

that such striking agreement with the physical features as I have shown to exist should occur. Probably such features would be altogether ignored; or if taken into consideration would be seized upon as *boundaries*. One could scarcely desire a more striking physical feature for a boundary than the chalk escarpment; but we have seen that it is only in rare cases that this forms the boundary of a parish; generally it is well within the parish, which stretches up and often far beyond it. The boundaries *cross* the escarpment, in nine cases out of ten at right angles to it. So again with the Lower-Greensand escarpment; although in its relation to the parishes it acts exactly the reverse of the chalk escarpment, yet they agree in rarely forming parish boundaries. To this it may be answered that, whatever the origin of parishes, whether civil or ecclesiastical, whether by grouping or subdividing divisions of land previously existing, regard would necessarily be had to the shape and extent of those divisions. This, I think, must have been the case; and considerations advanced in this paper lead us to infer that whatever may have been the origin of manors or parishes as such, they both depend upon still older divisions of the land, and that these were not formed by the arbitrary act of church or king, but resulted necessarily from the great physical features of the country."

The Origin of Serpent-Worship. By C. STANILAND WAKE, M.A.I.

After referring to various facts showing the existence of serpent-worship in many different parts of the world, the paper proceeded to consider the several ideas associated with the serpent among ancient and modern peoples. One of its chief characteristics was its power over the wind and rain; another was its connexion with health and good fortune, in which character it was the Agathodæmon. The serpent was also the symbol of life or immortality, as well as of wisdom. It was then shown that that animal was viewed by many uncultured peoples as the re-embodiment of a deceased ancestor, and that descent was actually traced by the Mexicans and various other peoples from a serpent. The serpent superstition thus becomes a phase of ancestor-worship, the superior wisdom and power ascribed to the denizens of the invisible world being assigned also to their animal representatives. When the simple idea of a spirit ancestor was transformed into that of the Great Spirit, the father of the race, the attributes of the serpent would be enlarged, and it would be thought to have power over the rain and the hurricane. Being thus transformed to the atmosphere, the serpent would come to be associated with nature, or solar-worship. Hence we find that the sun was not only a serpent god, but also the divine ancestor or benefactor of mankind. Seth, the traditional divine ancestor of the Semites, was the serpent sun-god, the Agathodæmon; and various facts were cited to establish that the legendary ancestor of the people classed together as Adamites was thought to possess the same character. It would appear to follow from the facts mentioned in the paper that serpent-worship, as a developed religious system, originated in Central Asia, the home of the great Scythic stock, from which the civilized races of the historical period sprung, and that the descendants of the legendary founder of that stock, the Adamites, were in a special sense serpent-worshippers.

The Rev. H. H. WINWOOD, M.A., F.G.S., exhibited some Flint Implements from South Africa.

GEOGRAPHY.

Address by FRANCIS GALTON, F.R.S., President of the Section.

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 organization, 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 for 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 exploration. 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 react upon one another. It is the highest problem of Geography to analyze 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 hill-slopes, rushes in torrents over the plains, and rapidly finds its way to the sea, either by rivers or by subterranean watercourses, 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 generalizations. 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 booksellers' 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 maps 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 memorialize Government to cause an issue of the maps to be made in quarter sheets on thin paper, and to be sold folded into 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, used to be sold for 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.

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; 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 would 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 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 drawings 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 an 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. It is on another plate, which contains nothing else but the road-work, where the corrections have to be made; and to do 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 memorialized 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 county 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 5 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 one 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 organized 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 to be so by many Continental Governments.

I therefore intend to propose to the Committee of this Section to consider the propriety of memorializing 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 5 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.

The Euphrates-Valley Route to India. By W. P. ANDREW.

In the opening portion of his paper the author dilated upon the many noble objects which the proposed railway to India, *viâ* the Euphrates Valley, would subserve. It would inevitably entail the colonization and civilization of the great valleys of the Euphrates and Tigris, restore the old and renowned productiveness of Mesopotamia, and resuscitate in modern shape Babylon, Nineveh, and Ctesiphon. He argued that no direct route to India, amongst the many which had been proposed, combined so many advantages as the ancient route of the Euphrates. It is the shortest and the cheapest, both for constructing and working a railway,—so free from engineering difficulties, that it appears as though designed by nature for the highway of nations between the East and the West; it is the most surely defensible by England, both its termini being on the open sea, and the most likely to prove remunerative. The other routes proposed, such as those from places on the Black Sea, were open to the fatal objection that while they would be of the greatest service to Russia, they would be beyond the control of Great Britain; they were besides excluded from practical consideration by the engineering difficulties they involved. These conclusions had been demonstrated by many eminent witnesses examined before the recent Select Committee of the House of Commons. The author admitted the value of a continuous line from Constantinople to India, but believed it to be too vast a project to be at present undertaken. The moderate scheme which he advocated was a line 900 miles in length, from the Gulf of Scanderoon, *viâ* the *right* bank of the Euphrates, to Kowait, in the north-western corner of the Persian Gulf. Should it be found desirable hereafter to construct a through line to India, this portion would form a ready-made and considerable section of it. It was precisely that portion of the route between Constantinople and India from which the greatest benefit would be derived by the substitution of railway for sea transit, whether regard be had to the rate of speed or the economy with which the traffic might be worked. Both the proposed termini possess all the requisites of first-class harbours; and the line, on leaving Alexandretta, would run to Aleppo, and along the Euphrates, by way of Annah, Hit, Kerbela, Nedjef, Somowha, and Sheikh el Shuyukh, to Kowait. The Euphrates would not be crossed, and the line would have the strategic advantage of two great rivers being interposed between it and an advancing enemy on the flank on which there would be the greatest likelihood of danger arising. The cost of the railway was estimated at £9,000,000 sterling. The advantages of the proposed railway to England would be the possession of an alternative route to India and the saving of nearly 1000 miles in linear distance.

On the Orography of the Chain of the Great Atlas.

By JOHN BALL, F.R.S., F.L.S.

The representations of the chain of the Great Atlas given on the most modern maps show how very vague and incomplete our knowledge still is. They agree in very little beyond the fact that high mountains extend in a nearly direct line from the west coast, where they approach the Atlantic, near Agadir, in about 30° 30' N. lat., for about 500 miles inland, where they subside at no great distance from the frontier of Algeria about the parallel of 33° 30'.

All but the most recent maps indicate a single range similar in general character