THE *Colonies and India* states that a discovery has recently been made on a Fiji plantation, which will probably prove extremely valuable in all tropical countries where the cultivation of bananas is regarded as a settled industry. The banana disease had for some time been causing much havoc on a plantation on Vanua Levu, and it appears that the discovery of an antidote was due to an accidental occurrence. On a flat near the sea-shore there was a patch of bananas much diseased, and some time ago the sea swept into it and remained on it for about an hour. All the plants were killed as far as the standing stems were concerned, but vigorous young shoots came up freely from the roots, and were not only quite free from disease, but soon began to bear much larger bunches of fruit than the parent plants ever did. Upon noting this effect the planters determined to try the experiment upon a number of badly diseased plants which the sea had not reached. They cut down the diseased plants, and, having stirred the ground about them, poured from one to four buckets of sea-water over each. The result was that, while the parent stems withered, vigorous young shoots came freely away, without a sign of disease.

A SERIES of successful experiments upon the simultaneous production of pure crystals of sodium carbonate and chlorine gas from common salt are described by Dr. Hempel in the current number of the *Berichte*. The experiments simply consisted in passing a current of carbon dioxide gas through a solution of salt contained in a special form of electrolytic cell, through which an electric current from a few Bunsen's cells or a small dynamo was circulated. The kathode found most convenient consisted of a plate of iron or carbon perforated with numerous holes about 4 millimetres in diameter, bored obliquely, so that bubbles of gas could readily escape upwards. For anode a similar plate of thin perforated carbon was employed. Both electrodes were circular in shape, and between them was placed a diaphragm of thick asbestos paper, which was directly squeezed between the two plates. This arrangement was found to possess the double advantage of bringing the two electrodes within 1 millimetre of each other, and so greatly diminishing the internal resistance, and of affording such excellent support to the asbestos diaphragm that any rupture of the latter was entirely prevented. The electrodes and their enclosed diaphragm were supported in a circular glass cell in such a manner that they divided the cell into two distinct chambers. To the glass wall of the cell on the positive or anode side was fitted a wide side tube, through which the salt was supplied as often as necessary in solid pieces, a little water being also from time to time added to replace that taken up in the crystallization of the sodium carbonate. A delivery tube was also attached to the upper portion of the anode chamber in order to conduct away the liberated chlorine gas. The negative or kathode chamber was supplied at its upper end with an opening serving on the one hand to introduce the carbon dioxide delivery tube, and on the other to extract the crystals of sodium carbonate. The apparatus was thus found to work continuously for weeks together, the asbestos diaphragm withstanding the pressure very satisfactorily. The separation of the soda crystals is readily explained by the well-known fact of the difficult solubility of sodium carbonate in solutions of sodium chloride; as fast as the electric current decomposes the sodium chloride into chlorine and sodium, the carbon dioxide converts the sodium hydrate formed by the reaction of the sodium upon water into the normal carbonate, which, in presence of the constantly replenished common salt, at once separates in the usual monoclinic form of $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$. The total resistance of the cell is only about five and a half volts, which may be still further reduced by constructing both electrodes of carbon. Using a small dynamo-electric machine, 64.5 grams of chlorine and 259.8 grams of $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ per horse-power of 630 volt-amperes were pro-

duced per hour, so that the experiments, in addition to their interest from a purely chemical point of view, may turn out to be technically. The soda produced is stated to be chemically pure, and the chlorine to contain but a very small admixture with other gases.

THE additions to the Zoological Society's Gardens during the past week include a Patas Monkey (*Cercopithecus patas* ♂) from West Africa, presented by the Rev. James Vernal; a Cheetah (*Cynelurus jubatus* ♂) from South Africa, presented by Captain M. P. Webster, s.s. *Roslin Castle*; a Ring-tailed Coati (*Nasua rufa* ♀) from South America, presented by Mr. J. A. Martin; two Short-toed Larks (*Calandrella brachydactyla*) from Devonshire, presented by Commander W. N. Latham, R.N., F.Z.S.; a Sharp-nosed Crocodile (*Crocodilus acutus*) from Jamaica, presented by the Jamaica Institute; two Tuatera Lizards (*Sphenodon punctatus*) from New Zealand, presented by Rear-Admiral Henry Fairfax, R.N., C.B., F.Z.S.; a Smooth-headed Capuchin (*Cebus monachus* ♂) from Brazil, deposited; a Collared Peccary (*Dicotyles tajaçu* ♀), four Rosy-billed Ducks (*Metopiana peposaca* ♂ & ♀) from South America; two Grey Squirrels (*Sciurus cinereus*) from North America; four — Finches (*Munia nana*) from Madagascar, purchased.

OUR ASTRONOMICAL COLUMN.

STELLAR PARALLAX BY MEANS OF PHOTOGRAPHY.—Prof. Pritchard has sent us his eminently successful "Researches in Stellar Parallax" by the aid of photography, from observations made at the Oxford University Observatory. The advantage in point of convenience and rapidity in the multiplication of observations which this method possesses over all others is incalculable, and it is interesting to note that in the case of 61 Cygni the parallax obtained was $0''.4294 \pm 0''.0162$, and that Bessel's probable error is practically identical with this here stated. Hence, as far as the present results are concerned, photographic and heliometric measures of parallax may be regarded as possessing an equality of accuracy.

The following list contains the stars whose parallax has been determined by this novel method, and some of the results obtained:—

61 ₁ Cygni	...	...	...	+ 0".429	± 0".016
61 ₂ "	...	...	...	+ 0".432	± 0".019
μ Cassiopeie	...	...	...	+ 0".021	± 0".023
Polaris	...	...	...	+ 0".052	± 0".011
α Cassiopeie	...	...	...	+ 0".035	± 0".024
β "	...	...	...	+ 0".157	± 0".036
γ "	...	...	...	- 0".032	± 0".026
α Cephei	...	...	...	+ 0".073	± 0".031

The almost identical parallax of the two components of 61 Cygni is worthy of note. The average of eight determinations gives a value $0''.437$, which is a close approximation to Dr. Belopolsky's value of $0''.50$ as the *absolute* parallax of 61 Cygni.

Bessel determined a small negative parallax for μ Cassiopeie, but Dr. Struve assigned it a value + $0''.342$. The very small positive parallax given by Prof. Pritchard may be explanatory of Bessel's negative determination.

The small negative parallax found for γ Cassiopeie would indicate that it and the comparison stars are in the same group, although its bright line spectrum points to a constitution different from that of other stars in this constellation.

Even a cursory examination of the summary of results renders it evident that no relation exists between the lustre and parallax of stars, and indeed, since we probably view bodies which are still in various stages of condensation, we should hardly expect to find any such relation.

MEASUREMENTS OF DOUBLE STARS.—*Astronomische Nachrichten*, Nos. 2929–30, contain a series of double star observations made with the 36-inch refractor of the Lick Observatory by Mr. S. W. Burnham. The discovery is claimed of two very faint stars in the trapezium of Orion, and an excessively faint double has also been detected by Mr. E. E. Barnard just outside and preceding the trapezium. The observers believe that, in spite of the numerous alleged discoveries of faint stars in this

region, it is impossible to see such as these now found with an aperture much less than that of the Lick telescope. A list is therefore given of the principal communications to astronomical periodicals relating to the alleged discovery of faint stars in the trapezium of Orion.

BARNARD'S COMET, 1888-89.—*Comptes rendus*, No. 17, October 21, 1889, contains some observations made by MM. Rayet and Courty of the motion of Barnard's comet, the positions of the comparison stars being also given. The series of observations extend from September 11, 1888, to September 27, 1889.

BIOGRAPHICAL NOTE ON J. C. HOUZEAU.—M. A. Lancaster, the collaborator with Houzeau of the most comprehensive bibliography extant, has proved himself, in this note, to be the most capable of writing his deceased friend's biography. Houzeau's scientific and literary labours cover an extensive field: astronomy and geodesy, mathematics and meteorology, geology and geography, are all represented in his works; and when but a young man, he directed the triangulation of his country. In politics Houzeau was an enthusiast, and whilst in America, about 1861-69, he gave a considerable amount of attention to the subject of the emancipation of the slaves, and wrote numerous and important articles upon it. In 1875, Houzeau completed a series of astronomical and meteorological observations made at Jamaica, and in the following year was appointed Director of the Brussels Observatory. His crowning work—the "Vade Mecum of Astronomy," was finished in 1882. It represented the work of a lifetime, and as a guide to astronomers is invaluable. Such a compilation, however, calls for continual additions, and a general bibliography was published in 1887, with the assistance of M. A. Lancaster. This was Houzeau's last work, but before his death, on July 12, 1888, he earnestly expressed the wish that it should be carried on by his collaborator. Houzeau's life was full of vicissitudes, and his biography is most interesting.

THE KARLSRUHE OBSERVATORY.—The third volume of the Publications of the Grand-Ducal Observatory of Karlsruhe has recently been published by Dr. W. Valentiner, the Director. The bulk of the volume is by Dr. E. von Rebeur-Paschwitz, and consists, first, of a series of measures with the 6-inch refractor of the two star-clusters M. 35 and M. 25; secondly, of a discussion of the orbit of Comet Wells, 1882 I., and the derivation of definitive elements; and lastly, of auxiliary tables for the computation of parallax for 169 different observatories.

Dr. Boy Mattheissen adds a short paper on the orbit of Comet Denning, 1881 V.

The volume contains three plates, the first two being maps of the star-clusters under observation, whilst the third gives photographs of the same two clusters as taken by Dr. E. von Gothard at Herény.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich, at 10 p.m. November 7 = 1h. 9m. 9s.

Name.	Mag.	Colour.	R.A. 1890°.	Decl. 1890°.
			h. m. s.	° ' "
(1) Nebula in Andromeda	—	Greenish-white.	0 35 4	+40 30' 14"
(2) γ Cassiopeiae	2	Bluish-white.	0 59 1	+60 7
(3) γ Piscium	5	Vell. wish-red.	0 42 58	+6 59' 2"
(4) ϵ Ceti	3	Yellowish-white.	0 13 48	— 9 26
(5) γ Pegasi	3	White.	0 7 34	+14 34
(6) D.M. + 34° 55'	8	Deep red.	0 21 42	+34 53
(7) T Herculis	Var.	Reddish.	18 4 56	+31 0

Remarks.

(1) Dr. Huggins notes that the spectrum ends abruptly in the orange. Maxima of brightness have since been recorded by myself at, approximately, 468-474, 517, and 546, and the latter two have also been confirmed by Mr. Taylor. Further confirmation is required. For comparison, a Bunsen or spirit-lamp flame will be found convenient for the first two, and the brightest fluting seen when lead chloride is introduced into the flame for the third. Mr. Lockyer suggests that since the central condensation is probably at a higher temperature than the surrounding portions of the nebula, different parts of the nebula should show differences in their spectra. Observing with Mr. Lockyer's 30-inch reflector at Westgate-on-Sea, on October 20, I suspected

some change in the spectrum away from the nucleus, but was unable to complete the observation on account of clouds, and have not since had an opportunity of repeating it.

(2) The bright lines most constantly seen in the spectrum of this star are C, F, and D₃, but their appearance is somewhat irregular. Continuous observations, with special reference to the relative intensities of the lines, are suggested. The lines are well seen in a 10-inch equatorial with a Maclean spectroscopic eye-piece. Bright flutings of carbon have also been suspected, and comparisons should be made with the Bunsen or spirit-lamp to confirm these. The continuous spectrum should also be carefully examined for maxima, δ , D, and other absorption-lines, have also been recorded.

(3) This is a star which gives a spectrum of dark flutings fading away towards the red. Dunér records bands 2 to 9, and describes the spectrum as superb. Band 3, near D, is of extraordinary width. The spectra of this type have been explained as mixed metallic fluting absorption and carbon fluting radiation. The carbon flutings probably present are 517 and 468-474, which again may be determined by comparison with the spirit-lamp, 517 being the brightest green fluting.

Dunér's notation and mean wave-lengths of the dark bands are as follows:—(1) 648-666, (2) 616'2-629'8, (3) 586 7-596'8, (4) 559'8-564'9, (5) 545'2-551'5, (6) 524'3-528'1, (7) 516'8-522'2, (8) 495'9-503'0, (9) 476'0-483'0, (10) 460'7-473. The bright spaces between 7 and 8, and 9 and 10 are probably due to carbon.

(4) This is a star of Class II.a, which is now divided into two groups, one having spectra of the type of α Tauri (Group III.), and the other of the sun (Group V.). The lines should be carefully observed, and differences from the solar spectrum, if any, noted, so that the star can be classed in one group or the other. The principal criteria so far determined for Group III. are strong lines at 499 and 540, 568 and 579. The line at 540 forms with E (5268), and the iron line at 5327 (both solar lines), an equi-distant trio. The difference between the two groups may perhaps best be observed by a comparison of Aldebaran and Capella.

(5) The spectrum of this star is Class I.a (Group IV.). The relative intensities of the hydrogen and metallic lines should be noted, in order that the star may be arranged with others in order of temperature.

(6) Dunér gives the spectrum of this star as Class III. δ (Group VI.), in which the main features are three dark carbon flutings fading away towards the blue. Other absorptions, if any, should be carefully observed, and their relative intensities recorded.

(7) This is a variable star, which reached its maximum on November 6. The magnitude at maximum is given by Gore as 6'9-8'3, and the period as 165'1 days. The spectrum has not yet, so far as I know, been recorded.

A. FOWLER.

GEOGRAPHICAL NOTES.

THE telegrams in the papers of Monday and Tuesday from Mr. Stanley are of the most suggestive and interesting character. For one thing, Emin, Casati, and others who have been holding out, are safe, though the brave Pasha has evidently been deserted by most of his men. That Mr. Stanley's expedition was needed the result has proved. He reached the Albert Nyanza for the third time, not a moment too soon to rescue the retreating party. We need not dwell on the sacrifices that have been entailed; they might to some extent have been avoided, but personally Mr. Stanley is not to blame. The geographical results of the expedition, as shadowed in the too brief telegram in Tuesday's papers, are evidently of the highest interest. There is now no doubt that there is a southern Albert Lake, Muta Nzige, which Mr. Stanley has named Lake Albert Edward. From the time when he himself discovered what he called Beatrice Gulf until the present, no one had seen this lake. At first it was thought to be a part of the northern lake, Albert Nyanza, but that idea had to be given up. Now it is clear that it is connected with that lake by the River Sempliki. The southern lake is 900 feet higher than the northern, and so is about 3200 feet above sea-level, and 450 feet above Lake Tanganyika, with which it is unlikely to have any connection. Mr. Stanley skirted the snowy mountain range referred to in his letters of six months ago, and found that they send down fifty streams to feed the

¹ Roy. Soc. Proc., vol. xlv, pp. 380-392.