

and flow to the Amazon and the Orinoko, the two great river-systems being connected, as is well known, by the natural canal of the Casiquiare. The more westerly rivers flow, for the most part, through open savannah country; so that the water-shed of the plateau is much more accessible from the Orinoko on the west and north than it is from the Atlantic on the north and east. From Mount Roraima south-eastward *Thalwegs* of the upper tributaries of the Rio Branco form a political boundary to near the source of the Essequibo, after which the watershed is a political boundary, the whole southern slope (except a small portion of the Rio Branco basin included in British Guiana) constituting Brazilian Guiana. From Roraima westward the whole area draining to the Orinoko River incontestably belongs to Venezuela. The present frontier disputes concern the forest-covered Atlantic drainage area, which is shared by the only three colonies remaining in South America—British Guiana on the west, Dutch Guiana in the centre, and French Guiana to the east. Here most of the boundaries are *Thalwegs*, i.e. the central line of rivers. There is no question as to Dutch Guiana, which is demarcated by treaty from British Guiana by the Korentin, and from French Guiana by the Maroni. But here certainty ends. The French and Dutch differ as to which of the upper tributaries of the Maroni should be taken as the boundary between Dutch and French territory. The Brazilian Government recognises the Oyapok as the French boundary toward Brazil; the French claim the Araguari, the space between the two rivers which flow nearly at right angles to each other being a triangle with 250 miles of coast as a base. The uncertainty of boundaries at the east of Guiana is simpler to understand, and easier to explain than that at the west. The claim of Venezuela is that British Guiana is bounded by the *Thalweg* of the Essequibo, and it is so represented on Venezuelan maps. The extreme British claim, on the other hand, is that the whole drainage area of the Essequibo belongs to the colony, i.e. that the boundary is the main watershed of the plateau as far as the Imataka range on the north, which runs parallel to and very near the Orinoko. In addition, there is a claim for the basins of the small rivers which occupy the triangular area between the drainage areas of the Orinoko and the Essequibo. If the western boundary of British Guiana were to be of the same type as those of the other colonies, it would require to be the *Thalweg* of a river flowing into the Atlantic, i.e. either the Essequibo, the Mazaruni, the Kuyuni (these three unite to enter the sea at a common mouth), or the Barama (Guiana), Barima, or Amakura.

It is now too late to suggest the solution of the boundary problem by geographical principles. Were it not so, a very interesting argument could be held as to how far the physical unity of a drainage basin is impaired by the obstacles to movement along the *Thalweg* due to cataracts interrupting navigation on the rivers, and forests obstructing progress on land. It is, in fact, very much easier to reach the upper basin of the Kuyuni branch of the Essequibo over the savannahs from the Orinoko than through the forests from the Atlantic coast.

All modern maps of Guiana—except the Venezuelan—follow what is known as Schomburgk's boundary, either in its original or in a modified form.

In 1840 the Schomburgk line first appeared on a sketch map, the topography of which was very inexact. From the Amakuru River in the north it ran along the watershed southwards, thus leaving the whole basin of the Barima in British Guiana. It so happened that the line ran nearly on the meridian of 60° W. as far as the Kuyuni River; and when the Barima was found to rise far to the west of that meridian, the line was often still drawn along it, instead of following the watershed as was intended. In 1886 the British Government modified the line by

carrying it along the Kuyuni River to its source, and then for a short distance along the watershed, to Roraima.

The whole area within the Schomburgk line has been taken into effective possession by the Government of British Guiana so far as a tropical forest of such magnitude can be occupied. The Barima River was recently explored to its source by Mr. G. G. Dixon, and the account of his journey in the *Geographical Journal*, for April 1895, gives some idea of the difficulty of forcing a way through the woods. Much of the land is auriferous, and the real point of the present frontier difficulty lies in the value of Yuruari mines in the upper basin of the Kuyuni, at present occupied politically by Venezuela, and commercially by the nondescript cosmopolitan population always attracted to gold-fields.

It is this fact that makes it hopeless to expect the dispute to be settled by the geographical principles which forty years ago could have easily prevented it. The only alternatives are to base the rival claims on actual effective possession, or on the original rights which were recognised between the Dutch settlers in Guiana and the Spanish colonists of the Orinoko at a time when the geography of the district was practically unknown. The romantic story of British enterprise in Guiana is admirably told in Lucas' "Historical Geography of the British Colonies," vol. ii., a work of admirable clearness and brevity.

D'Anville's atlas of 1772 shows practically the whole of the disputed area as Dutch Guiana, but contemporary and later maps are very conflicting, and all of them being unofficial are of small value as evidence. The chart of Captain Edward Thompson, who took part in the first capture of the "Wild Coast" from the Dutch in 1781, marks the Barima as "the western boundary of the Dutch according to their claim," but does not suggest any boundary in the interior. The rights and wrongs of historic evidence will doubtless be fully investigated by those responsible for a decision, and the present dispute will probably be settled, as similar difficulties have been settled before, by some judicious compromise which will give both parties the inestimable benefit of a fixed and definite frontier. But similar disputes will continue to arise in other places, and their solution will be protracted and rendered difficult as long as unsurveyed territory is claimed by rival powers, spurred on by rival concessionaires and interested company promoters.

The recent International Geographical Congress decided that the time had come when all governments should be urged to make a map of their possessions on the uniform scale of 1 : 1,000,000, or about sixteen miles to an inch. If the governments of all countries were jointly to take this matter up, survey all unsurveyed lands which they claim, and submit the uncertain boundaries, which are not yet complicated by gold-mines, to an International Commission of Geographers, to be decided on the basis of the new map on purely geographical principles, the expense would be many times saved by the security which defined frontiers give, and a magnificent contribution to science would be effected.

HUGH ROBERT MILL.

DR. JOHN RUSSELL HIND, F.R.S.

IT is with deep regret that we announce the death of Dr. J. R. Hind, whose name and whose work were possibly more familiar to astronomical students of the last generation than they are to those of to-day. By this we do not mean to imply that Dr. Hind had outlived his reputation, but that circumstances forced him to the front early in life and in connection with subjects that have long since ceased to attract or to interest. His claim to scientific reputation and remembrance will

mainly rest on his long connection with the *Nautical Almanac*, and the steady character for accuracy and efficiency that it maintained under his direction. But to the production of the *National Ephemeris*, while one is responsible, many contribute, and no one would admit more readily than the late chief of that department, how much he was indebted to the invaluable aid he received from such assistants as Messrs. Richard Farley, Godward, and others, or more willingly share the credit with those less well-known authorities. For these and other reasons, it is not a little difficult to assign to Dr. Hind his proper place among astronomers. He never devoted himself in any way to the higher branches of physical astronomy; the mathematical training that is sufficient for an engineer is not of that character that is required to advance our knowledge of planetary theories, or to assist their development by new functions. He will rank rather with the school of Argelander, to whom he was deeply attached, than with that of Bessel or Le Verrier. It is equally true that he never had occasion to employ the newer methods of observation that spectroscopy and photography demand, or to discuss the results obtained by their means, since the habits of his life and the direction of his work were settled before these methods of investigation were generally employed. Looked at, therefore, from the broader ground that astronomy now occupies, his scientific life seems somewhat cramped; but to conclude that his career was misspent, would be to read the history of astronomy for the last half-century very incorrectly. He was emphatically a practical astronomer, and whether as an observer or in making the mathematical work of others available for practical ends, he had few equals. He knew his capacity very well; he attempted nothing beyond his powers, and few men have made fewer mistakes.

As already intimated, Dr. Hind was originally intended for the profession of engineering, a science for which he had little taste, and it was fortunate for his subsequent career that circumstances permitted him to join the staff of the Royal Observatory. He was attached to the magnetical and meteorological department, at that time not fully organised nor even confidently regarded as a permanent part of the establishment. In those early days (1840), self-recording instruments were practically unknown, and meteorological readings and general attention to details required all-night sittings from the assistants. It was in these long watches that he acquired the habit of calculating comet and planetary orbits, undertaken at first with the view to keep himself awake, but which grew into a confirmed habit, and laid the foundation of his reputation as a computer. In 1844 he left Greenwich to take charge of Mr. Bishop's private observatory at Regent's Park. At that time Neptune was not discovered, and the first work that he began at that observatory was the formation of ecliptical charts of stars, three degrees each side of the ecliptic, with the view of detecting the object that disturbed the motion of Uranus. The comparison of these charts with the heavens led to the discovery of a number of small planets, which then were objects of interest and importance. Some variable stars, and a few comets of which he was the fortunate discoverer, extended his reputation and attested his zeal as an observer. Meanwhile the habits of calculation that he had acquired at Greenwich, were never allowed to lay dormant, and every *Nachrichten* as it came to England contained the orbit of a comet or a new planet which he had contributed to its columns. The history of ancient comets, the unravelling of the tedious descriptions of old or of Chinese astronomers, was his constant occupation, so that he acquired a masterly knowledge of the history of that portion of astronomy, and at one time we believe he had the intention of publishing an annotated *Pingré*. That such a work would have enhanced his reputation, and shown him to be the possessor of much curious

information gleaned from many authorities, cannot be doubted, but the pleasure he derived from clearing up doubtful points, and adding to his own stock of information, were his only reward.

His facility as a computer led to his selection for the post of Superintendent of the *Nautical Almanac* when a vacancy occurred in 1853, through the death of Lieut. Stratford, and it will generally be admitted that he filled the post with credit to himself, and to the extended reputation of the important work of which he had charge. Official duties to some extent interfered with his private researches, but his industry was always very great. The list of papers to which Dr. Hind's name is attached in the Royal Society's "Index," though considerable, does not exhibit the full measure of his computational activity, because he did not often publish his results. An examination of this "Index" will, however, show the large variety of astronomical topics to which he turned his attention. And to this list we can only refer, without mentioning any particulars. But, in this place it would be ungrateful not to recall the fact that the deceased astronomer was the first contributor to our "Astronomical Column," and for some years the whole of the "Notices" were written by him. Neither can we undertake to give a complete list of the honours and awards that were showered upon him. He received the medals of both the Royal and the Royal Astronomical Society, the Danish Medal for cometary discovery, and the Lalande Medal on more than one occasion. He was made a Corresponding Member of the Institute of France, and many other foreign societies placed his name among their honoured members. The writer of this brief notice trusts that it may not be out of place for him to record his own sense of indebtedness for many acts of kindness and much valuable information that he has received at the hands of Dr. Hind. WILLIAM E. PLUMMER.

NOTES.

THE list of New Year Honours includes the names of two well-known men of science—Sir Joseph Fayer, K.C.S.I., who has been made a baronet, and Prof. Prestwich, who has been knighted. If long and distinguished services to the cause of science count for anything, both Sir Joseph Fayer and Prof. Prestwich have well earned the honours conferred upon them. Mr. H. H. Johnston, C.B., has been promoted to the Knighthood of the Bath; but this is probably more on account of his administrative work in recent years than for his explorations in Africa.

THE late Baron Larrey has left a bequest to the Paris Academy of Sciences for an annual prize of 1000 francs for the best treatise by an army doctor on any question of medicine, surgery, or sanitation.

PROF. A. ARCIMIS, writing from Madrid, informs us that at 6 p.m. on December 25, 1895, an earthquake was felt in some villages of the province of Orenne, Galicia, north-west of Spain. Some walls were cracked, the clocks stopped, and two small houses were thrown down.

THE commercial prospects of Hudson Bay are receiving much attention. Notice has been filed of application to the Canadian Parliament for a charter to construct a railroad from Calgary, on the Canadian Pacific Railroad, to Fort Churchill.

THE inhabitants of Zürich have rejected, by 39,476 votes to 17,297, a proposal submitted to them for the absolute prohibition of vivisection. On the other hand, a counter proposal of the Grand Council in favour of the protection of animals with due satisfaction to the demands of science was adopted by 35,191 votes to 19,551.

It is announced in *Science* that Miss Helen Culver has signed papers giving 1,000,000 dollars to the University of Chicago, to