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SOME ASPECTS OF POLITICAL GEOGRAPHY.*

By Colonel Sir T. H. HOLDICH, K.C.M.G., K.C.I.E., C.B.

WHEN first honoured by an invitation to address a Cambridge University audience on a geographical subject, I accepted that invitation without due consideration. For it now appears to me to be sheer presumption to imagine that any words of mine can usefully supplement the ample measure of theoretical and practical instruction which the University offers to geographical students. Time was (and not so very long ago either) when the whole wide area of scientific knowledge embraced in the broad field of geography was narrowed to a ridiculous little educational streamlet which babbled of place-names and country products. Scanty as was the educational value of geographical teaching fifty years ago, it was almost equalled in its feebleness by the practical knowledge of the subject which included the all-important matter of map-making. True we had our geodetic scientists, and much profound thought and practical energy had already been devoted to solving the riddle of the Earth's form and dimensions, such as laid the foundation for an after extension of valuable bases for surface measurement which would certainly sustain the building up of maps. But the science of geodesy was still too much in the academic stage, and our systems of map-making were framed on old-world principles, immensely costly and profoundly slow, which were applied to Great Britain with more or less useful effect but which left Greater Britain untouched and uncared for. I think we may fairly claim that it was the adoption of continental methods in India, and the rapid extension and adaptation of those methods in that vast and varied continent which first opened the eyes of business administrators to the enormous advantages, commercial,

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political, or military, which were to be gained by comprehensive and sweeping surveys.

Nearly forty years ago, I had the honour of introducing to a select but limited audience at the United Service Institution the simple survey instrument called the plane-table. There was at that time not one in England. The clumsy specimen which was prepared for the purpose of illustration of that lecture served as a sort of model for instructors subsequently, and I can hardly express the difference between the practice of geography in the necessary branch of map-making in those days and in these, better than by pointing out that in those days the plane-table was an unknown accessory to the equipment of the geographical surveyor, whilst in these its use is taught in every survey school.

But it was not the development of map-making alone (although I regard that as the ultimate object of all geodetic science) which led to the better appreciation of the absolute necessity for scientific geographical education in the very widest sense of the term. It was the practical consideration that we were being left very far behind in the field, not so much of research (for there we have always held our own), but of that practical knowledge which profoundly affected our position as a commercial nation, our prospects in the military field, or our political dealings with other countries when questions arose of the partition of spheres of interest, that forced the conservative hand of our educational administration and led to the formation of geographical schools throughout the breadth of the country. In short, it began to be quite clear that geography was a science which had to be reckoned with, and which it paid pre-eminently to study. But so wide is the field which that science embraces, so intricate are its relations with almost every other existing natural science, which either has its roots in land formations and a growth dependent on climatic influence, or else is in itself the bed-rock of such formations, that a whole world of separate and distinct branches of geographical study have arisen in connection with them. But we need not waste time now in the discussion of what geography covers. I rather share the view expressed by Prof. Davis, who said that he was a geologist rather than a geographer, for, after all, "geography is only the geology of to-day;" and he added, "If this seems to subordinate geography too much to geology, it may be appropriate to state that I regard all geology as only the summation of a vast series of geographies, the chief difference between the present and the earlier geographies being that the one lies directly before us and is therefore open to immediate observation, while all the others are known only through very imperfect records, and are therefore largely matters of inference. A geologist who is making a study of a certain period would be delighted if he could draw maps of the lands and waters of that time, and pictures of the scenery and the inhabitants just as a geographer draws for to-day."

This, however, lands us in the speculative side of the subject, and it is neither the speculative nor the strictly scientific side to which I desire to call your attention now, but to matters eminently practical, in which my own individual and original experience may perhaps count for something in a paper which I fear may have little else to recommend it. As my experiences have been essentially those of a map-maker and boundary demarcator, it is to the field of problems connected with this branch of geography that I would conduct you, and even then I propose to limit myself to a few suggestions which seem to be specially suited to the present occasion and to the probable opportunities which the future may present to you. You all know that the basis of all map-making is a geodetic framework. On this all else must ultimately hang, and the necessity for it is the greater, the larger the area of the world's surface that lies open to the topographer. There should be no mistake about this. Whatever may be the outcome of geodetic measurements (conducted and perfected with all the scientific care of the best observers in the world), as regards scientific theories of the world's shape and the corrections that thereby may be introduced into those data from which our computations of latitude, longitude, and azimuth are deduced, there is this solid practical effect of it—that it furnishes the anatomy or framework of the whole world's map-construction; and as the years roll on, and here and there a continental area is added to the map-geography of the Earth, there will be no fitting together of the patchwork puzzle—no unity or continuity of illustration—unless it is nailed down to a pre-existing geodetic framework. The Geodetic Conference, which has lately been held, and in which the leading geodetic surveyors of Britain and India have taken part, is therefore of world-wide significance. We may fairly trust that from it there will work out an accordant system universally adaptable, which will bind together the scientific efforts of all nations concerned in the future development and civilization of the dark places of the world.

In urging the importance of their world's work, our geodetic supporters should not claim too much. Perfect, absolute accuracy is not in accordance with the dispositions of nature. Finality is not attainable on this Earth, and we may hope to see a little less of the appearance of final and absolute determination of value, either in co-ordinate position or in altitude, which sometimes indicate a minute precision which is not really warranted by the results of observation or of computation. In the purely geodetic field it is still those unknown qualities dependent on the, as yet, unascertained figure of the Earth which introduce trouble and work mischief. In other fields dependent on a geodetic basis, but not ranking directly as geodesy, it is the unknown factors in the physical constitution of our atmosphere which are the most disturbing. The altitudes of high and unapproachable peaks, for instance, can never be said to be determined to within many feet of their probable, or

possible, value; and it is a mistake to enter them in our maps in other than round figures denoting this uncertainty. Nevertheless, when all is said, direct observation is our only means of ensuring relative accuracy. As in the case of altitudes not all the barometric observations that could be taken over weeks and months of careful daily record will give results which can compare in probable accuracy with the roughest form of direct observation by triangulation; so you may surely reckon that no substitute, no provisional method of Earth-measurement, can possibly take the place eventually of that geodetic backbone of all map anatomy which we may typify to-day by the great arc of direct triangulation which is being gradually measured through the length of Africa.

But all this initial process must necessarily be in the hands of scientists—and science moves slowly, if surely, and it is usually expensive. The world cannot sit idle and wait for this slow evolution of exact determinations on strict geodetic principles before demanding maps. And we have found now, by the experience of the last twenty or thirty years, that other provisional methods, methods which involve the use of a smaller class of instrument and rapid progress through a country, are quite sufficient to enable us to spread out our map-system on comparatively small scales of work over the vast areas that are of primary interest to the commercial, military, or political geographer, without the accumulation of any error that would invalidate the map. And this is the sort of work that you, gentlemen, in the capacity of travellers with a purpose, which purpose may be ethnological, archaeological, geological, or, in fact, which may represent any branch of natural science which requires map illustration, can all readily learn to do. It is this sort of practical geography which we wanted in South Africa and did not possess. It is this which is wanting wherever a political discussion arises as to respective spheres of national interest, and which usually remains wanting. It is often by means of the early possession of geographical data of quite the most elementary type that the commercial pioneer succeeds in striking in effectively to the development of a fresh trade area, and, like the early bird, succeeds in securing the first fat worms.

I am not going to trouble you with details as to how this class of work can be best accomplished. Your most able and energetic staff of instructors can tell you that quite as well, if not better, than I can, although, maybe, I have had more rough practical experience. It is sufficient to me to be able to record with a certain note of thanksgiving that our geographical schools can now turn out fair topographers by the score, whether for military purposes or for civil, and that our geographical travellers take the field with an aptitude for recording what they see, and a set purpose of effecting some useful research, designed to give new knowledge to the world, which was practically unknown in the days of such heroes as Speke or Burton. It is in connection with one

special branch of this class of geographical map-making that I think I may usefully employ the short space of time at my disposal by recounting some of the difficulties which I have encountered as a boundary demarcator, and suggesting means for their avoidance in future.

This is an age of boundary making. It is an age of partitioning and dividing territory—a process which has by no means ended yet, and which may continue whilst the world endures. And the territories to be partitioned to which political boundaries have to be set, are mostly dark and remote, and have been hitherto guiltless of any map-illustration of sufficient accuracy to ensure confidence in demarcation. All sorts of countries, under all sorts of conditions of government, from the black barbarism of Central Africa to the hot-house civilization of South America, have been subject to the process, and of all of them may the same thing be said, *i.e.* that the process of boundary fixing has finally revolved itself into a strictly geographical problem. Indeed, it must always be so. A boundary is an artificial impress upon the surface of the land, as much as a road or a railway, and like the road or the railway, it must adapt itself to the topographical conditions of the country it traverses. If it does not, it is likely to be no boundary at all. Boundaries have been twisted out of every conceivable natural feature, with more or less success. Those that have been defined in abstract terms of meridians and parallels, or other abstract lines, for want of knowledge of existing natural features, have never proved satisfactory. The very first preliminary to a boundary settlement should be, where possible, a reasonably clear topographical illustration of the country concerned. But it is not always possible, and it may happen that the mere agreement between two countries upon an abstract definition may be all that is necessary for the time being. In that case, a store of future trouble may be laid up unless the agreement is carefully regarded as provisional only.

Here, then, we have the first great rock upon which boundary definitions usually split. It is want of geographical knowledge. If, indeed, it is compulsory ignorance, if there is no possibility of waiting till maps can be made and arbitrators are forced into the position of adopting the worst of all possible boundaries, *i.e.* those defined by straight lines (whether co-ordinate lines in latitude or longitude, or any other system of straight lines independent of natural features), a provisional or elastic agreement is essential to the probability of successful demarcation.

Some notable instances have occurred lately in connection with boundary settlements in Central and Southern Africa which strongly support this contention. In one case a meridian line was selected before even such preliminary investigations were concluded as might have determined a fairly accurate longitude and fixed a point on that meridian. The result was an international complication as soon as it was discovered that in the neighbourhood of the Ruwenzori mountains

a wide tract of valuable land had been erroneously assigned to England which subsequently had to be transferred to Belgium. In that case, I think I am right in stating that quite enough of the features of the country were known to decide whereabouts the dividing line should run, only, unfortunately, the meridian fixed upon did not happen to represent the line. There was no excuse for the mistake.

In another instance a definite meridian line was adopted which traversed a desert—the Kalahari desert—of South Africa. Now, a desert may be a very good boundary in itself, just as may be the highest altitudes of a great range of mountains where eternal snow-fields and the remoteness of a stern white wilderness is never disturbed by the foot of man. It is true that even in deserts, African or Asiatic, wild nomadic tribes may sometimes exist who can band themselves for mischief, and who can raid across into each other's territory; and to them it may be desirable to point to a landmark, either natural or artificial, and to say, "You may not pass that mark." Outward and visible evidence of the boundary is the only sign that they can understand. But how does a meridian line help the matter? It is not only not outward and visible, but it may be very, very hard to determine. In this particular case a comparatively lengthy geodetic series of triangles had to be carried south of the boundary into German territory, entailing months, if not years, of scientific labour in a most unwholesome climate, and costing a sum equivalent to the value of many thousands of square miles of useful geographical mapping, in order to determine with some approach to scientific exactitude where that meridian really lay. Then the most expensive and unnecessary process of demarcating a straight line through the midst of the wilderness commenced, and the final result (which cost lives as well as money) was no more useful than would have been attained if a lightly equipped plane-table had run a compass traverse survey across the country (always assuming that artificial demarcation was necessary at all), and fixed up a pile of stones or rocks here and there within sight of each other. Something might have been said for the value of the geodetic series for the extension of ultimate surveys, but it was run chiefly in German territory. Perhaps the most successful example of a right-line boundary in existence is that which parts Canada from the United States. It has the advantage of being chiefly based on a parallel of latitude, and a parallel is comparatively easy of accurate determination astronomically. It would not be difficult, but it is unnecessary, to point out certain weaknesses even in that demarcation.

Next to absolute blank ignorance of the geographical conditions which prevail in the theatre of boundary operations, perhaps the hardest and most dangerous rock in the arbitrator's course is an inaccurate or assumed geography on which to base his treaty. Not so very long ago two great republics in South America, each entrusted with enormous financial interests by Europe, were at loggerheads over a boundary

which had been defined by treaty in this way. In many respects it was a very remarkable instance of the unwisdom of trusting to Nature's topographical dispositions as being arranged on any definite and normal plan. Throughout the western regions of South America there runs the magnificent Cordillera of the Andes. Cloud-capped, majestic, and inaccessible, the serried ranks of parallel folds, which enclose innumerable Andine valleys, admit no rival in the field of great mountain systems nearer than the Himalayas. Right through the midst of this gigantic natural barrier, dominating the minor ridges and folds, spilling its glacial waters on either side to the Pacific or the Atlantic oceans, there runs through all the Northern sections of the Andes one great divide. Few and scattered are the narrow ways which lead across that majestic rampart, and the traveller who passes through the mists out from the cradle of a river system on one side into the mountain streamlets of the other has no difficulty in recognizing that he has crossed a great water-parting. Here there is one of the best and grandest of Nature's own boundaries. No artificial waymarks are required to assist her demarcation. Perchance on the passes a pillar or a pile of stones may be useful to signify to the wayfarer that he has crossed the line of partition, but for the most part the wild grandeur of those eternal heights is unspoiled by artificial devices. Nothing indeed could be better, and for thousands of miles the central water-parting of the Andes is a grand political and international boundary. The trouble came with the reclamation of Patagonia in the south from the barbarities of Indian occupation, and its partition between Chili and the Argentine Republic. It was known that the Andine Cordillera continued southward through the continent. What more natural than that treaty-makers on either side should assume that Nature's excellent arrangement for a central water-parting should continue. At the time of treaty-making it was perhaps impossible to make exhaustive examination of the geographical conditions. Anyhow, the intention of the treaty was clear enough. The boundary was to follow the main range of the Cordillera, which parted the waters of the Pacific from those of the Atlantic. It was, in short, to continue towards the south under the same excellent conditions that supported it farther north.

When geographical explorers took the field it was not long ere they discovered that the conditions of the treaty were irreconcilable. The Southern Andes break up into a system which still contains all the grandeur of snow-capped ranges seamed by magnificent glaciers, and presents to the Pacific a snow-crowned rampart of majestic forest-clad hills, with here and there at regular intervals the white pinnacle of a volcano dominating its walls. But it softens down towards the Argentine pampas and plains into a comparatively irregular formation of lower ridge and furrow flanked by broad terraces, scarlet and purple in autumn with all the glory of the Patagonian beech scrub, and infinitely varied

both in form and colour. This lesser Cordillera encloses valleys of great beauty, and is frequently intersected, traversed, indeed, by lakes of surpassing loveliness, the waters of which draw this way and that, taking their sources frequently from the flats and masetas of the Argentine plains and passing them right through the mountain system to an exit in the Pacific. This to the treaty-makers was unexpected and vexatious, and experts on either side were deputed to prove that the boundary could but take one course, which course (according to the side from which it was argued) was either the main range of the Cordillera, *i.e.* that which was highest and most dominating; or else the main water-parting of the continent, which sometimes followed a range and sometimes was exceedingly hard to find amidst marshy flats. These experts respectively proved their case in a series of really splendid volumes, which I still regard with admiration, but which left international difference of opinion exactly the same at the end of these literary efforts as at the beginning. War seemed the only possible outcome of the dispute. Millions, many millions, were spent in ships and armament; and just that most natural assumption of a geographical conformation which did not exist seemed likely to set back the tide of splendid progress of which both Republics could boast, and to wreck them on the shores of a long, bloody, and probably indecisive war. Fortunately, stern good sense prevailed in the end, and British arbitration, crowned by our King's award, was accepted with deep gratitude by some, and, I am inclined to think, with relief by all.

Another instance of the probably fatal result of assuming a geographical status on insufficient evidence may be quoted nearer home. Some of you may perhaps be able to cast back your memories to the time of a certain Liberal Government, under Mr. Gladstone's leading, which was exceedingly anxious to bring the tension of doubt and suspicion which surrounded Russia's proceedings in Asia to an end. This was to be achieved by setting a boundary between Russia and Afghanistan, and thus defining for as nearly "ever" as anything in this indecisive world can be, the limit of her progression southwards. Then followed the meeting between the high diplomatic dignitaries on either side and the definition of where that boundary was to run. Now I may be permitted to say at once that there have been far worse definitions perpetrated in later years than that one; but it happened, as it so often happens, that the geographical information on which it was based was vague and of an ancient date. It need not have been so, but it was. I have recorded my opinion often enough to make it unnecessary to repeat it, that of all natural boundaries the water-parting or divide between river systems is the soundest and best. But this, of course, presupposes that such a natural feature can be found for the boundary near the position which other and greater interests demand. Failing a water-parting, a river may be exceedingly useful, especially if

it is comparatively narrow and confined within rocky (and therefore unchangeable) banks. But a broad river in an open plain may be a veritable pitfall for the arbitrator. It may have a dozen channels, of which it is difficult to determine the main one. It may shift its course and wander irresponsibly in loops and curves in unexpected directions. It may throw up islands, as do the Indus and the Godavari, and the right of ownership may lead to an inextricable tangle. But, on the whole, the river Oxus, which is fairly well confined in its mountain channel from Lake Victoria to the plains, and sweeps with a broad expanse of silted flood across the flats, difficult to cross, as a rule, but with historic and much-used fords and ferries, may be accepted as a fine example of an indisputable line of separation between two great countries. The mischief of the Russo-Afghan boundary treaty came in with the mention of a particular post or village on the Oxus banks on which the boundary of the southern plains from the Hari Rud was to be directed. There was no such post. It had gone. Swept into the river by an unexpected change of course, it had been washed out of existence. But it took long to determine this fact. There had been long delay already in the field before the Russian Commission appeared. The historic incident of the Panjdeh action had passed. Herat had been placed in a state of defence, and it was clear that it would not take much to wreck the object of the commission altogether. Indeed, it was perilously near to shipwreck. The worst that happened, however, was delay in this case (and, of course, expense); but delay in the field of Afghanistan, with an uncertain and gout-ridden Amir dominating the political situation locally, was not diplomatic, to say the least of it. It was exceedingly dangerous, and we were well out of it.

Another shoal in the intricate sea of arbitration (even when that arbitration is based on ascertained topography) is the misapplication of a boundary to some impossible feature. This, indeed, is not very usual, but it is very fatal to rapid and satisfactory progress. Let me give you an instance. We will turn to one of the loveliest valleys in Afghanistan, the valley towards the head of which lies the historic fortress of Chitral. The valley is narrow, the broad flats which border the feet of the Kashmir mountains to the south where the river winds in loops of azure through emerald fields, have given place to closely terraced hillsides with villages clinging limpet-like to the rocky spurs, and the river rushing as a noisy torrent in an eroded water-way of cliff-faced gorge. Here was the question of setting a limit to Afghan interference with tribes which recognized (more or less) British political supervision, and which were, when I left India ten years ago, termed "independent." It was, in short, the Afghan boundary on the Indian side of it that was under demarcation, and the commission party was safeguarded by an Afghan escort that was technically true to its trust, but at the same time was undoubtedly secretly interested in the siege of Chitral, not so

very far from the scene of boundary operations. The boundary agreement had been concluded with the Amir at Kabul, and that wily monarch Abdurrahmon was undoubtedly well aware of the value of map evidence. The river could not, under the principles which governed the agreement, serve as a boundary. It would indeed have found a most awkward division between interests on either side of it which were often indivisible. Back from the left bank of the river, but with flat terraces carved out of the rugged spurs at its foot, stood a well-defined range, one of the many great offshoots of the Hindu Kush, with its water-parting line removed some 6 miles or so from the river and parallel to it. The boundary had been defined as running parallel to the river on the side of that range, at an even distance of 4 miles, and thus it fell on the spurs of the range (say about halfway between the summit of the range and its foot) passing from spur to spur, cutting across mountain torrents, a continuous line of ascent and descent over some of the wildest, ruggedest, and most inaccessible mountain-side country that the Indian frontier presents. Demarcation was an utter impossibility. There was no measuring the 4-mile limit with any approach to accuracy, nor could, or would, any tribesman of the wild Pathan frontier pretend to recognize such a line without an infinity of artificial boundary-marks. Fortunately, it was possible to suggest an alternative without great loss of time, and as that alternative was the crest of the range (an unmistakable feature in that particular range) instead of halfway down its rugged side, and as the shifting would concede territory to the Afghan, there was no great difficulty in effecting an alteration in the text of the agreement. Here again the hazard of the business was delay. Delay and inactivity in regions such as Afghanistan, or the Indian hinterland, spells idle hands and almost immediate mischief. The 4-mile limit might not necessarily lead to an impossible line for demarcation. In this case it should have been obvious that it must do so.

A word or two about demarcation as apart from definition. It is the crux of all boundary-making. Any one can define a paper boundary. It is the demarcator who has to do the spade work, to determine the sites for pillars and artificial boundary-marks, and to fit the line to the conformation of the land. And it is in this process that disputes are apt to arise. It is then that the value of a few acres more or less becomes apparent, and may lead to serious disagreement. Important features, such as wells and springs influencing the agricultural prospects of large areas of country, are apt to be discovered in unexpected positions, and a thousand points of local importance are found which never were taken into account by the arbitrators, whose definition leaves their destination uncertain.

It is, however, seldom that boundaries have to be determined in highly developed countries where the most exact determinations of position and the most accurate surveys are necessary. It is usually on

a much larger and more comprehensive scale of interests that the determination has to be made, and in late years, at any rate, it is not the division of counties, but that of countries, which has had to be negotiated. Now, nothing perhaps so hampers and delays the progress of an important demarcation as the erection of artificial boundary-marks. They are almost invariably necessary in one part or another of a long boundary, but they are frequently multiplied to a most unnecessary extent and placed in positions where they are absolutely useless. A very well-defined water-parting should require no artificial assistance to add grace to Nature's provision of a boundary. A river, again, is obviously its own best demarcation; a comparatively wide space of desert may be quite definite enough, and the open sea sets its own limit with apparently little room left for argument. And yet, in all these geographical conditions, and many others which I might enumerate, there is almost invariably some point of exception which requires most careful investigation on the part of the demarcator. The well-defined water-parting has passes across it, and on the pass it may be a matter of importance to advertise the exact position of the boundary. Or (which is much more awkward) a self-contained basin, forming a small lake, the remnant maybe of an ancient glacier, which has no outlet either to right or left, may disturb the harmony of Nature's water-parting. The river, on the other hand, may possess valuable islands with channels of indefinite value on either side; the desert may contain a small oasis or perchance a well which may be all-important, and it may be crossed by more or less definite tracks; and the great ocean, as we shall see, may present more difficulties as a limiting geographical feature than all these others put together. A flat and marshy water-parting is most difficult of artificial demarcation, and is usually best left alone, but apart from the frequent occasions when natural features no longer serve, and artificial demarcation becomes essential, it is always necessary to study the geographical conditions of the land forms in order not to waste time and money to an indefinite extent in artificial decorations of those which are indisputable and unmistakable in their character of a boundary wall.

So far I have attempted to illustrate some of the many pitfalls which beset the path of the political arbitrator who is compelled to arbitrate without topographical maps, or who having topographical maps (not an uncommon case) is ignorant of the meaning of them. Now let me point out some of the more important difficulties which occur when maps are existent showing the general character and trend of the land-forms and otherwise sufficiently accurate for broad definitions. In this case, as in the case of an agreement based on fictitious geography, the difficulty has to be faced and the problem disentangled by the unfortunate demarcator, whose time may be lost in referring back to the seat of arbitration for a decision. First and foremost is the error of inexact geographical expression.

It is quite true that the nomenclature of geography is by no means fixed. Not long ago, at a meeting of the Research Department of the Royal Geographical Society, the subject was discussed after a most interesting and able paper by Prof. Davis. But it is not with reference to the actual definition of dispositions of nature in land formation that the difficulty to which I refer arises. It matters not much whether the technical classification of land-forms is genetic, based on the geological history of the formation, or whether it is simply physiological description expressing the character of the form in terms of its influence on other geographical features; whether the names of such features have a foreign derivation, or whether they are pure Anglo-Saxon, so long as the geographical definitions contained in the text of a boundary treaty are technically accurate and precise in their meaning. I assure you that the actual loss to this country, due to the promulgation of boundary treaties drawn up with little or no regard to technical accuracy of expression, can only be reckoned in millions of pounds sterling. If a man were making a will full of complicated provisions he would employ a lawyer armed with the full technical vocabulary of that rhetorical profession to make it for him. If he wishes to put a hedge between himself and his neighbour's estate even, he would take care that the agreement was correctly worded. But in defining a boundary between one nation and another, not even the most elementary knowledge of geographical nomenclature seems to be considered necessary. To take the case already quoted of the boundary disagreement between the republics of Argentine and Chili, when the treaties laid down broadly that the boundary was to follow the main range of the Cordillera dividing the waters of the Atlantic from the Pacific. What is meant in the first instance by a "main range"? Were these diplomatic representatives of two great powers aware that the actual backbone of a mountain system, that which by reason of continuity as a divide and general strike should be reckoned as the fundamental axis of the system, is frequently the oldest, the most disintegrated, and degraded; overshadowed by the magnificence of parallel ridges of possibly later formation, with the highest and most important peaks either decorating its own spurs (and thus carried on the crests transverse to the general strike of the formation), or else dominating distinct ranges? In short, the expression "main range" is geographically indefinite. Again, were the same high authorities aware that there might be no continental water-parting at all—no continuous line, that is to say, from which the waters on one side flowed to the Atlantic, and on the other to the Pacific? A broad, self-contained lake region in the middle of a continent is very apt to upset such a provision, and to a certain extent it did so. Let me say at once that the treaties were most ably prepared on the whole, and there were certain indications in them that these difficulties were not entirely unforeseen; but

the provision for dealing with them when they arose was quite inadequate.

I have said that a river may be an excellent boundary, but that it is a most undesirable feature to adopt under certain conditions. If both banks are occupied by undivided ownership; or if the river is liable to wide overflow in flood-time; if channels shift and change, and the river carves out new courses for its waters; if islands are submerged, converted into silt, and then reformed in new positions; in all such cases a river may prove to be a most fruitful source of dispute and litigation. The legal archives of Madras must be full of records of the disputed ownership of islands and valuable silt formations in the Godavari river, where some of the best tobacco of India is grown. What has been said of mountain ranges and of rivers may be said of almost any natural topographical feature. There is no law fixed and unalterable applied by nature consistently to the outward fashioning of her land formations, and it is the peculiar function of geography to insist on a careful and accurate illustration of all such formations, assuming nothing before applying the severe test of military movements or of political boundary-making. It is doubtful whether the worst disasters have resulted from geographical ignorance on the part of our military leaders, or from the blunders of our treaty-makers. Both have cost the country dearly. Let us hope that fresh light has arisen, and that if you, gentlemen, are hereafter entrusted with important functions as directors of armies, or as makers of diplomatic treaties, you will at least have learnt the great lesson of the value of accurate geographical definition.

On the nature of the illustration and the means of securing it, all of which practically is included in the science of map-making, I have no time to enlarge; but a word or two still has to be said about the all-important matter of accurate definition, especially as regards calling things by their right names. You may have all the information possible at your command; you may even have a fair map of the theatre of operations before you, and yet be guilty of loose expression or of ambiguous phrases, which may lead to most serious disruption when definition gives place to demarcation. I will give you an instance of my meaning. I was once concerned with a boundary which passed through open country—a country of hill and plain, where the hills were sharply defined in long and mostly continuous lines, sometimes knife-edged as to their summits, with steep rocky spurs rifted deeply by water-channels, and from the foot of the spurs there sloped away in smooth but often steep gradients the fans formed by detritus washed down from the mountain-sides, forming what is locally known in Baluchistan as “dasht.” The “dasht” shaped into a broad smooth ramp, 7 or 8 miles in width, a prairie land of scrub and flower in spring, a wide expanse of stone-dusted slope in winter, which stretched between the foot of the mountain spurs and the meandering course of the nullah-bed which formed

the main drainage line of the valley. A very considerable length of the boundary which was to be based on the mountain range or ridge was defined as following "the foot of the hills." Here at once was opening for serious disagreement—and the disagreement promptly arose. What was the "foot of the hills"? Was it where the steep rocky spurs ended and the sloping grades of dasht began? Or was it where the nullah ran in the midst of the plain, and the slopes from the hills could descend no farther? In the latter case one would have thought that the boundary would have been defined by the actual nullah-bed. That was actually the interpretation maintained, and the interpretation threatened a frontier war.

Everybody remembers the Alaska boundary discussion, and the deep feeling of disappointment which was caused in Canada by the final award. The treaty-making in that instance was doubtless of somewhat ancient date, and the geographical conditions dealt with must have been, at the time the treaty was made, at least indefinite and hazy. But that was no reason for the employment of such an expression as the "shore" or coast "of the ocean" for defining a political boundary. What is the coast-line of the ocean when that coast involves an archipelago of islands, and is deeply indented with fiords or inlets? To include the islands would form a boundary impossible of practical demarcation; if the coast-line of each island formed a separate item in the boundary the intervening sea would be open. If an imaginary boundary were adopted in the sea and parallel to the general coast-line at a certain distance from it beyond the islands, the coast-line as a definition disappears. Or if, leaving alone the islands, the actual shore-line of the mainland (at low or high water) were accepted, where does it end as it rounds the inlets? There must be some limit beyond which it cannot penetrate into the interior. This is merely an illustration of an ill-considered use of the very commonest words. There is no technical difficulty. All that is wanted is the most ordinary knowledge of coast-line formations.

Once again I will take you into Asiatic highlands, where the Pamirs spread out their gently sloping flats and valleys under the shadow of well-defined mountain ranges. So vast and so rugged are these ranges that it is only here and there by grace of a glacial ramp that they can be ascended, and the connection between the triangulation which determined the points on which to base the Afghan boundary in these regions, and that which fixed the Himalayan peaks to the south was difficult exceedingly. However, it was accomplished, and Indian triangulation was carried on to the Pamirs and connected with the local Russian surveys. There was no room for argument about the initial position of the Russo-Afghan boundary, although it was based on a latitude, and although it was all-important that the value of that determination of latitude should be as exact as science could make it. There was the

triangulation to support the astronomical deductions. Thus all went well enough till approaching the end of the demarcation where the boundary was run to a junction with the Chinese frontier-line. Then came the trouble. The definition of boundary was as follows: "From this point the boundary shall run in an easterly direction to a junction with the Chinese frontier." What is an easterly direction? A little east of north? A little east of south? Due east? You will admit that this expression is sufficiently indefinite. In this case the interpretation involved the question of certain passes (whether they were of value or not we need not stay to inquire), but they were considered important at the time. The short summer and autumn were drawing rapidly to a close. Snow was settling deep on the passes India-wards, and it seemed probable that ere an answer to the simple question, "What is an easterly direction?" could be received, the camp of the commission would be snowbound in those vast altitudes, condemned to an Arctic existence for the next six months. Naturally there was no agreement between the Russian and British camps. And they arranged to separate for the winter. Fortunately, the weakness of geographical expression was recognized in time. It was so certain to lead to complications as to justify a reference to the high contracting authorities before those complications arose, and the reply, which determined the conclusion of the line on the basis of the actual topography, was received just in time to enable us to escape over the passes, already menacing and deep with snow, back to sunny India.

If, in pointing out to you just a few of the costly blunders which have beset the political efforts of our geographers of the past to arrange for boundary-lines in various parts of the world, I have appeared to call your attention to such elementary details as might seem subject to the application of the simplest common sense, involving no scientific insight, no appreciation of well-digested theories such as your studies here may develop, it is with the purpose of illustrating the value of even the most rudimentary study of geographical land formations. I have dealt with only one little hitherto unconsidered branch of the now widespread demand for more accurate geographical knowledge. It is even more particularly important in matters military or commercial, than in matters political; that is to say, the want of it leads to more actual positive loss to individuals and to the country. It is for you, gentlemen, in the future to take your place in the working world as soldiers, men of business, or diplomats, and if I have proved to you that quite apart from deep scientific research, or that higher knowledge which is only gained by a lifetime of study, a careful appreciation of the very simplest problems which geography offers may be of almost infinite value to you, I shall feel that I have not wasted your time.