from the south impracticable; but he has succeeded in ascending another mountain 24,000 feet high.

THE *Sanitary Engineer*, which has for some time been published in New York, is now to be published simultaneously in England and America.

DR. KING'S annual report on the Government Cinchona Plantations in Bengal for the year 1882-83, which is dated May 11 last, is a review of the work in the plantations down to March 31. The planting operations of the year show a grand total of cinchona trees on the Government estate at the last-mentioned date of 4,711,168 of all sorts; this is a decrease, we are told, of about 50,000 on the returns of the previous year, the falling-off being due to the uprootal of 20,000 hybrids, and 43,697 *Calisayas*, which were shown on analysis to have bark of rather poor quality. Dr. King says: "The removal of these inferior trees is in conformity with the policy which has been followed for some years of raising the standard of the produce of these estates by cultivating only the finest kinds of quinine yielders. In conformity with the same policy 160,085 red bark trees, which had to be uprooted in the ordinary rotation followed on the plantation, were replaced, not by red barks, but by yellow barks and hybrids. Ground was, towards the end of the year, broken at Runjung, in the new cinchona reserve across the Tiesta. A European assistant has been located there, and preliminary measures have been taken for planting out there, during the year now entered upon, a number of the best kinds of *Ledgeriana* and hybrid cinchonas." Regarding the crop of bark harvested during the year, Dr. King says it was the largest ever obtained from the plantations, and amounted to 396,980 lbs. of dry bark, 38,880 lbs. of which were collected on the young plantation at Sittong, and the remainder on the old plantation. The total crop was divided as follows: 372,610 lbs. of *Succirubra*, 22,120 lbs. of *Calisaya* and *Ledgeriana*, and 2250 lbs. of hybrid bark. The bulk of the crop was made over to the factory for conversion into cinchona febrifuge, 41,800 lbs. being sent home by order of the Secretary of State to be converted, it is understood, into various forms of cinchona febrifuge in this country for trial by the medical department. It seems that the plants yielding Carthagena bark have not thriven, only three plants being alive at the end of the year, and this notwithstanding every care that could possibly be given to them. The quinologist's report for the same period as the preceding is appended to it, and it shows that the net result of the manufacture of febrifuge for the year was 10,363¼ lbs. of ordinary and 300 lbs. of crystalline febrifuge, the cost price of which was lower than in any previous year. It appears that the year's working resulted in a profit of Rs. 66,284.9.5, which, it is stated, is equal to a dividend of 6½ per cent. on the capital, and may be considered satisfactory. On this point Dr. King says: "The quantity of febrifuge supplied to Government departments during the year was 4180½ lbs., and the cost was Rs. 68,988.8, an equal quantity of quinine at Rs. 96 per lb. would have cost Rs. 4,01,328. The saving to the State effected by substituting febrifuge of Government manufacture for English-made quinine was therefore Rs. 3,32,340."

MR. CHARLES F. PARKER, the curator in charge of the Academy of Natural Sciences of Philadelphia, died September 7, after an illness of several months. Mr. Parker had paid special attention to the botany of New Jersey, and, both in the completeness of his herbarium and the accuracy of his knowledge of it, he had few, if any, equals.

MR. F. E. SAWYER sends us reports of two papers in which he gives the results of his investigations on the folk-lore and superstitions of Sussex. There is also a paper by him in Part vii. of the *Folk-lore Journal* on St. Swithin and the rain water. The same number contains part 6 of Mr. Sibree's valuable collections on "The Oratory, Songs, Legends, and Folk-tales of the Malagasy."

AT the Upsala University a young lady, only seventeen years of age, has just taken the first degree of examination.

THE additions to the Zoological Society's Gardens during the past week include two Bonnet Monkeys (*Macacus sinicus* ♂ ♀) from India, presented by Mr. John Verinder; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. W. H. B. Morris; a Bonnet Monkey (*Macacus sinicus*) from India, presented by Miss Stokes; a Geoffroy's Cat (*Felis geoffroii*), a Chilian Sea Eagle (*Geranoætus melanoleucus*) from Uruguay, presented by Mr. Charles S. Barnes; a Crested Porcupine (*Hystrix cristata*) from Africa, presented by the Earl de Grey; a Purple Gallinule (*Porphyrio cæruleus*), European, presented by Mr. Robert Dowling; a Golden-headed Conure (*Conurus auricapillus*) from South America, presented by Mrs. Robins; a Smooth Snake (*Coronella lævis*), British, presented by Mr. W. H. Pain; an Æsculapian Snake (*Coluber æsculapii*), European, two Redshanks (*Totanus calidris*), British, a Yellow Baboon (*Cynocephalus babouin*), a Gambian Pouched Rat (*Cricetomys gambianus*), a Slaty Egret (*Ardea gularis*) from West Africa, a Little Egret (*Ardea garzetta*), European, a Very Black Lemur (*Lemur nigerrimus* ♂) from Madagascar, purchased; a Brown Bear (*Ursus arctos*), North European, a Puma (*Felis concolor*) from America, a Patas Monkey (*Cercopithecus patas*) from West Africa, two Black-footed Penguins (*Spheniscus demersus*) from South Africa, a Cocteau's Skink (*Macrocincus cocteauii*) from the Cape Verde Islands, deposited.

OUR ASTRONOMICAL COLUMN

PONS' COMET.—Several observers have drawn attention to a remarkable fluctuation in the brightness of this comet in September. M. Bigourdan of the Paris Observatory says that on the 5th of that month it appeared as a faint nebulosity about equal in brightness to a star of the twelfth magnitude, and nearly round. On the 9th, with a power of 500, there was a small nucleus, ill defined but sufficiently distinct from the surrounding nebulosity; the comet's light had increased since the 5th. Moonlight and clouds interfered with observation till the 23rd, when the brightness was much increased, and in a small telescope was equal to that of a star of the eighth magnitude. On the following night, in a fine sky, the comet's aspect was still the same, and its diameter was nearly 2′. On the 27th a considerable change had taken place; the nebulosity was much fainter, and the nucleus distinct from it was from 10-11m. After that date the nucleus further diminished, and on October 6 was only of 12m., though the comet as a whole was more easily seen than at the beginning of September. Thus on September 24 the comet was of 8m., while its brightness, calculated from that of September 5, would have assigned it only 11-12m. It therefore had, as M. Bigourdan remarks, for some time a brightness thirty to forty times that given by theory, which, he says, it is difficult to reconcile with the opinion that comets have not a light of their own.

Herr Rumker, observing at Hamburg, noticed similar variation. On September 23 he had seen the comet as "ein sehr helles Object mit einer glanzenden Verdichtung." On September 27 and following nights, "glich der Comet einem sehr blassen, unregelmässigen, ziemlich grossen Nebel mit einem Kleinen kaum sichtbaren condensations-centrum." The contrast, he says, was so striking that on September 27 he at first doubted if he had the comet in the field.

Baron von Engelhardt found the comet fainter on October 1 than on September 28, but on the latter night it was much better seen with a 5-inch comet-seeker than with a power of 140 on the equatoreal.

THE GREAT COMET OF 1882.—The weather during the last moonless period appears to have been very unfavourable, at least in this country, and there was no opportunity for satisfactory examination of the position of the great comet of 1882, on the chance of glimpsing it with our larger instruments as the earth somewhat overtook it on its course. The theoretical in-

tensity of light during the next period of absence of moonlight is slightly less, but we continue an ephemeris from the elliptic elements calculated by M. Fabritius:—

At Greenwich Midnight

	R.A. h. m. s.	N.P.D. ° ′ ″	Log. distance from Earth.	Log. distance from Sun.
Oct. 27	7 31 37	103 58 6	0·7637	0·7767
28	– 31 22	104 3 9		
29	– 31 6	— 9 1	0·7630	0·7782
30	– 30 50	— 14 3		
31	– 30 32	— 19 5	0·7624	0·7796
Nov. 1	– 30 14	— 24 6		
2	– 29 55	— 29 7	0·7618	0·7810
3	– 29 36	— 34 7		
4	– 29 16	— 39 7	0·7612	0·7824
5	– 28 55	— 44 6		
6	– 28 34	— 49 5	0·7606	0·7838
7	– 28 12	— 54 3		
8	7 27 48	104 59 0	0·7600	0·7851

THE VARIABLE STAR U CEPHEI.—A minimum of this variable was observed by Mr. Knott at Cuckfield, on the evening of October 20. The time was 8h. 34m. G.M.T., and the star's magnitude was 9·2. The minimum fell an hour later than Schmidt's elements (*A. N.* 2382) would predict. The divergence of Mr. Knott's observations has increased to that amount from nine minutes in 1881; at the same time he doubts if a slight increase of the adopted period would of itself completely satisfy the observations, and perhaps the period may be subject to variation.

Reckoning from the minimum on October 20, and using Schmidt's mean period, the next few minima will fall thus:—

October 30, 7h. 52m. G.M.T. ... November 9, 7h. 11m.
November 4, 7h. 31m. G.M.T. ... November 14, 6h. 50m.

PHYSICAL NOTES

AT the British Association meeting a paper by Prof. J. A. Ewing was read, on the magnetic susceptibility and retentiveness of iron and steel. This paper was a preliminary notice of some results of an extended investigation which the author had been conducting for three years in Japan. Experiments with annealed rods and rings of soft iron wire showed that that material possesses the property of retentiveness in a very high degree. As much as 90 and even 93 per cent. of the induced magnetism survived the removal of the magnetising force. The extraordinary spectacle was presented of pieces of soft iron entirely free from magnetic influence nevertheless holding an amount of magnetism (per unit of volume) greatly exceeding what is ever held by permanent magnets of the best tempered steel. The magnetic character of the iron in this condition was, however, highly unstable. The application of a reverse magnetising force quickly caused demagnetisation, and the slightest mechanical disturbance had a similar effect. Gentle tapping removed the residual magnetism completely. Variations of temperature reduced it greatly, and so did any application of stress. On the other hand, the magnetism disappeared only very slowly, if at all, with the mere lapse of time. The residual magnetism in hardened iron and steel was much less than in soft annealed iron. The maximum ratio of intensity of magnetism to magnetising force during the magnetisation of soft iron was generally 200 or 300, and could be raised to the enormous figure of 1590 by tapping the iron while the magnetising force was being gradually applied. A number of absolute measurements were made of the energy expended in carrying iron and steel through cyclic changes of magnetisation; and the effects of stress on magnetic susceptibility and on existing magnetism were examined at great length. The whole subject was much complicated by the presence of the action which, in previous papers, the writer had named *Hysteresis*, the study of which, in reference both to magnetism and to thermoelectric quality, had formed a large part of his work.

M. P. TIHON has lately shown at the Industrial Science Society of Lyons a new semi-incandescent lamp, giving the brilliancy of an arc light. This is attained by having two carbon rods, slightly inclined to one another, brought down on to a small prism of chalk, and separated from one another by a small rod of the same material. The current passes through the chalk rod making it incandescent. By this means the light is rendered steadier than an arc light, and it is said to have the same brilliancy.

MR. FRANK GERALDY has published some interesting statistics comparing the cost of the electric light with gas, both as to its actual cost and its cost per candle power:—

Installation.	Electric light system.	No. of lamps.	Candle power of lamps.	Motor.	Total cost per hour gas.	Total cost per hour electric light.	Cost per candle power gas.	Cost per candle power electric light.
Salle de Télégraphistes at Brussels (Nord)	Jaspar	3	235	Gas	1·86	3·82	0·0265	0·0054
Halle aux marchandises, Lyons Station (Paris) ...	Lontin	18	64	Steam	6·825	6·625	0·0273	0·0054
Spinnery at Riverside (United States)	Brush	71	75	,,	36·80	11·68	0·0353	0·0022
Ducommun Establishment at Mulhouse	Serrin	4	110	,,	—	6·64	0·044	0·015
Passage in the Friedrichstrasse (Berlin)...	Siemens	10	50	Gas	9·14	6·45	0·040	0·013
Thames Embankment... ...	Jablochkoff	20	28	Steam	—	0·487	0·0150	0·018
Spinnery of E. Manchon (Rouen)	Sautter-Lemonnier	6	150	,,	9·550	7·387	0·0597	0·0082

This is only an extract from a longer list, but conclusively shows that in large instalments electric lighting is cheaper than gas on the total cost; whilst considered per candle power it is far away cheaper. An exception to the rule seems to occur in the first on the list; this is due to the smallness of the installation. In the case of the Thames Embankment the light is reduced by the use of ground glass globes. If we bear in mind the fact that the economy consists in having large installations, we shall be brought face to face with the fact that whereas gas is now made in as large quantities as is practicable, electricity has still to be brought to that state of economy. Thus we may still expect a greater economical advantage than is shown by the above figures.

M. J. JAMIN has a paper in the *Journal de Physique* on the "Critical Point of Liquefiable Gases," in which he discusses a new theory. He says: "I believe that gases are liquefiable a all temperatures when the pressure is sufficient." Describing Cagniard-Latour's experiment, he says: "According to known laws, the quantity of vapour above the liquid increases very rapidly, its density increasing at the same rate as its weight without known limit. Again, the remaining portion of the liquid expands at an increasing rate until it passes that of the gas (Thilorier); it is clear then, by the effect of these inverse variations, that at last a limiting temperature must be reached when the liquid and the vapour must have the same weight for the same volume. At this point they are inseparable; the vapour