This law comprises two inequalities, with the periods respectively of 141·3 years and 37·7, and coefficients of 173·3 and 18·0 minutes of time. A third period of 17 years, with a coefficient of 3·5 minutes, was suspected, but the coefficient is so small as to bring it almost within the limit of errors of observation. The resulting elements are as follow: 1888 January 3, 7h. 21m. 29·23s. (G.M.T.) + 2d. 20h. 48m. 55·425s. E′ + 173·3m. sin. ($\frac{1}{360}$ E′ + 202° 30′) + 18·0m. sin ($\frac{3}{40}$ E′ + 203° 15′) + 3·5m. sin ($\frac{1}{6}$ E′ + 90° 20′); where E′ = E (Schonfeld) − 11210. The interpretation of the theory is as follows:—The period at the time of Goodricke's discovery of the character of the variation was 2d. 20h. 48m. 58·0s., lengthening to 59·8s. in 1798, diminishing again in the next ten years to 57·2s., and then again lengthening irregularly to 59·2s. in 1830. A rapid diminution shortly followed, and the rate was reduced to 54·0s. in 1843. After a halt a further but less rapid diminution set in, and in 1858 the period was 52·8s. The following six years saw an increase of 1·6s., followed by another shortening, until in 1877 the period had fallen to 51·1s., from which time it has remained nearly constant; but should the theory be correct, a period of increase must shortly set in, which, with halts and retrogressions, will attain a maximum somewhat late in the coming century.

The paper concludes with a table of heliocentric times of minima up to August 1898.

M. Oudemans, Director of the Utrecht Observatory, is likewise preparing a work on this variable, and requests observers to transmit to him copies of their notes on all observed minima since 1883.

OBSERVATIONS OF VARIABLE STARS.—Mr. Edwin Sawyer has given, in Nos. 164 and 165 of *Gould's Journal*, his observations of several variable stars made during the year 1886. The following table will show how some of these compare with the ephemerides given week by week in NATURE.

Star.	Phase.	Observed.	Calculated.
V Cancri ...	*M* ...	1886 March 29 ...	April 12
R Ursæ Majoris	*M* ...	1886 April 29 ...	May 12
R Virginis ...	*M* ...	1886 April 8 ...	April 10
S Coronæ ...	*M* ...	1886 May 10 ...	April 10
R Scuti	*m* ...	1886 July 21 ...	June 27
	M ...	1886 Sept. 12 ...	Aug. 1
	m ...	1886 Dec. 2 ...	Nov. 17

Mira Ceti was observed at maximum 1886 January 9; *g* (30) Herculis at minimum June 14, and at maximum September 20; and W Cygni at three epochs, viz. *m* July 8, *M* September 10, and *m* November 5.

Gore's new variable near χ_1 Orionis, to which Mr. Sawyer gives the lettering U Orionis, but which other astronomers have generally designated T, attained a maximum about 1887 December 14. The maximum was only a feeble one, −7·5 mag. The light remained almost stationary from 1887 November 29 to 1888 January 2, a period of thirty-four days. The period of the star must be almost exactly a year.

The variable Lal. 40083, discovered by Mr. S. C. Chandler (see NATURE, vol. xxxv. p. 282), and to which he has given the name X Cygni, has shown from further observation that its light-curve is not constant in different periods, the minimum brightness being especially variable, but since the bright and faint minima do not alternate regularly the star does not belong to the β Lyræ class. Mr. Chandler's revised elements for the star are as follow: 1886 October 13, 14h. 20m. G.M.T. + 15d. 14h. 24m. E. Approximate duration of increase 5·6 days, of decrease 10·0 days. The maximum brilliancy is generally about 6·4m.; the minimum ranges from 7·2m. to 7·7m.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1888 *APRIL* 8–14.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on April 8

Sun rises, 5h. 20m.; souths, 12h. 1m. 43·3s.; sets, 18h. 43m.: right asc. on meridian, 1h. 10·4m.; decl. 7° 29′ N. Sidereal Time at Sunset, 7h. 53m.

Moon (New on April 11, 9h.) rises, 4h. 46m.; souths, 10h. 6m.; sets, 15h. 35m.: right asc. on meridian, 23h. 14·6m.; decl. 8° 21′ S.

Planet.	Rises. h. m.	Souths. h. m.	Sets. h. m.	Right asc. and declination on meridian. h. m.	° ′
Mercury..	4 52 ...	10 29 ...	16 6 ...	23 37·0 ...	5 8 S.
Venus ...	4 47 ...	10 32 ...	16 17 ...	23 40·9 ...	3 40 S.
Mars ...	18 53*...	0 22 ...	5 51 ...	13 28·6 ...	6 48 S.
Jupiter ...	22 57*...	3 10 ...	7 23 ..	16 16·9 ...	20 19 S.
Saturn ...	10 59 ...	18 58 ...	2 57*...	8 7·8 ...	20 48 N.
Uranus...	18 9 ...	23 46 ...	5 23*...	12 56·4 ...	5 17 S.
Neptune..	6 56 ...	14 37 ...	22 18 ...	3 45·7 ...	18 11 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

April. h.
8 ... 23 ... Mercury in conjunction with and 1° 16′ north of the Moon.
9 ... 1 ... Venus in conjunction with and 2° 24′ north of the Moon.
11 ... 6 ... Mars in opposition to the Sun.
14 ... 4 ... Mercury in conjunction with and 1° 10′ south of Venus.

Variable Stars.

Star.	R.A. h. m.	Decl. ° ′		h. m.	
U Cephei	0 52·4 ...	81 16 N. ...	Apr. 12,	4 2	*m*
Algol	3 0·9 ...	40 31 N. ...	,, 13,	3 26	*m*
R Canis Majoris...	7 14·5 ...	16 12 S. ...	,, 11,	20 7	*m*
U Monocerotis ...	7 25·5 ...	9 33 S. ...	,, 12,		*m*
S Cancri	8 37·5 ...	19 26 N. ...	,, 13,	19 30	*m*
δ Libræ	14 55·0 ...	8 4 S. ...	,, 10,	22 56	*m*
U Ophiuchi... ...	17 10·9 ...	1 20 N. ...	,, 11,	2 57	*m*
			,, 11,	23 5	*m*
W Sagittarii ...	17 57·9 ...	29 35 S. ...	,, 9,	4 0	*m*
Z Sagittarii...	18 14·8 ...	18 55 S. ...	,, 11,	1 0	*M*
U Sagittarii	18 25·3 ...	19 12 S. ...	,, 10,	3 0	*m*
			,, 13,	2 0	*M*
η Aquilæ	19 46·8 ...	0 43 N. ...	,, 14,	2 0	*m*
T Vulpeculæ ...	20 46·7 ...	27 50 N. ...	,, 13,	4 0	*M*
R Vulpeculæ ...	20 59·4 ...	23 23 N. ...	,, 13,		*M*
δ Cephei	22 25·0 ...	57 51 N. ...	,, 12,	3 0	*m*

M signifies maximum; *m* minimum.

Meteor-Showers.

	R.A.	Decl.	
Near α Ursæ Majoris ...	163° ...	60° N. ...	April 10 and 11.
,, 42 Herculis... ...	248 ...	50 N. ...	,, ,,

GEOGRAPHICAL NOTES.

A SHORT excursion into the almost unknown interior of San Domingo was made last summer by Baron H. Eggers, in the course of which he explored the mountainous district, and made a complete study of the vegetation of this elevated region; he further discovered a route along which the exploration of this little-known mountain region may be carried out with facility. The following details are taken from the traveller's own account of his journey, published in *Petermann's Mitteilungen* (Part 2, 1888). He left Puerto Plata, on the north coast, on May 2 last, and about the middle of the same month found himself at Jarabacoa on the Rio Yagin, having passed through Santiago on his way. While at Jarabacoa he ascended Monte Barrero (4100 feet) in the vicinity of the town. The steep slopes of this peak are covered with lofty pine woods. In the small ravines and between rocks the traveller observed many interesting plants, *e.g.* the dark red *Fuchsia triphylla*, a bright red *Siphocampylos*, a large *Pentarhaphia*, and a beautiful *Cyathea*; he also found a large number of hitherto unnoticed plants, including an ilex, several Compositæ, Labiatæ, &c. The animal life in these pine forests appears to be very poor: there are scarcely any insects, and a species of crow is the only bird seen. At the end of May the traveller with a small party of blacks set out in a due southerly direction for the Valle de Constanza. The valley is well watered, and its height above the sea is 3840 feet. Its inhabitants, numbering 100, are engaged in cattle-rearing, and the cultivation of beans, maize, cassava, tobacco, &c. The climate is cool, and from November to March dry; during the rest of the year it rains. The thermometer at 6 o'clock in the morning of May 28 stood at 59° F. The higher part of the surrounding mountains, which almost everywhere contain gold, though in small quantities, are quite unexplored. From the Valle de Constanza the traveller made a

further excursion to the south-east to a savanna region, situated in a depression among the mountains, and called by the natives "Valle Nuevo." The path led over forest-clad mountains with intervening gorges, and formed a continual ascent till the Valle Nuevo was reached, which is 7450 feet above the sea. One of the forest tracts which the traveller traversed was especially dense and almost impassable; beautiful mosses, ferns, orchids, lycopods, and other epiphytes were growing on the trees. The Valle Nuevo is surrounded by low hills, which form the culminating points of the range; the highest of these, viz. Pico del Valle Nuevo (8630 feet above the sea-level) was ascended by the traveller.

DR. RINK contributes to the current number of *Petermann's Mitteilungen* an account of the results of the recent journeys made by Lieuts. Ryder and Block along the coast of Greenland to the north of Upernivik in 1887. By accurate measurements made in the ice-fiords of Angpadlar Fok, &c., both in April and August, some interesting and important results have been secured as regards the physical geography of this region. Some of the ice-fiords are very prolific in ice-bergs, notably that of Giesecke, where the edge of the permanent ice has retreated considerably within recent years. The results show not only the extraordinary rapidity, but the great variableness in the movements of the ice, apart apparently from the temperature of the time of year. The average temperature of the air during the measurements from April 20 to 24, was from $-9°$ F. to $-15°$. On January 28 the water temperature, at a point where the ice-fiord was 512 fathoms in depth, was as follows: at the surface 27°·7 F., at 50 fathoms 28°·9, at 200 fathoms 32°, and at 287 fathoms 32°·2. The question of the limit and movements of the inland ice of Greenland, to which the attention of recent Danish explorations has been directed, and towards the solution of which the results obtained by Lieuts. Ryder and Block have materially contributed, is discussed by Herr Rink in his paper, which also gives some interesting notes on the botany, geology, and ethnography of the country.

IN the April number of the Proceedings of the Royal Geographical Society there is an excellent new map of Siam, based on the surveys of Mr. James McCarthy. There also will be found the second and third of General Strachey's Cambridge geographical lectures.

AT the last meeting of the Royal Geographical Society a paper of unusual interest and originality, on the Solomon Islands, was read by Mr. C. M. Woodford, who spent several months in the group in 1886–87. Mr. Woodford's attention was mainly directed to Treasury Island, his head-quarters for some months being at Alu, on that island. He made many journeys into the interior, and was so successful that he obtained nearly 17,000 specimens in natural history, which, so far as they have been examined, have been found to comprise three new genera, and eight new species of mammals, fifteen new species of birds, six new species of reptiles, and over a hundred new species of Lepidoptera. Mr. Woodford visited, besides Treasury Island, the islands of Fauro, New Georgia, Guadalcanar, and others, exploring their interiors as far as possible, and in the case of Guadalcanar attempting to ascend Mount Lamma (8000 feet), without, however, succeeding. He followed the Bokokembo River as far as possible, finding the vegetation most luxuriant, and composed of large Ficus and other forest trees, with occasional clumps of sago and areca palms, but few coco-nuts. The coast natives are greatly afraid to venture into the interior, partly through fear of the bush-folk who live in the mountains, and partly through superstition. Mr. Woodford's observations on the natives are of great value; he had unusual opportunities of observing their modes of life. They are mostly inveterate head-hunters and cannibals. Natives of different parts of the group differ considerably from one another, but they belong to the Melanesian or Papuan type. Mr. Woodford believes, however, that on the island of Ysabel there is a strong infusion of Polynesian blood from Ongtong Java, or Lord Howe's Group, as canoes are known to have been driven in bad weather from that group, and to have arrived on the coast of Ysabel. The natives of Bouka and Bougainville, and of the islands of Bougainville Straits and of Choiseul, are intensely black in colour, but as one journeys eastward the colour changes to a dark brown. They have woolly hair, but occasionally natives are met with wavy, and in some cases straight hair. Mr. Woodford attributes this fact to an infusion of Polynesian blood, and has noticed it in natives from Ysabel, also at Fauro.

THE Royal Geographical Society of Sweden has awarded the *Vega* Gold Medal—instituted in honour of Nordenskiöld's voyage—to Dr. Wilhelm Junker, the celebrated African traveller. The medal, which has not been awarded since 1884, has hitherto had only four recipients, viz. Nordenskiöld, Palander, Prejevalsky, and Stanley.

THE ATOLL OF DIEGO GARCIA AND THE CORAL FORMATIONS OF THE INDIAN OCEAN.[1]

DIEGO GARCIA is a typical atoll; a narrow strip of land varying in width from a mile to 30 yards, nearly completely encircles a lagoon of irregular shape. The lagoon is open to the ocean towards the north-west, its mouth being divided by three small islets into four channels, of which three are sufficiently deep to allow ships to enter the lagoon. The whole of the land composing the atoll is very low; the highest point in the island is not more than 30 feet above the level of high tide, and this height, which is quite exceptional, is due to the accumulation of great heaps of sand through the action of the south-east trade winds which blow with considerable strength for more than one-half of the year. Diego Garcia is the southernmost atoll of the Chagos Group; it lies in S. lat. 7° 26′, E. long. 72° 23′, and forms the last of the great chain of coral formations reaching from the Laccadive Islands, through the Maldives to the Chagos Group. To its south-west lie the submerged atoll-shaped reefs known as Pitt's Bank and Centurion's Bank, to its north lies the huge submerged atoll known as the Great Chagos Bank. It is an interesting fact that throughout the Laccadive, Maldive, and Chagos Groups there is no instance of a fringing or of a barrier reef; nothing but coral structure rises above the waves; all the islands are atolls; none of these are upraised, but there are several submerged banks. The existence of this long line of atolls seemed to be one of the strongest arguments in favour of Darwin's theory of the formation of coral reefs.

In Diego Garcia the nature of the soil varies considerably from place to place. In some localities it consists of nothing else than bare coral rock upon the surface of which coral boulders are scattered about; in other places it is composed wholly of calcareous sand, and one may dig down for 6 or 8 feet without finding coral rock. It is obvious after a short examination that some parts of the land are older than others, and that the great strip of land was formerly a series of disconnected islets which have since been joined together by the accumulation of sand and coral *débris* between them. In the older parts of the island, which have apparently been covered with vegetation for a considerable period, a thick peaty mould has been formed by the decay of fallen leaves and stems of trees and shrubs.

Throughout the island the outer or seaward shore is higher than the inner or lagoonward shore, owing to the pile of coral boulders thrown up in the form of a low rampart along the former by the action of the waves. In most places a flat reef extends fully 60 yards seaward of the rampart; and this reef is just uncovered at low spring tides. As a rule the inner shore slopes gently down into the lagoon for some distance, and then pitches down rather suddenly to a depth of 10 or 12 fathoms, but in some places there is a depth of 6 or 8 fathoms close up to the inner shores. Marshy pools of fresh or brackish water are found in the centre of the strip of land on the south-east and west sides of the island; into these the sea enters in many cases during the highest spring tides, and at the south-east and south ends of the island it has established permanent breaches into some of these pools, through which the tide runs in and out regularly from the lagoon. Thus there are formed sheets of water like secondary lagoons within the strip of land; these are known on the island by the name of *barachois*, and they are of some importance when one comes to consider the amount of change which is continually going on in the island.

Externally the shores slope away very rapidly to considerable depths, the sounding-line giving depths of 250 fathoms and upwards at a distance of a few hundred yards from the edge of the reef, excepting at Horsburgh Point at the south-east side, where a depth of 45 fathoms is found at a distance of 1 mile from the shore. After a stay of two or three months on the island one cannot fail to be impressed with the immense amount of

[1] By G. C. Bourne, B.A., F.L.S., Fellow of New College and Assistant to the Linacre Professor in the University of Oxford. Communicated to the Royal Society by Prof. E. Ray Lankester, F.R.S.