Occultations of Aldebaran are on record as far back as the year A.D. 491; it is stated in the Chinese Annals that the star was occulted at Nankin on March 29. Apparently the first occultation observed in Europe was found by Bullialdus in a Greek manuscript, which thus describes it:—"Anno 225 Diocletiani, Phamenoth 15 in 16, vidi Lunam sequentem claram Hyadum post accensas lucernas, digiti unius ad summam semisse. Videbatur autem occultasse ipsam. Stella quippe apposita erat parti, per quam bisecatur limbus Lunæ illuminatus." Bullialdus makes the date A.D. 509, March 11, and an approximate calculation shows that he is correct. New moon fell about 7h. G.M.T. on March 6.

ENCKE'S COMET.—This comet at its present return will be observable in these latitudes in the early evening hours before perihelion. The following ephemeris is for 6h. G.M.T.:—

1885	R.A. h. m. s.	Decl. ° ′	Log. distance from Earth	Log. distance from Sun
Jan. 1	22 55 26	+3 57·8	0·1526	0·1309
2	22 56 18	4 0·5		
3	22 57 12	4 3·4		
4	22 58 7	4 6·5		
5	22 59 3	4 9·8	0·1500	0·1120
6	23 0 1	4 13·3		
7	23 1 0	4 16·9		
8	23 2 0	4 20·7		
9	23 3 2	4 24·7	0·1462	0·0917
10	23 4 5	4 28·9		
11	23 5 10	4 33·2		
12	23 6 17	4 37·7		
13	23 7 25	4 42·4	0·1410	0·0699
14	23 8 35	4 47·2		
15	23 9 46	4 52·2		
16	23 10 58	4 57·3		
17	23 12 12	5 2·6	0·1344	0·0463
18	23 13 27	5 8·0		
19	23 14 44	5 13·5		
20	23 16 2	5 19·1		
21	23 17 20	5 24·8	0·1261	0·0206
22	23 18 40	5 30·7		
23	23 20 1	5 36·6		
24	23 21 24	5 42·6		
25	23 22 47	5 48·7	0·1158	9·9926
26	23 24 11	5 54·8		
27	23 25 37	6 1·0		
28	23 27 4	6 7·2		
29	23 28 31	6 13·5	0·1033	9·9619
30	23 30 0	6 19·7		
31	23 31 29	+6 25·0		

The intensity of light expressed in the usual manner is 0·27 on January 1, and 0·51 on the last date of the ephemeris.

GEOGRAPHICAL NOTES

AN interesting project was laid before the Associated Swiss Societies of Geography at their meeting at Berne last month, by M. Müllhaupt. He suggested the formation of an international geographical bureau for the following purposes:—(1) To carry out the resolutions arrived at by the International Geographical Congresses. (2) To make exchanges every month, or oftener if need be, between the eighty odd geographical societies; in place of each society sending its own publications in eighty different directions, it would only have to send them all at once to the bureau, which would do so. This, he claims, would save both time and money. (3) To publish, in the four or five principal languages, a summary of the contents of the publications of the various geographical societies; instead of each society being forced to do this for itself, a single examination would suffice to put them all *au courant* with what has been done all over the globe. There would in this way be the further advantage of knowing what was published by societies like the Geographical Society of Japan, the publications of which are in a language not generally known in Europe. M. Müllhaupt thought that the idea was not a difficult one to be carried out; the expenses would be shared by the numerous societies interested. These contain approximately 38,000 active members, and doubtless the countries having an interest in the progress of the geographical sciences would take part in a central organisation of the nature here suggested.

THE last number (Band xi. No. 8) of the *Verhandlungen der Gesellschaft für Erdkunde zu Berlin* contains two papers on West Africa: one accompanied by an excellent map, by Herr Flegel, of his recent journey along the Niger to Adamawa; the other, by Herr Reichenow, on the Cameroons, and the German colony there. Dr. Lopez writes on the Argentine States, and the importance of the German element in the foreign population there.

THE investigation of the subterranean course of the Reka River has been actively pursued for some time past by the Coast Section of the German and Austrian Alpine Society. The Reka is that mysterious river which, coming from the Schneeberg in Carniola, loses itself in the caves of the Karst, and after a subterranean course of more than thirty kilometres, breaks out of the ground near San Giovanni di Duino, is then called the Timavo, and eventually flows into the Bay of Monfalcone. Already, on March 30 last, a part of this subterranean course was investigated by a party starting from the village of St. Canzian, where a celebrated cave is situated, into which the Reka falls with thundering noise when the water is high. In September a second exploration was made. The first subterranean cave is called the Rudolfsdome; it was from here the explorers started in two boats. First, they passed a canal about sixty metres in length, very narrow, and bounded by rocky walls one hundred metres in height; then a large cave was reached, where the party landed and fastened the boats, as waterfalls and rapids prevented further progress in boats. The underground journey was now continued on the rocky banks, the river being crossed several times on ladders. Thus six waterfalls were passed, and a seventh was reached. Altogether the explorers penetrated to a distance of between two and three hundred metres underground.

BULLETIN No. 5 of the U.S. Geological Survey is, *Science* remarks, a dictionary of altitudes in the United States, compiled by Henry Gannett, chief geographer of the Survey. It is essentially an extension of the "Lists of Elevations," prepared by the same author for Hayden's Survey; but, with the present broader organisation of the Geological Survey, the lists now appropriately include the whole country, while the earlier editions were concerned chiefly with the region west of the Mississippi. A list of authorities fills eight pages, and railroad abbreviations occupy eight more; then the States and stations follow alphabetically, the number of altitudes given being about 18,000. It is stated that the collection of railroad profiles for Pennsylvania is exceptionally complete and admirably adjusted, making the portion of the dictionary referring to that State by far the fullest and most satisfactory. By an unfortunate oversight, it is not stated whether the base level is high, mean, or low tide.

AT the recent meeting of the Ethnological Section of the Imperial Russian Geographical Society a paper was read describing Adrianow's journey through the Altai Mountains in 1881. The traveller was only able to take four companions, on account of the meagre funds at his disposal; nevertheless he was able to obtain excellent results, and to penetrate hitherto unknown regions. Although the southern slopes of the Altai Range have already been the object of investigation of various students, such as Pallas, Ledebur, Humboldt, and others, the eastern part of the region, the vast districts between the River Tom and the Government of Yenisei, have been almost a *terra incognita*. Adrianow's expedition started from the town of Kustnetsk, crossed the River Lebed, examined Lake Teletsk, touched Chulshman, Jan, and Agalan, crossed the Shapshal Pass, advanced to the River Kemchik, and sought for and found the sources of the Yenisei. They travelled through the region through which the river flows to the town of Yeniseisk, where the expedition came to an end. Throughout the journey Russians were found only around the sources of the Yenisei and on the River Usg. The population of the Altais is composed of sectaries who emigrated thither during the last century; their existence was wholly unknown until 1868, when they were by chance discovered by a Russian officer who was surveying there. Adrianow met similar colonies at Tobut on Koko-nor. These were founded in 1800. The colonists are described as savage and predatory. Besides these the traveller visited the so-called Black Tartars, on the rivers Koudoma and Luida—a tribe which has only once before been visited and described. They are regarded as descendants of the great Finnish and Turanian tribes, but hardly anything in an anthropological sense is known about them. The travellers also brought back a considerable number of pictures of monuments and works in stone, which exist among the Sajans and in Mongolia. Those of monuments to the dead are very interesting; some of them are merely

conical heaps of stones, while others are laid quite flat and are surrounded by a circle of larger stones; a third kind exhibit a primitive art of stone-cutting, the stones bearing a distant resemblance to the human body. Frequently around the graves the bones of horses which had been brought as sacrificial offerings, were found, as were also certain Runic inscriptions.

M. ADRIANOW, in his journey through the Altais, notices the existence in these regions of immigrant communities which have been forgotten and which have been re-discovered by chance. It is also reported from St. Petersburg that a similar discovery has been made elsewhere in Siberia. In the course of a prolonged inspection of his province, the Governor of Irkutsk (Governor-General of Eastern Siberia?) came across a town called Ilim, with 500 inhabitants, 150 houses, and four ancient churches, with remarkable relics of Cossack times. It is still under the republican rule of a *vetche*, or public assembly, convoked by a bell, as in old Novgorod the Great, although the new municipal institutions were supposed to have been applied to that part of the Empire ten years ago. Not one of the inhabitants can read or write.

AN important geographical work on Austro-Hungary is now being produced in parts by Mr. Alfred Hölder, the publisher, of Vienna. The author, Prof. Umlauft, gives in alphabetical order the names of the various States and peoples of the Austro-Hungarian empire, as well as those of the more important districts, mountains, rivers, and towns, with their meanings. He does not, however, confine himself simply to present names, but also gives the forms employed formerly and the various changes which the name has undergone from the earliest times down to the present day. The work is thus historical and philological. The total number of names treated will be between six and seven thousand. The first part, which has appeared, contains 1041 names, from Aa to Donau. Geographical names, it is said, not only have their history, they are themselves pieces of history. The distinction between the German and Slav names of places is characteristic. The great majority of the German village names are connected with those of persons, probably the founders or original owners, more rarely with that of the patron saint. Thus Simmering comes from Simoning, Hütteldorf from Utendorf, Hadersdorf from Hadrichsdorf, Kalksburg from Chadalhohisperg (*i.e.* mountain of one Chadalhoh), Domsdorf from Dominiksdorf. The change wrought in course of time in some names has been very great, and renders their explanation difficult. The Slav names, on the other hand, are mostly taken from the position of the place or some peculiarity in the neighbourhood. They also manifest great stability of form, and it is only in their Germanising that they have materially altered. Thus the Czech Brloh becomes in German Bierloch, Ratibor Rothwurst, and Radoina Rothweim. The Czech Lhota, which means simply a settlement which is free from taxation, assumes in German such various forms as Oehlhütten, Elhotten, Ellgoth, Wellhotten, Welhütten, Wellhütten, Mehlhüttel, Malten, and others. Even real German names have undergone the same eccentric change, and names which in their original form are quite clear in their meaning have by a slight change become incomprehensible; thus Donnersmark is really Donnerstagmarkt, or Thursday Market. It may be remembered that some articles in the *Times* during the autumn, followed by a long correspondence, did much interesting and valuable work of this kind for English place-names, though of course in a less regular and systematic form.

MR. IM THURN'S Roraima expedition left Kalacoon on October 16 with three boats and crews of seventeen Pomeroon and two Mazarooni Indians, and on the following day they ascended the first falls of the Essequibo. Simultaneously with their departure from Kalacoon, an expedition for Roraima, under the charge of a commercial botanist named Siedel, left Bartica for Roraima *viâ* Mazarooni. The two parties will probably meet on the mountain.

M. AYMONIER, a Saigon official, has recently returned from a journey of exploration in Indo-China. He left Saigon at the end of September last year to explore Southern Laos, and made a collection of the ancient Cambodian inscriptions. Having explored the intervening country, he reached Bangkok at the end of June last, and here he remained for some time to complete his studies on the Siamese kingdom. The result of his travels will shortly be published in the "Excursions et Reconnaissances," and he will afterwards proceed on another journey of exploration in Annam.

ROOTS[1]

IN treating of the roots of plants this evening, I may request you to dismiss from your minds any expectations or apprehensions of marvellous descriptions of tropical or rare roots on the one hand, or of a list of the peculiarities of various kinds of roots or so-called roots on the other, though it is not improbable that some of the facts will be, in part at least, new to some of you, as they certainly are to many people. I do not propose even to put any new discoveries before you. It has seemed much more to the purpose to show, as well as time will permit, that a vast amount of interesting and important information can be derived from a proper and systematic study of the roots of a common plant—information, moreover, which is important alike to the scientific botanist and to the practical agriculturist, two people who find they have more and more in common each day they come to know one another better. As the diagrams must in part have told you already, I propose that we meet on ground familiar, to a certain extent, to every one; and the sequel will show, I hope, that we have in no way acted unwisely in taking each other into confidence on the subject of an ordinary root, such as is well known to all of us. So much is this the case, that our study may be confined for the most part to the root of the common broad bean and a few other plants of our gardens.

[The lecturer then shortly described the germination of the common bean, maize, and a few other plants, and illustrated by diagrams the mode in which the first or primary root of the bean seedling emerges below, as the young seedling shoot (or "plumule") prepares to force its way upwards to the light and air. Next followed a short consideration of what this root may be said to be.] Anticipating matters to a certain extent, it may be shortly described as an organ for fixing the rest of the plant to the substratum, or soil, from which it absorbs certain food-materials. By confining our attention to this typical and well-known form of root, we may avoid any complexities resulting from the consideration of the more extraordinary cases occurring among the lower plants, or among curious aërial epiphytes, parasitic or otherwise, and other abnormal forms—forms which would demand several lectures by themselves.

The roots we have to consider, then, are organs for anchoring the rest of the plant firmly into the soil, and for absorbing certain matter dissolved in water from that soil. Obviously, we may do well to see, first, how the root gets into the soil; and secondly, how it accomplishes its objects when there.

When the young root first peeps forth from between the coats of the seed, it is seen to have its tip directed downwards towards the centre of the earth. Now this is not an accident; for if the seed be turned over, so that the apex of the root is made to turn upwards, its tip soon bends over, and again becomes directed downwards. [Mr. Ward then proceeded to explain, as shortly as could be done without detailed experimental evidence, that this persistent turning earthwards of the young root is due to a peculiar property, almost of the nature of a sensitiveness or perception to the influence of gravitation, and is not due merely to the weight of the organ.]

Next, evidence has been obtained to show that the tip of the root has a slightly rocking or swinging movement, which is more or less of the nature of the movements so well known in the case of the stems of twining plants; the tip of the root, in fact, not only moves earthwards, but tends to describe a very steep spiral as it does so. These successive very slight noddings to all sides of the tip as it proceeds in a line directed towards the centre of the earth are extremely slight, it must be borne in mind, but they may aid the point of the root to wriggle its way between the particles of earth in a loose soil, or to run down any crevice or hole it meets with.

Thirdly, in addition to its determined tendency to descend, though in a very slightly spiral course, the tip of such a root as we are describing has been found to be peculiarly sensitive to the contact of solid bodies. This extremely curious phenomenon could only be fully described by references to experiments and matters which we have scant time for. It must suffice, therefore, to state that there is evidence to show that the *extreme tip* of the root, on coming in contact with a hard resistant body, is caused to turn aside *from* that body, and if it comes simultaneously into contact with two bodies, one of which is harder than the other, it is caused to bend away from the harder of the

[1] Abstract of a lecture delivered before the Manchester Horticultural Society, in the old Town Hall, Manchester, on November 6, by H. Marshall Ward, M.A., Fellow of Christ's College, Cambridge, and Assistant Lecturer in Botany at the Owens College