him some indication as to what these points were. He heartily agreed with the view which had been presented by Mr. Mackinder, and greatly admired the singular clearness, logical cogency, and width of philosophical view by which the paper had been marked. Mr. Mackinder succeeded very well, not only in defining his general position and point of view, but in showing by happy illustrations the way in which that point of view was capable of being worked out and applied to different minor departments of geographical investigation. He had been a little surprised to hear Mr. Galton speak of geographical teaching as if it were mainly a matter of description. It was also with some surprise that he had heard the view expressed that geography was concerned chiefly with distribution, and that the main business of the geographical teacher was to give facts. The study would become infinite if they were to occupy themselves chiefly with giving the facts on which generalisation must be based. He understood that they were considering geography from the point of view of a University professor, and that they were to assume that the students would be reasonably supplied with the main facts. A knowledge of the facts should be assumed, and if necessary the teacher should issue a statement telling what subjects he was going to lecture upon, and suggesting to students that they should come prepared with a reasonable amount of preliminary knowledge. That being assumed, was it not the case that geography was not a science of description nor of distribution, but of causality, that its function was to exhibit the way in which a variety of physical causes played, firstly upon one another, and secondly upon man, and that the duty of a University professor of geography would be best discharged when he dealt with the elementary causes, and showed the students by successive stages how each cause passed into a secondary or subsidiary cause, until the world as it is now was arrived at. A geographer would naturally begin with the distribution of land and sea, and with the distribution of the great centres of formative force which had made the earth's surface what it is. He would therefore show how it was that the world had been made to consist of continents, islands, oceans, and would explain the directions of mountain chains. He would then pass on to consider the distribution of winds and rain, which depended on the distribution of land and sea, and upon the degree of elevation of parts of the dry surface. Thus there would be introduced another set of causes which were themselves originally due to the distribution of land and sea. Next he would



explain the working of these meteorological causes, showing how they affected the distribution of vegetation (since the quantity and nature of vegetation depended mainly on rainfall and temperature), and would examine the resulting fertility and productive power of different districts. The whole theory of botany and zoology must be worked out with reference to rainfall, and the rainfall itself is of course conditioned by the distribution of sea, the influence of the sun's heat, and other cosmic causes. The teacher would then pass on to consider how all these causes operated upon man, and determined the course of human history. In that way it seemed to him that geography was really the tracing out of various causes, some of which continued to operate directly, and some set in motion other causes, and the condition of the earth at present and human history as it had gone on on the earth were the complex result of the joint operation of all these causes. To show how these causes operated one upon another was the main function of a professor of geography. While, therefore, the study of geography developed a philosophical habit of mind it also cultivated the imagination, because there was nothing that excited the imagination more than the consideration of large forces operating over large periods of time and in different ways. It also developed the faculties of observation, and it seemed to him that it would have a very important function at the Universities in fitting men to become travellers. Nothing was more remarkable in our modern world than the rapid development of cheap means of communication, and the extent to which they were used. Let them compare the interest with which ordinary people travelled over the earth's surface now, with the opportunities they had to acquire knowledge of other countries 100 years ago, and they would see the progress the world had made was as remarkable in that respect as in any other. How differently a man profited by his travel if he had been taught to observe, wherever he went, the nature and direction of the mountain ranges, the kind of rocks, and the influence they had on the direction of streams and lakes, and how the meteorology of a country influenced it, and how all these causes played upon the flora and fauna. If a man travelled with knowledge of that kind he found a constant delight and interest in visiting different parts of the world which was entirely absent if those lines of inquiry were closed to him, and he believed in these matters it was not so much the mere facts that it was the duty of a professor to teach as the method. Let them give their students a clear comprehension of the true method of study. Let them take one particular country or one particular branch of the subject, such as the meteorology or the geology, or the distribution of agricultural products, and deal with it in a philosophical way, showing how the action of various causes is mingled, and then a mind of reasonable intelligence would find it easy to apply that method in other matters and other spheres. He would like to add one word to the effect that in these matters we must look for good results mainly from influencing and training highly a comparatively small number of persons. He did not feel very hopeful at present about the study of geography in schools, for it was hard to find time there for a new study like geography, which had been hitherto taught in such a way that it could scarcely be said to have been taught at all. The direction in which they might look for improvement was in implanting just ideas of philosophic method in a comparatively small number. If a class of twenty men who were to become teachers in the great schools were to receive a training in geography such as Mr. Mackinder recommended, it would fascinate their minds, and not only geography but every subject which came into connection with geography would be vivified and permeated with it, and the same ideas and methods would by degrees filter through and spread among the colleges and schools of the country, until an intelligent comprehension of the earth's surface would come to be a part of common knowledge. They must therefore not be dis-



contented if they were not able at first to operate on a very large sphere. It was of much more importance that a small number of superior minds should be imbued with good methods, and be able to practise them, than that methods of a more mechanical kind should be taught to a larger number of persons.

Mr. DELMAR MORGAN said that as he was present at Birmingham when Sir Frederic Goldsmid delivered his address, he was very pleased to have heard his defence. The result of the address was that the British Association appointed a Committee to exercise their influence on the Universities of Oxford and Cambridge in order to interest them in the cause of geographical education. He hoped that Mr. Mackinder would give two or three words of explanation with regard to a few points in his paper. How did the discovery of America cause the fall of Venice? How did artificial lighting render possible the existence of a great community in St. Petersburg?

Mr. DOUGLAS FRESHFIELD said that on the whole the speakers had stuck very well to the subject of discussion, namely on what general lines geography should be taught. Mr. Markham, to whom Mr. Mackinder's paper had been referred, had in his Report to the Council of the Society summarised excellently its main points. He would read extracts from Mr. Markham's report which, coming from one who had been Secretary of the Society for twenty-five years, would carry more weight than any words of his own. Mr. Markham wrote, "The question which Mr. Mackinder discusses is whether the science of geography is one investigation, or whether physical and political geography are separate subjects to be studied by different methods, the one as an appendix of geology, the other of history. He contends for the former view, and that no rational political geography can exist which is not built upon, and subsequent to, physical geography. The present system, he maintains, is an irrational political geography, a body of isolated data to be committed to memory. It is like learning mathematics by trying to remember formulæ instead of grasping principles. A true geographer, taking up the central geographical position, should look equally on such parts of science and such facts of history as are pertinent to his inquiry. His work is to bring out the relations of special subjects. The more scientific investigation tends to specialism, the more necessity is there for students whose aim it shall be to bring out the relations of the special subjects. One of the greatest gaps lies between the natural sciences and the study of humanity; it is the duty of the geographer to build a bridge over this abyss, which is upsetting the equilibrium of our culture." Mr. Markham continued, "I am inclined to anticipate that the reading and consideration of this paper will form an era in the history of our Society." On some points he (Mr. Freshfield) might be disposed to differ from Mr. Mackinder. Mr. Mackinder's definition of geography appeared to him a summary of his scholastic method rather than a final definition of the science itself. He should perhaps define it as the science which examined the face of the earth, the causes and connections of its features, and the relations between them and its denizens. But he should be sorry to see time spent in endeavours to frame rigid definitions. What was wanted was a clear and liberal view of the functions of geography as the main meeting-point between the sciences of nature and of man, and its thorough adoption of this point of view, which the speaker had himself urged at Birmingham, was one great merit of Mr. Mackinder's address. He thought that Canon Daniel had rather confused geography as a scientific pursuit with geography as a scholastic discipline. In scientific research the true method was, no doubt, to collect facts in order to deduce principles and laws from them. But in teaching, the laws laid down by research must be enforced and illustrated by individual facts. "The general truths," as Mr. John Morley has said, "are the means of lighting up the particulars." It had been objected also to the method advocated by Mr. Mackinder that it was not practical, that it would not affect schools, and was not

suited for examinations. As a fact, the attendants at Mr. Mackinder's lectures had been examined in them. He wished to read an account of their success, sent by the Secretary of the Oxford University Extension, the lectures of which were given to working and middle-class audiences in the north and west by graduates of Oxford. "Since the above was written I have received reports from Salisbury and Manchester as to the success of Mr. Mackinder's lectures. On Tuesday, February 8th, a meeting was held of all the elementary school teachers attending Mr. Mackinder's lectures on geography at Manchester. They numbered 105. The teachers themselves pointed out that the fact that the fifth lecture of the course was attended by so large a number was an indication of the way in which the lectures were appreciated. The head masters and mistresses calculated that the geographical teaching of 6000 pupils was affected by the delivery of one course on the subject in Manchester." That showed that the prospect of teaching geography as a branch of education which would call into play the reasoning powers, was likely to be realised in the immediate future, and that by encouraging teaching of that sort the Geographical Society, both at the Universities and in elementary schools, might do a great deal of good. Mr. Mackinder had suggested that the supply of papers of discovery and adventure was likely to become exhausted because the world was being used up. He did not at all agree with that. The world was not used up yet. For instance, there was New Guinea, in which "Captain Lawson" some years ago ventured to invent the story of the discovery of Mount Hercules, 32,000 feet high; the South Pole, large tracts of Asia and South America, many remote and remarkable islands. There was still room for tales of adventure; but he would put his objection on different grounds. He did not consider that any region had been explored until it had been described by a person of some perception. Mr. Galton said there were very few people who could find words to describe what they saw. It was perhaps not so much the words as the power of observation that was wanting. The number of good narratives of travel was comparatively small, because the perception of English travellers was so often limited and untrained. In this connection he would read to the meeting some sentences from an article by his friend, Mr. Conway (Professor of Art at Liverpool), in the last number of the 'Alpine Journal.' Mr. Conway was discussing the exhaustion of the Alps as a literary subject, but it seemed to him that what he said might, *mutatis mutandis*, be applied to the larger literature of general travel. "The credit due to explorers can only be measured by the utility of their work to others. The first visit is therefore the first recorded visit—the first visit so recorded that others are enabled to follow where the first man forced his way in doubt and perplexity. An unrecorded journey is nothing; one badly recorded is worth little more. The man who only visits a remote region, and contents himself with stating the fact, can only be regarded as swaggering. If he records his route in plain language, he deserves thanks. If he so records it that readers can discover its interest and beauty compared with the interest and beauty of other routes, he deserves much more credit." He would like to ask any Fellow who had been accustomed to attend the meetings of the Society, how many countries they had heard described which they did not wish to hear described again by somebody with vivid perceptions. One means of training the power of perception in travellers was to give better geographical education in English schools and Universities; they had been told over and over again that the only way to secure that was to get capable teachers, and to make teachers they must secure geography its proper position at the Universities which trained the teachers. He hoped that in this way brilliant papers of adventure, discovery, and research would be obtained by the Society for its Journal and its meetings, so that every taste might be satisfied.

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Mr. MACKINDER said that he was surprised at the general unanimity which had characterised the proceedings, and he felt gratified that any paper of his should have been the cause of bringing out from what he might call the authority on geography so unanimous an opinion as to what geography was. In the world outside there was an opinion that geographers did not know their own minds, and were not certain as to the limits of their own science. He therefore felt that the opinions which had been expressed by the different speakers would have a considerable effect, and he was gratified that his paper had been the means of eliciting that opinion. Part of the discussion that had taken place had been on words rather than on things. Sir Frederic Goldsmid had contrasted theodolites with theories. He (Mr. Mackinder) did not undervalue the work done by explorers and by those who had to undertake the, perhaps, more difficult and drier work of Ordnance Surveying, but he submitted that until the reason of the facts observed by the instrument was given, they had not reached a scientific stage, however skilfully the instruments were manipulated. In reply to Canon Daniel he would say that his experience tended to show that, when teaching elementary geography, the best way was not to teach the facts first and then the principles, but to combine the two, and teach the facts incidentally while explaining the principles. He could not help feeling that that was the way in which all but the ABC of geography should be taught. Obviously, in his paper he was not referring to the most elementary pupils, but he believed that his system, properly diluted, would be applicable to them also. With regard to geography as the science of distribution, he thought that Professor Bryce had clearly mistaken the sense that he attached to the expression. What he (Mr. Mackinder) meant by it was not merely the enumeration of the distributions, but the causation and the connection of the distributions.

The CHAIRMAN (General R. Strachey) said he thought that many of the observations which had been made might, with due respect, be termed rather academical in their character, still they had all no doubt been useful. A certain amount of misconception seemed however to have arisen amongst some of the speakers as to what the others meant, and there had perhaps been a little want of precision as to the distinction between what geography was as a science and what was its practical utility, and what the best method of teaching it. Mr. Galton had also spoken of geography as involving the art of geographical description. The fact of the matter was that geography, like all mixed sciences, might be viewed in ten thousand ways, but all those ways were useful and valuable. The same might be said with regard to the methods of teaching, whether it was Mr. Mackinder's particular way, or Canon Daniel's, or Prof. Seeley's, or Mr. Dunn's, they were, he had no doubt, all very good. All the speakers had shown that they really appreciated the proper manner in which geography should be taught, and he would say to them all, "Go on your own way." Why should they make a Procrustean bed and compel people to deal with the subject in any particular manner? That was not the way in which science grew or would grow. Let everybody exercise his ingenuity in the manner which to him was apparently the most conducive to the object he had in view. If any one wanted to know what his own opinions on the subject were, he would mention that ten years ago he read a discourse before the Society, on the subject of Scientific Geography, and he would refer them to this paper which was printed in the 'Proceedings' of the Society. He did not find, on reconsidering the subject recently, that he had very much to change in what he then said.

A vote of thanks to Mr. Mackinder concluded the proceedings.