

Occultations of Stars by the Moon (visible at Greenwich).

July.	Star.	Mag.	Disap.	Reap.	Corresponding angles from vertex to right for inverted image.	
					h. m.	h. m.
6	... π Capricorni	... 5	... 21	3	near approach	149° —
6	... B.A.C. 7053	... 5½	... 21	49	... 22 53	... 37 280
6	... o Capricorni	... 5½	... 21	49	... 22 54	... 38 280
9	... 42 Aquarii	... 6	... 0	48	... 1 45	... 43 320

Variable Stars.

Star.	R.A.		Decl.		h. m.
	h. m.	°	h. m.	°	
U Cephei	... 0	52° 3'	... 81	16' N.	July 7, 23 13 m
δ Libræ	... 14	54° 9'	... 8	4' S.	9, 0 8 m
U Coronæ	... 15	13° 6'	... 32	4' N.	9, 1 29 m
U Opbiuchi	... 17	10° 8'	... 1	20' N.	6, 0 12 m
S Sagittarii	... 19	12° 8'	... 19	14' S.	9, M
T Capricorni	... 21	15° 8'	... 15	38' S.	9, M
δ Cephei	... 22	25° 0'	... 57	50' N.	8, 1 0 m

M signifies maximum; m minimum.

MR. MCCARTHY, the Government Surveyor of Siam, has just returned to this country, with a very fine set of maps of that country, embodying the results of seven years' survey work. These he is working out at the Royal Geographical Society.

MR. W. J. STEAINS has just returned from Central Brazil, where he has spent a considerable time among the Botocodos, a savage people, concerning whom our information is exceedingly scanty. Mr. Steain's has collected much information concerning these people, and brought home some two hundred sketches, which he will probably publish soon in some form.

ONE of the public lectures at the Manchester Meeting of the British Association will be by Sir Francis De Winton, late Governor of the Congo Free State. Sir Francis, we believe, will illustrate his lecture with a series of maps (perhaps thrown on the screen) showing the progress of our knowledge of Central Africa from the time of Ptolemy down to the present day.

DISCOVERY OF FOSSIL REMAINS OF AN ARCTIC FLORA IN CENTRAL SWEDEN.

FOR the first time fossil remains of an Arctic flora have been discovered in the great stretch of land between Scania and Norrland. The discovery was made in a part where it was least expected, viz. just north of the town of Vadstena, close to the shore of the lake Wetteren. The soil in the vicinity of Vadstena greatly resembles that of South-Western Scania, being mostly formed of moraine clay or clayey moraine sand, whilst marine formations appear to be absent in the former place; they are, however, found further to the north-east, but I have as yet been unable to ascertain the limits of the two districts. Within the moraine clay are found here and there little cavities or depressions, occupied by peat bogs or alluvial formations. Close to the shore of the lake Wetteren, barely a third of a kilometre north-east of Vadstena, such a depression occurs, occupied by a peat bog. This peat bog continues to the north-east beyond the depression, a little way up the rising ground, caused by the existence here of some strong wells, around which in remote times considerable quantities of calcareous tufa have formed. My attention was drawn to this locality by Dr. J. Jönsson, who had noticed the tufa under some work effected for the Geological Survey of Sweden, but not having closely examined the fossil remains of plants in the same, he was only able to inform me that he had found mosses therein.

On examining the collection of specimens of the tufa obtained, I found at the back of one some well-preserved leaves of *Dryas octopetala*, L., other fossil remains in the same fragment, besides mosses, being branches of *Empetrum* and leaves of *Vaccinium uliginosum*, L. In consequence of this discovery, I decided to visit the spot myself, partly in the hope of discovering some more specimens of *Dryas*, and partly in order to study the adjacent layers of earth and the strata containing the fossil plants. But although I spent a whole day in examining loose blocks and the accessible parts of the strata I did not succeed in finding any more leaves of *Dryas*.

The calcareous tufa is, as I have stated, deposited on a declivity and around a well, and the latter, whose flow is rather strong, is now exposed through the removal of the peat (a couple of feet in thickness) which covered it, along with the tufa immediately round the well. The latter appears to have rested immediately on clayey moraine debris or moraine clay (bottom moraine), whilst nearest the well the lower layers are sinter-formed without distinct remains of plants, though probably containing such pine needles and mosses as are found in the upper layer. The mosses are in the upper part of the tufa in certain places common, and form sometimes separate layers consisting solely of such. The composition of the bed seemed to be as follows:—Lowest, the lime had formed round growing grass or Juncaceæ, the leaves of which are indicated by more or less perpendicular holes. Next above this appears a more distinctly stratified tufa, containing leaves and exterior bark of the pine, but, judging from the fragments thrown up in the vicinity, the layer containing *Betula nana* should be placed between these two. As a proof of such a layer are the mosses, leaves of *Vaccinium uliginosum*, *Empetrum*, and even needles of pine, although more seldom than in the true pine layer. From the layer containing remains of dwarf-birch the piece of tufa with

GEOGRAPHICAL NOTES.

AT Monday's meeting of the Royal Geographical Society, Mr. J. T. Last gave a brief preliminary account of his recent explorations among the Namulli Hills, to the south-east of Lake Nyassa and along the River Rovuma. He found that, although the thermometer often falls below freezing-point, no snow exists on the Namulli Hills. At the same meeting, General Haig read an unusually interesting paper on a recent journey he made in the south-west corner of Arabia. He started from Hodeida, went inland to Sana'a, and south to Aden. He found himself in a region of mountains rising to over 10,000 feet, in many places terraced by the natives up to a height of 8000 feet. The scenery was often of the most magnificent and picture-que description, and the climate so comparatively temperate as to be suited for European settlement. The whole region of which this forms part, and indeed the entire southern portion of Arabia, including Hadramaut and Omân, is one that would richly repay serious exploration. General Haig made a journey of about fifty miles into the interior of Omân, and found that, while there was a rainfall of only 6 inches on the coast, at least 30 inches fell upon the hills of the interior.

SOME further steps have been taken in Australia for the prosecution of Antarctic exploration. The Antarctic Committee appointed by the Royal Society of Victoria and the Royal Geographical Society of Australia have memorialized the Premier of Victoria on the propriety of stimulating Antarctic research by the offer of bonuses. They recommend that a sum of £10,000 be placed on the Estimates for this purpose, and that tenders be solicited from shipowners for the performance of services in connexion with Antarctic exploration. It is stipulated that shipowners whose tenders are accepted shall provide, free of charge, cabin accommodation in each ship for two gentlemen, who will sail as the scientific staff; and a second cabin as instrument-room and office. The master of the ship must afford these gentlemen every facility for observing natural phenomena. The master will receive special bonuses for every hundred tons of oil from fish caught south of 60° S. The special services desired are as follows:—A flying survey of any coast-lines lying within the Antarctic Circle, and not laid down upon the Admiralty charts; the discovery of new waterways leading towards the South Pole, and of harbours suitable for wintering in. Opportunities must be afforded to the scientific staff to add to our knowledge of the meteorology, oceanography, terrestrial magnetism, natural history, and geology of the region. Special bonuses will be given for passing 70° S., and also for establishing on shore a temporary observing camp. Two ships are wanted, and both must be in Port Philip Bay and ready to start on October 15. The Premier of Victoria, we are glad to say, has promised to place £10,000 on the next Estimates for these purposes, on condition that the other colonies will join in the enterprise; this they no doubt will do.

THE Russian Government has decided to establish Chairs of Geography in the Universities of the empire. The first appointment will be to the University of St. Petersburg in the autumn of the present year.

the *Dryas* leaves was undoubtedly obtained. Some samples of this tufa show a relatively rapid precipitation, the needles and pieces of bark themselves being sometimes found intact on the cleaving of the tufa. In this layer are also found remains of a species of broad bladed grass, and Herr Carlson has further found in it the imprint of a feather. Uppermost, at all events in certain spots, mosses only are found. The calcareous tufa, the greatest thickness of which is hardly more than 3 feet, is in turn covered with peat.

In the tufa are sometimes found, in layers, thin bands of remains of plants, chiefly of grasses and mosses, the vegetable substance of which is still preserved. In such a layer even a leaf of *Betula nana* was found. Besides the above-mentioned remains of plants may be mentioned leaves of at least three different kinds of *Salices*, one reminding of *S. cinerea*, one of *S. repens*, and one which most certainly cannot be referred to any of the varieties now found in Southern Sweden. In addition to those of *Betula nana*, imperfect leaves of a large birch-tree, probably *B. odorata*, have been found, and also a perfect leaf of one apparently corresponding with *B. intermedia*, although there is some probability that it may be a smaller leaf of *B. odorata*, it being generally impossible to define leaves varying so much as those of *Betula* and *Salix* from a single imprint.

Of the species just named, two at all events, viz. *Betula nana* and *Dryas octopetala*, are extinct near Vadstena. It is also probable that one of the varieties of *Salix* is now foreign to these parts. *Betula nana*, however, is still found in certain parts of Östergötland, but the nearest spot in which *Dryas* grows is in the mountains around the valley Herjedalen, about 4° to the north-west of the lake Wetteren, and we may safely assume that the presence of these two plants in the same locality clearly indicates that at the time of the deposition of the older layers of calcareous tufa the climate was much colder than that now prevailing there. For my own part, I am even disposed to consider this discovery of fossil *Dryas* near Wetteren as a proof of a purely Arctic flora having prevailed in these parts at an age older than that represented by the calcareous tufa; studies of the same in the province of Jemtland in my opinion indicating that a true Arctic climate is not favourable to the development of calcareous tufa, this mineral being first deposited after the climate has become milder. In Jemtland we certainly find Arctic plants in the tufa, but generally together with remains of pine, and they must therefore be considered as the last remnants of an Arctic flora, which already then was in course of being supplanted by the pine and accompanying species. Its greatest significance lies, not only in the proof of an Arctic flora once having flourished in these parts, but also in the circumstance that it proves that an Arctic flora could exist at such a low elevation.

It will further appear from the above exposition that the Arctic flora in this locality was followed by a pine vegetation, the process thus entirely corresponding with what took place in Scania and Norrland. Information from other localities in these parts is, however, required before we can arrive at general conclusions.

Finally, it may not be out of place here briefly to refer to a question which to some extent may be considered to be affected by this discovery. In a paper read in 1860 before the Academy by Prof. Sven Lovén, "On some Crustacea found in the lakes Wetteren and Wenern," the author pointed out that, as regards Wetteren, this lake sheltered a fauna belonging to deeper waters, of originally marine and at the same time Arctic character. This fauna Prof. Lovén considered to be a relic from the time when Wetteren, by way of the Baltic and Lake Ladoga, was connected with the Arctic Ocean. He said:—"Some few favoured species, those which in a higher degree than others were able to adapt themselves to the new medium, and which already in their former habitat, the less saline Arctic Ocean, had accustomed themselves to live for instance where melting glaciers diluted the sea-water, or at the mouth of rivers, would in one or another of the great lakes thrive longer than others, and finally be the only ones surviving. Such a lake is Wetteren." It should be pointed out that the discovery of the fossil *Dryas* leaves on the shore of the lake Wetteren is of considerable significance in view of the opinion thus expressed by Prof. Lovén. For the calcareous tufa referred to here having been deposited since the sea had already receded from these parts, and this tufa nevertheless containing Arctic plants, we may conclude that the lake Wetteren became separated from the sea whilst the climate was still Arctic.

A. G. NATHORST.

GEOLOGICAL STRUCTURE OF FINISTÈRE.

THIS article is founded upon the "Aperçu sur la constitution géologique du Finistère," prepared for a recent excursion of the Geological Society of France by Dr. Charles Barrois, of Lille.

Since the three great promontories of South Wales, Devon and Cornwall, and Brittany, are sharers in no small degree of a common geological history, English geologists can hardly fail to take an interest in the structure of the western extremity of Brittany. Dr. Barrois is very well known to many of us, and the fact that for some time past he has been engaged on the geological survey of Brittany renders his observations all the more valuable. From time to time he has furnished the annals of the Société Géologique du Nord with some of the results of his observations in that country. Of these we may mention "Le granite de Rostrenan (Côtes-du-Nord), ses apophyses et ses contacts," "Mémoire sur les schists métamorphiques de l'île de Groix (Morbihan)," "Mémoire sur les grès métamorphiques du massif granitique du Guéméné (Morbihan)," "Note sur la structure stratigraphique des Montagnes de Menez (Côtes-du-Nord)," and "Légende de la feuille de Châteauhin (Finistère)."

The department of Finistère is traversed from east to west by two parallel chains—on the south the Black Mountains, on the north the Mountains of Arrée. Between the first-named chain and the Atlantic lies the southern plateau of Brittany, whilst the northern plateau is situated between the Mountains of Arrée and the English Channel. Both plateaux are formed by Archæan (*primitifs*) and Cambrian rocks more or less injected by granite. The basin included between the two ranges presents a series of beds extending from the Silurian to the Carboniferous in parallel folds, and is evidently one of the most important physical features in the north-west of France.

The stratified rocks of the region present the following succession:—

Carboniferous.

Schists and Conglomerates of the Coal-Measures.
Schists and Sandstones of Châteauhin.
Porphyritic Tuffs.
Conglomerates and Porphyritic Tuffs.

Devonian.

Nodular Schists of Porsgruen.
Schists and Limestones of Néhou.
White Grit of Landévennec.
Schists and Quartzites of Plougastel.
Limestone of Rosan with *S. looiensis*.

Silurian.

Nodular Schists with *C. interrupta*.
Bituminous Schists with Graptolites.
White Sandstones.
Slates of Angers.
"Grès Armoricaïn."
Conglomerates and Red Schists of La Chèvre.

Cambrian.

Schists and Conglomerates of Gourin.
"Phyllades" of Douarnenez.

Archæan.

Schists of Groix.
Mica Schists of Audierne.
Granitic Gneisses of Pont-Scorff.

Archæan.—The most ancient group of rocks in Finistère consists of certain granitic gneisses and mica schists. The gneisses are devoid of white mica, consisting mainly of white and rose feldspar in large grains, with abundance of black mica, in foliations, sometimes replaced by hornblende in fragments, with granitoid and secondary quartz. These gneisses alternate with interstratified beds of mica schists and amphibolites, and pass into gneissic granites which penetrate them after the manner of an eruptive rock.

The injection of this *gneissic granite* may be explained in three different ways: (1) either it is contemporary with the gneiss and the mica schists, or (2) it may date from a later epoch, or (3) lastly, it may proceed directly from the gneisses by means of local recrystallisations under the action of a powerful general metamorphism. If we accept the first of these hypo-