placed in the same electrical circuit, whereas the experiments show that under certain conditions the quantity of hydrogen from the water vapour which collects at the kathode is five or six times as large as that which separates in the voltameter.

THE additions to the Zoological Society's Gardens during the past week include a Chacma Baboon (*Cynocephalus porcaricus*) from South Africa, presented by Captain R. Bolton; a Campbell's Monkey (*Cercopithecus campbelli*) from West Africa, presented by Mr. F. G. Lloyd; a Getulian Ground Squirrel (*Xerus getulus*) from Morocco, presented by Mr. Arthur Gill; a Cape Hyrax (*Hyrax capensis*) from South Africa, presented by Mr. A. C. Boddam Whetham; two Egyptian Jerboas (*Dipus oegyptius*) from North Africa, presented by Mr. G. Swales; a Spotted Eagle Owl (*Bubo maculosus*) from Africa, presented by Mr. C. H. Turner; a Horned Capuchin (*Cebus apella*), a Tayra (*Galictis barbara*) from South America, a Jelerang Squirrel (*Sciurus bicolor*), a Larger Racket-tailed Drongo (*Dissemurus paradisens*), two White-throated Ground Thrushes (*Geocichla cyanonotis*), an Indian Pitta (*Pitta brachyura*), an Indian Dial-bird (*Copsychus saularis*) from India, a Common Rat Kangaroo (*Potorus tridactylus*) from Australia, a Common Water-Buck (*Cobus ellipsiprymnus*) from South Africa, four Flat-backed Tortoises (*Testudo platynota*), a Phayre's Trionyx (*Trionyx phayrei*) from Burmah, two Eroded Cinixys (*Cinixys erosa*) from West Africa, two Bell's Cinixys (*Cinixys belliana*) from Tropical Africa, three Pennsylvanian Mud Terrapins (*Cinosternum pennsylvanicum*) from North America, deposited; an Amherst's Pheasant (*Thaumalea amherstiae*) from China, purchased.

OUR ASTRONOMICAL COLUMN.

COMET δ , 1902 (PERRINE).—The photograph of this comet which accompanies this note was secured by Dr. Isaac Roberts on the evening of October 10. It was taken with his 20-inch reflector and received less than one hour's exposure, namely, 52 minutes. A great amount of detail is shown on the original positive from which this reproduction has been made, and it

will be noticed that the comet has a multiple tail, two of comparatively large dimensions and several smaller streamers.

The rapidity with which the comet is travelling relatively to the stars can be gathered from the length of the star trails on the plate, the observer correcting the telescope for the comet's motion at short intervals.

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A BRIGHT METEOR.—Mr. W. Lascelles-Scott, of Little Ilford, Essex, states in the *Times* that at about 7.52 p.m. on October 15 he observed a bright meteor and noted the following particulars as to its path:—“General course and direction of the meteor, N.W. by N. towards S.W.; general angle of course to S.W. on horizontal plane, 30° ; general length of course to S.W. about 105° ; general shape of course, like an inclined and attenuated letter S; apparent diameter of meteor at maximum, about 1.25th of that of the moon, or 4:100; apparent brightness at maximum, about $\frac{1}{10}$ th that of the moon, or 12:100; colour variations, from faint yellow, through blue to purplish at finish; apparent duration, about 3.8 sec. (nearly 4 sec.); coruscation, faint tripartite at finish.”

OBSERVATIONS OF FIFTY-EIGHT LONG-PERIOD VARIABLES.—Part ii. of vol. xxvii. of the *Annals* of the Harvard College Observatory is devoted to the observations of fifty-eight long-period variables. The methods employed in making these observations were explained in part i. of this volume in reference to a similar research with regard to circumpolar long-period variables. Most of the stars are brighter than tenth magnitude, and these have been observed with the meridian photometer; those between the tenth and thirteenth magnitudes have been observed with the photometer attached to the 15-inch equatorial.

By taking a series of comparison stars in the immediate neighbourhood, observing their magnitudes in order of brightness and their differences in magnitude, and then plotting a smooth curve having for its abscissa these approximate brightnesses, and its ordinate the photometric magnitude, a very trustworthy value has been obtained for the magnitude of each variable.

A NEW ALGOL VARIABLE.—In No. 3820 of the *Astronomische Nachrichten*, Mr. A. Stanley Williams announces the discovery that the star E.D. + $41^\circ 504$ is a variable of the Algol type. The position of this star is R.A. = 2h. 30m. 50s., Dec. = $41^\circ 34' 3''$ (1855), and its normal magnitude 9.4. At minimum the star's brightness decreases to nearly twelfth magnitude.

Owing to the various observations being interrupted by clouds and by daylight, the instant of minimum has not been finally determined, but from the observations which have been made, the following elements and ephemeris have been found:—

Minimum of 14 1902 Persei = 1902 Sept. 16, 16h. 38m. G.M.T.
+ 3d. 1h. 21m. 32s. 23 E.
= J.D. 2416009.6934 + 3d. 056623 E.

Ephemeris for every fifth minimum.

E.	Date.	G.M.T.	E.	Date.	G.M.T.
		h. m.			h. m.
207 ...	1902 Oct. 17 ...	6 14 ..	247 ...	1903 Feb. 16 ..	12 35
212 ...	„ Nov. 1 ...	13 1 ...	252 ...	„ Mar. 3 ...	19 23
217 ...	„ „ 16 ...	19 49 ...	257 ...	„ „ 19 ...	2 11
222 ...	„ Dec. 2 ...	2 37 ...	262 ...	„ Apr. 3 ...	8 58
227 ...	„ „ 17 ...	9 25 ...	267 ...	„ „ 18 ...	15 46
232 ...	1903 Jan. 1 ...	16 12 ...	272 ...	„ May 3 ...	22 34
237 ...	„ „ 16 ...	23 0 ...	277 ...	„ „ 19 ...	5 21
242 ...	„ Feb. 1 ...	5 48			

NOTES ON THE RECENT ERUPTIONS OF MONT PELÉE.

Dominica, September 24.

August 17.—A steamer passing five miles to the west of Mont Pelée met a heavy ash cloud, which rendered the day as dark as night whilst the vessel passed through it. The deck was covered with ash.

August 18 and 19.—News reached here of further eruptions of Mont Pelée.

August 25.—Detonations heard during the day.

August 26.—Loud detonations and sounds like growlings were heard in the afternoon and evening. To the south-west of the island there were very heavy black ash clouds like a wall with a level top. The sun set behind this cloud as though a solid mass, all rays of light being cut off. During the whole day the upper atmosphere was charged with dust, but very little fell on this island.

August 28.—In the evening there was a magnificent display of lightning from Mont Pelée, and the sky in the direction of the volcano glowed with a pinkish light. At 11 p.m., lightning

shot out from the mountain in all directions, zigzagging and flickering flashes alternating with, or being accompanied by, reddish globes, which ascended and exploded, and shot out stars and long rays. Away towards the south-west was another large focus of electric energy, which appeared to me to have a distinct relation to the volcanic electric discharges from Mont Pelée. This spot was, I reckoned, at least forty miles from the volcano, from which it bore almost west two points north. This latter electrical display was similar, but less extensive than that from Mont Pelée, and it was accompanied by curious glowing globes, which burst and shot out tongues of lightning. The most curious part of the magnificent sight, however, was that occasionally long rays of light, very like to the rays of a search-light, shot out from the direction of Mont Pelée downwards to the secondary and distant electrical display, and on this broad ray reaching the western focus, the lightning there became more vivid, intense and extensive.

The West Indian volcanic explosions are undoubtedly due to the irruption of water into the reservoirs feeding the volcanoes. There are no large rivers or lakes that could supply water in sufficient quantity to produce the phenomena observed. Clearly, then, the sea has got in by some fissure or dislocation, and it has occurred to me that the electrical display to the west of Pelée observed on the night of August 28 was caused by a fissure in the sea bottom permitting an irruption of water into the reservoir from whence the volcano has obtained the material for its solid ejecta. Anyhow, the disastrous eruption of Pelée on the 30th—that is, two days afterwards—was accompanied by an enormous discharge of steam and hot water, much greater, indeed, than in the case in the earlier eruptions.

In the neighbourhood of the volcanoes there has been much alteration of the bottom of the Caribbean Sea. The cable-repairing ships report the depth in places to have increased by half a mile. On September 19, a telegram from the West Indian and Panama Telegraph Company stated that:—

“Unprecedented difficulties have been encountered in the endeavour to repair the interrupted cables between St. Lucia and St. Vincent and St. Lucia and Grenada. The cables appear to be buried under a layer of volcanic mud, and this, combined with the great depth of water, which can only be attributed to the alteration of the sea-bed due to the late eruptions, has rendered it difficult to raise the cable to the surface in consequence of the enormous strain. The repair of the St. Lucia—St. Vincent section, which was effected on the 16th instant after several weeks' operation, has been a very costly one, necessitating an expenditure of over thirty miles of new cable, and the fresh interruption which occurred in this section during the night of the 17th is in this new cable put down only the day before, and was evidently caused by some submarine disturbance.”

Since the loss of the *Grappler* during the destruction of St. Pierre, no attempt has been made to repair the cable between Dominica and Martinique, so there is no recent authentic information concerning the disturbance of the sea bottom near to Mont Pelée; but Captain McKay, the Superintendent of the Quebec Steam Ship Co., who went south in the s.s. *Korona* on August 29, reported that “the sea between Dominica and Martinique was of a light green colour, which makes one think there was shoal water.” This colour was due, doubtless, to the suspended ash which has fallen into this portion of the sea in enormous quantities from time to time, and it is to be expected that there has been a subsidence instead of an upheaval of the sea bottom to the west of Martinique.

August 30.—There were detonations in the afternoon, with slight vibrations of the earth; and at 7 p.m. there were exceedingly loud detonations and growlings, which continued at intervals until 2 a.m. on August 31. Volcanic ash began to fall at 5.30 p.m., and, as the night wore on, the fall was so great that the darkness became intense. The ash came from the east, so that evidently it was shot high into the upper strata of the atmosphere and carried to the north-east before it began to fall into the lower regions swept by the “trades.” Later on, news came that the fall of ash in Guadeloupe was very heavy. In Montserrat the fall was lighter, and in Antigua it was lighter still.

August 31.—The fall of ash in Roseau (at the south-western end of the island) covered the surface to the depth of a quarter of an inch; the dust penetrated everywhere, closed drawers and presses being insufficient to keep out the finer particles.

September 1.—The atmosphere is still dust-laden, and the sun

was obscured all day; it could be seen only towards the evening, when it set like a dull greenish disc. In the afternoon heavy ash clouds were drifting to the west through the Martinique Channel.

September 2.—Mr. A. Robinson, the Government Officer at the eastern side of the island, reports to me that the ash fell there on the night of August 30 to the depth of from an inch to two inches, that small trees and branches of large ones were broken down by the weight of the dust, which clung tenaciously to the leaves, branches and stems, and that the cattle were suffering from hunger, as the grass was covered and grazing was impossible.

September 3.—The mail steamer came in to-day from the south, and brought some refugees from Morne Rouge, which was destroyed by the eruption of Mont Pelée on the night of August 30. There was a French priest on board who was an eye-witness of the disaster. The following statement he made was kindly written down for me by Mr. C. A. Seignoret, the Quarantine Officer:—

“The phenomena were entirely new, and hot water and red-hot dust were the principal elements of destruction amongst the inhabitants of Morne Rouge and Carbet. Several houses were completely destroyed, while others sustained no damage.”

Mr. Seignoret has also kindly interviewed one of the intelligent refugees for me, and he has furnished me with the following statement made by her:—

“Miss Carra, a respectable resident at Morne Rouge, who was an eye-witness to the eruption of Mont Pelée which occurred on August 30 last, informed me that rumbling noises were heard from the crater all day, with detonations and frequent flashes of electricity, and towards evening the mountain appeared to be a mass of flame, emitting alternately jets of hot water and red-hot ashes, which ascended into the air in the form of rockets, and as the ashes fell upon the wooden housetops, the buildings at once caught fire. A great many lives were destroyed by hot ashes and water, for numbers of persons rushed from their houses into the streets to escape from the flames, and as the ashes fell upon their faces and other exposed portions of their bodies, the skin at once became red as scarlet and peeled off, causing the parts to swell to an enormous size. In most cases, portions of the legs, arms and chest were burnt, while the clothes were intact. White persons got completely charred in the face, causing them to appear like coal-black negroes. Some of the gendarmes were found dead in fixed positions with their clothing quite sound, while others were burnt in various parts of their bodies. Water! Water! was the only cry from the wounded and dying, and in many instances death ensued immediately after their thirst was quenched.”

This interesting account indicates that there was an ejection of much larger quantities of steam and hot water than occurred in the earlier eruptions. Persons who shut themselves close in their houses were nearly all saved, the hot blast passing quickly, but from other accounts I have received it appears that the heat was fearful for a brief period and that the rapid evaporation of moisture from the tissues caused a thirst that was agonising until assuaged.

About 1500 persons were killed and, according to the statements of *L'Opinion* of Fort-de-France, a greater number have suffered injuries.

H. A. ALFORD NICHOLLS.

ASTRONOMY AND COSMICAL PHYSICS AT THE BRITISH ASSOCIATION.

AT the Bradford meeting, in 1900, a department of astronomy was established as a subsection of Section A, in deference to a wish that had been expressed that astronomy should be better represented at the British Association. After two years' experience, it was felt that the astronomical papers that were received were scarcely enough to justify this division of Section A, and this year the subsection was strengthened by the addition of cosmical physics. On the Friday the whole section was given up to cosmical physics; on the Monday and Tuesday the subsection met separately. On all three days the room was well filled, and it was apparent that the enlarged subsection was in some ways a success. But towards the end of the meeting there was a strong expression of opinion that it is not to the advantage of the section as a whole that it should be so much subdivided, and the whole matter will have to be carefully considered before next year. Perhaps a solution of the difficulty