

prehistoric archæologist, I can only add my humble testimony to that of others who think that this branch of anthropology is very unsatisfactorily dealt with by the metropolitan societies in which it is discussed. Quite recently this happy family has been increased by the birth of a fine child under the title of an Historic Society, and I observe that by way of specialising the functions of this society, it commenced life with a paper on Prehistoric Man. But there are no signs of any limitation to this improvident childbearing; it is announced that a Psychological Society is confidently expected. No one would be more disposed than myself to welcome psychology as a special branch of study if this family of gutter children is to go on increasing *ad libitum*; but it will be admitted that a Psychological Society, of all others, is liable to grow up scatterbrained, if completely severed from the influence of its more experienced kinsfolk.

I trust that I have made it apparent that Anthropology in its various branches includes some of the most popular and widely-disseminated scientific interests of the country; that the loss of power is enormous; not only is there no means of organised exploration, but the information which is published is either repeated over and over again in the different societies, or it is so scattered as to be beyond the reach of the majority of the students. They labour also under the disadvantage of being supported chiefly by men of small means, for the well-to-do classes in this country do not, as a rule, take any interest in either scientific or anthropological investigations. During the past year, a single American has done more in the way of anthropological exploration than the whole of the English societies, institutes, and associations together.

I will now briefly state my views as to the remedies for the evils of which I have spoken. I am averse to the principle of amalgamation; narrow views are often the most pronounced, and if they become dominant are liable to bring down the standard of an amalgamated society instead of enlarging its sphere of usefulness; besides, this amalgamation necessarily entails a certain loss of income by the loss of double subscriptions.

If my experience as a member of the council of most of the societies of which I speak does not deceive me, it should be the object of those who have the progress of anthropological studies at heart to induce the metropolitan societies to specialise their functions. The following might then become the titles of the various societies included under the term Anthropology, and they would represent not only the natural divisions of the science, but practically the divisions which are most consonant with the organisation of the existing societies. Setting history and historic archæology aside as beyond our province, we should have (1) Protohistoric Archæology; I adopt the term proposed by Mr. Hyde Clarke for this branch, which practically includes all that comes under the head of Biblical Archæology at present; (2) Prehistoric Archæology; (3) Philology; (4) Biology, including Psychology and Comparative Anatomy, in so far as it relates to man; (5) Descriptive Ethnology, viz., original reports of travellers on the races of man, conducted in association with geographical exploration. Under these heads we should, I believe, include all the various classes of special workers. These should constitute independent but associated societies; that is to say, the members of one should be privileged to attend the meetings and take part in the discussions of the others, but not to receive the publications of any but their own society. By this means each would profit by the experience of the other societies, but the funds necessary for the maintenance of each would be secured. As branch sections of anthropology they would be under the control of a general elected council, only in so far as would be necessary to prevent their clashing with each other, and for the control of any measures which it might be necessary for the several sections to undertake in concert; under the auspices of the general council might also be held the anthropological meetings devoted to such general subjects as either embraced the whole, or were not included in the sections. By these means the standard of anthropological science as a comprehensive study of the science of man in all its branches would be secured, and the possibility of its becoming narrowed under the influence of any dominant party would be obviated. It is hardly necessary to say that the chief advantage of such an arrangement as I suggest would consist in the employment of a single theatre and library for these cognate societies; they would employ a single printer, and the arrangements might include one or more artists, lithographers, and map-drawers, by which a great increase, and at the same time economy, would be effected in the

illustrations. The saving effected by the union of these societies in a single establishment might be applied to conducting explorations either at home or abroad in connection with the Geographical Society. The question of the utilisation of apartments is one which commends itself especially to the notice of Government in regard to those societies, for which apartments are provided at the public cost. It should be made a *sine quâ non* that the societies so favoured should fairly represent all the branches of their subject.

As regards the local societies, it has been proposed to republish a selection of their papers under the auspices of this association. It is to be hoped that some arrangement, such as that proposed by the committee of which Sir Waller Elliot is secretary, may be carried out. I have only one suggestion to make on this point: re-publication is simply a repetition of cost and labour, if the desired object of bringing the papers together can be accomplished by other means. As to selection, I have no faith in it. If local and metropolitan societies could be induced to adopt a uniform size for their publications—not necessarily a uniform type—the papers relating to the same subjects might be brought together without the cost of reprinting. It would only be necessary to establish a classification of papers under various headings, such as, for example, those which constitute the sections of this Association. The societies might then print additional copies of their papers under each heading, in the same manner that additional copies are now struck off for the use of authors. A single metropolitan society might be recognised as the representative of each branch, and under its auspices the whole of the papers of the local and metropolitan societies relating to its branch might be brought together and printed in a single volume. Time does not allow me to enter into the details of the arrangements which would be necessary to carry out such a measure. I believe the difficulties would not be so great as might at first sight appear, especially as the evils of the existing arrangements are much complained of; but it should be a primary object of any arrangement that may hereafter be made that the independence of the several branches should not be sacrificed unnecessarily; it should be endeavoured to stimulate them and train them into useful channels, rather than to bring them too much under central control.

SECTION E

GEOGRAPHY

OPENING ADDRESS BY THE PRESIDENT, FRANCIS GALTON,
F.R.S.

THE functions of the several Sections of the British Association differ from those of other Institutions which pursue corresponding branches of science. We, who compose this Section, are not simply a Geographical Society, meeting in a hospitable and important provincial town, but we have a distinct individuality of our own. We have purposes to fulfil which are not easily to be fulfilled elsewhere; and, on the other hand, there are many functions performed by Geographical Societies which we could not attempt without certain failure. Our peculiarities lie in the brief duration of our existence, combined with extraordinary opportunities for ventilating new ideas and plans, and of promoting the success of those that deserve to succeed. We are constituents of a great scientific organisation, which enables us to secure the attention of representatives of all branches of science to any projects in which we are engaged; and if those projects have enough merit to earn their deliberate approval, they are sure of the hearty and powerful support of the whole British Association.

These considerations indicate the class of subjects to which our brief existence may be devoted with most profit. They are such as may lead to a definite proposal being made by the Committee of our Section for the aid of the Association generally; and there are others, of high popular interest, which cannot be thoroughly discussed except by a mixed assemblage, which includes persons who are keen critics, though not pure geographers, and who have some wholesome irreverence to what Lord Bacon would have called "the idols of the Geographical den."

We may congratulate ourselves that many excellent memoirs will be submitted to us, which fulfil one or other of these conditions. They will come before us in due order, and it is needless that I should occupy your attention by imperfect anticipations of them. But I must say that their variety testifies to the abundance of the objects of geographical pursuit, other than explo-

There is no reason to fear that the most interesting occupation of geographers will be gone, when the main features of all the world are known. On the contrary, it is to be desired, in the interests of the living pursuit of our science, that the primary facts should be well ascertained, in order that geographers may have adequate materials, and more leisure to devote themselves to principles and relations. I look forward with eagerness to the growth of Geography as a science, in the usually accepted sense of that word; for its problems are as numerous, as interesting, and as intricate as those of any other. The configuration of every land, its soil, its vegetable covering, its rivers, its climate, its animal and human inhabitants, act and re-act upon one another. It is the highest problem of Geography to analyse their correlations, and to sift the casual from the essential. The more accurately the crude facts are known, the more surely will induction proceed, the further will it go, and, as the analogy of other sciences assures us, the interest of its results will in no way diminish.

As a comparatively simple instance of this, I would mention the mutual effects of climate and vegetation, on which we are at present very imperfectly informed, though I hope we shall learn much that is new and valuable during this meeting. Certain general facts are familiar to us: namely, that rain falling upon a barren country drains away immediately. It ravages the hillslopes, rushes in torrents over the plains, and rapidly finds its way to the sea, either by rivers or by subterranean water-courses, leaving the land unrefreshed and unproductive. On the other hand, if a mantle of forest be nursed into existence, the effects of each rainfall are far less sudden and transient. The water has to soak through much vegetation and humus before it is free to run over the surface; and, when it does so, the rapidity of its course is checked by the stems of the vegetation. Consequently, the rain-supplies are held back and stored by the action of the forest, and the climate among the trees becomes more equable and humid. We also are familiar with the large differences between the heat-radiating power of the forest and of the desert, also between the amount of their evaporation; but we have no accurate knowledge of any of these data. Still less do we know about the influences of forest and desert on the rate of passage, or upon the horizontality, of the water-laden winds from the sea over the surface of the land: indeed, I am not aware that this subject has ever been considered, although it is an essential element in our problem. If we were thoroughly well informed on the matters about which I have been speaking, we might attempt to calculate the precise difference of climate under such and such conditions of desert and of forest, and the class of experiences whence our data were derived would themselves furnish tests of the correctness of our computations. This will serve as an example of what I consider to be the geographical problems of the future; it is also an instance of the power of man over the phenomena of nature. He is not always a mere looker-on, and a passive recipient of her favours and slights; but he has power, in some degree, to control her processes, even when they are working on the largest scale. The effects of human agency on the aspect of the earth would be noticeable to an observer far removed from it. Even were he as distant as the moon is, he could see them; for the colour of the surface of the land would have greatly varied during historic times, and in some places the quantity and the drift of cloud would have perceptibly changed. It is no trifling fact in the physical geography of the globe, that vast regions to the east of the Mediterranean, and broad tracts to the south of it, should have been changed from a state of verdure to one of aridity, and that immense European forests should have been felled.

We are beginning to look on our heritage of the earth much as a youth might look upon a large ancestral possession, long allowed to run waste, visited recently by him for the first time, whose boundaries he was learning, and whose capabilities he was beginning to appreciate. There are tracts in Africa, Australia, and at the Poles, not yet accessible to geographers, and wonders may be contained in them; but the region of the absolutely unknown is narrowing, and the career of the explorer, though still brilliant, is inevitably coming to an end. The geographical work of the future is to obtain a truer knowledge of the world. I do not mean by accumulating masses of petty details, which subserve no common end, but by just and clear generalisations. We want to know all that constitutes the individuality, so to speak, of every geographical district, and to define and illustrate it in a way easily to be understood; and we have to use that knowledge to show how the efforts of our human

race may best conform to the geographical conditions of the stage on which we live and labour.

I trust it will not be thought unprofitable, on an occasion like this, to have paused for a while, looking earnestly towards the future of our science, in order to refresh our eyes with a sight of the distant land to which we are bound, and to satisfy ourselves that our present efforts lead in a right direction.

The work immediately before us is full of details, and now claims your attention. There is much to be done and discussed in this room, and I am chary of wasting time by an address on general topics. It will be more profitable that I should lay before you two projects of my own about certain maps, which it is desirable that others than pure geographers should consider, and on which I shall hope to hear the opinions of my colleagues in the Committee-room of this Section.

They both refer to the Ordnance Maps of this country, and the first of them to the complete series well known to geographers, that are published on the scale of one inch to a mile. It is on these alone that I am about to speak; for, though many of my remarks will be applicable more or less to the other Government map publications, I think it better not to allude to them in direct terms, to avoid distracting attention by qualifications and exceptions.

English geographers are justly proud of these Ordnance Maps of their country, whose accuracy and hill-shading are unsurpassed elsewhere, though the maps do not fulfil, in all particulars, our legitimate desires. I shall not speak here of the absence from the coast-maps of the sea *data*, such as the depth and character of the bed of the sea, its currents and its tides (although these are determined and published by another Department of the Government—namely, the Admiralty), neither shall I speak of the want of a more frequent revision of the sheets, but shall confine myself to what appear to be serious, though easily remediable, defects in the form and manner of their publication. It is much to be regretted that these beautiful and cheap maps are not more accessible. They are rarely to be found even in the principal bookseller's shops of important country towns, and I have never observed one on the bookstall of a railway station. Many educated persons seldom, if ever, see them; they are almost unknown to the middle and lower classes; and thus an important work, made at the expense of the public, is practically unavailable to a large majority of those interested in it, who, when they want a local map, are driven to use a common and inferior one out of those which have the command of the market. I am bound to add that this evil is not peculiar to our country, but is felt almost as strongly abroad, especially in respect to the Government of France. I account for it by two principal reasons. The first is, that the maps are always printed on stiff paper, which makes them cumbrous and unfit for immediate use; it requires large portfolios or drawers to keep them smooth, clean, and in separate sets, and an unusually large table to lay them out side by side, to examine them comfortably, and to select what is wanted. These conditions do not exist on the crowded counter of an ordinary bookseller's shop, where it is impossible to handle them without risk of injury, and without the certainty of incommoding other customers. Moreover, their stiffness and size, even when published in quarter-sheets, make them most inconvenient to the purchaser. Either he has to send them to be mounted in a substantial and therefore costly manner, or he must carry a roll home with him, and cut off the broad ornamental borders, and divide the sheet into compartments suitable for the pocket, which, to say the least, is a troublesome operation to perform with neatness. The other of the two reasons why the maps are rarely offered for sale, is that the agents for their publication are themselves map-makers, and therefore competitors, and it is not to be expected of human nature that they should push the sale of maps adversely, in however small a degree, to their own interests.

The remedy I shall propose for the consideration of the Committee of this Section is, to memorialise Government to cause an issue of the maps to be made in quarter-sheets on thin paper, and to be sold, folded in a pocket-size, like the county maps seen at every railway station, each having a portion of an index-map impressed on its outside, to show its contents and those of the neighbouring sheets, as well as their distinguishing numbers. Also, I would ask that they should be sold at every "Head Post-office" in the United Kingdom. There are about seven hundred of these offices, and each might keep nine adjacent quarter-sheets in stock, the one in which it was situated being the centre of the nine. An index-map of the whole survey might be procurable

at each of these post-offices, and, by prepayment, any map not kept in stock might be ordered at any one of them, and received in the ordinary course of the post. This is no large undertaking that I have proposed. The price of a quarter-sheet in its present form, which is more costly than what I ask for, is only sixpence; therefore the single complete set of nine sheets for each office has a value of not more than four shillings and sixpence, and for all the seven hundred Head Post-offices, of not more than 160*l*.

I believe that these simple reforms would be an immense public boon, by enabling any one to buy a beautiful and accurate pocket-map of the district in which he resides, for only sixpence, and without any trouble. They would certainly increase the sale of Government maps to a great extent, and they would cause the sympathies of the people and of their representatives in Parliament to be enlisted on the side of the Survey, and they probably be imitated by Continental nations.

It has often been objected to any attempt to increase the sale of Government maps, that the State ought not to interfere with private enterprise. I confess myself unable to see the applicability of that saying. It would be an argument against making Ordnance maps at all; but the nation has deliberately chosen to undertake that work, on the ground that no private enterprise could accomplish it satisfactorily; and, having done so, I cannot understand why it should restrict the sale of its own work in order to give a fictitious protection to certain individuals, against the interests of the public. It seems to me to be a backward step in political economy, and one that has resulted in our getting, not the beautiful maps for which we, as taxpayers, have paid, but copies or reductions of them, not cheaper than the original, and of very inferior workmanship and accuracy.

So much for the first of the two projects which I propose to bring before the consideration of the committee of this section. It is convenient that I should preface my second one with a few remarks on colour-printing, its bearing on the so-called "bird's-eye views," and on its recent application to cartography. Colour-printing is an art which has made great advances in recent years, as may be seen by the specimens struck off in the presence of visitors to the present International Exhibition. One of these receives no less than twenty-four consecutive impressions, each of a different colour from a different stone. This facility of multiplying coloured drawing will probably lead to a closer union than heretofore between geography and art. There is no reason now why "bird's-eye views" of large tracts of country should not be delicately drawn, accurately coloured, and cheaply produced. We all know what a geographical revelation is contained in a clear view from a mountain top, and we also know that there was an immense demand for the curiously coarse bird's-eye views which were published during recent wars, because even such as they are capable of furnishing a more pictorial idea of the geography of a country than any map. It is therefore to be hoped that the art of designing the so-called "bird's-eye views" may become studied, and that real artists should engage in it. Such views of the environs of London would form very interesting, and it might be, very artistic pictures.

The advance of colour-printing has already influenced cartography in foreign countries, and it is right that it should do so, for a black and white map is but a symbol—it can never be a representation—of the many-coloured aspects of Nature. The Governments of Belgium, Russia, Austria, and many other countries, have already issued coloured maps; but none have made further advance than the Dutch, whose maps of Java are printed with apparently more than ten different colours, and succeed in giving a vivid idea of the state of cultivation in that country.

I now beg to direct your attention to the following point:—It is found that the practice of printing maps in more than one colour has an incidental advantage of a most welcome kind, namely, that it admits of easy revision, even of the most beautifully executed maps, for the following reason. The hill-work in which the delicacy of execution lies, is drawn on a separate plate, having perhaps been photographically reduced; this has never to be touched, because the hills are permanent. But it is in the plate which contains nothing else but the road-work where the corrections have to be made, and that is a very simple matter. I understand that the Ordnance Survey Office has favourably considered the propriety of printing at some future time an edition of the one-inch maps on this principle, and at least in two colours—the one for the hills and the other for the roads.

This being stated, I will now proceed to mention my second proposal

Recollecting what I have urged about the feasibility of largely increasing the accessibility and the sale of Government maps, by publishing them in a pocket form and selling them at the Head Post-offices, it seems to me a reasonable question for the committee of this section to consider whether Government might not be memorialised to consider the propriety of undertaking a reduced Ordnance map of the country, to serve as an accurate route-map and to fulfil the demand to which the coarse country maps, which are so largely sold, are a sufficient testimony. The scale of the reduced Government map of France corresponds to what I have in view; it is one of five miles to an inch, within a trifle ($\frac{1}{320000}$ of Nature), which is just large enough to show every lane and footpath. Of course it would be a somewhat costly undertaking to make such a map, but much less so than it might, at first sight, appear. Its area would be only twenty-fifth that of the ordinary Ordnance map, and the hill-work of the latter might perhaps be photographically reduced and rendered available at once. The desirability of maps such as these, accurately executed and periodically revised, is undoubted, while it seems impossible that private enterprise should supply them except at a prohibitive cost, because private publishers are necessarily saddled with the cost of re-obtaining much of what the Ordnance Survey Office has already in hand for existing purposes. A Government department has unrivalled facilities for obtaining a knowledge of every alteration in roads, paths, and boundaries of commons, and Government also possesses an organised system in the post-offices, fitted to undertake their sale. The production of an accurate route-map seems a natural corollary to that of the larger Ordnance maps, and has been considered so by many Continental Governments.

I therefore intend to propose to the committee of this section to consider the propriety of memorialising Government to cause inquiries to be made as to the cost of construction, and the probability of a remunerative sale, of maps such as those I have described; and, if the results are satisfactory, to undertake the construction of a reduced Ordnance Map, on the same scale as that of France, to be printed in colours, and frequently revised.

These, then, are the two projects to which I alluded—the one to secure the sale of one-inch Ordnance Maps, on paper folded into a pocket form, to be sold at the Head Post-offices of the United Kingdom—700 or thereabouts in number, each office keeping in stock the maps of the district in which it is situated; and the other to obtain a reduced Ordnance Map of the kingdom, on the scale of about five miles to an inch, to fulfil all the purposes of a road map, and to be sold throughout the country at the post-offices, in the way I have just described.

I will now conclude my Address, having sufficiently taxed your patience, and beg you to join with me in welcoming, with your best attention, the eminent geographers whose communications are about to be submitted to your notice.

SECTIONAL PROCEEDINGS—FRIDAY, AUGUST 16

Discoveries at the Northern End of Lake Tanganyika, by H. M. Stanley.

THE President, Mr. Galton, in announcing the programme of proceedings for the day, explained the circumstances connected with Dr. Livingstone's discoveries previous to Mr. Stanley's expedition.

Mr. Stanley then read his paper, in which the following are the most important items, omitting everything of merely personal interest:—

"If you will glance at the south-eastern shore of the Tanganyika, you will find it a blank; but I must now be permitted to fill it with rivers and streams and marshes and mountain ranges. I must people it with powerful tribes, the Wafira, Wakawendi, Wakonongo, and Wanyamwezi, more to the south with ferocious Watula and predatory Warori, and to the north with Mara, Msengi, Wangondo, and Waluriba. Before coming to the Malagarazi, I had to pass through Southern Wavinza. Crossing that river, and after a day's march north, I entered Ubha, a broad plain country, extending from Uvinza north to Urundi and the lands inhabited by the Northern Watuta. Three long marches through Ubha brought me to the beautiful country of Ukaranga, and a steady tramp of twenty miles farther westward brought me to the divisional line between Ukaranga and Ujiji, the Liuche Valley, or Ruche, as Burton has it. Five miles farther westward brought us to the summit of a smooth hilly ridge, and the town of Ujiji embowered in the palms lay at