

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mrs. Florence A. Hill; a Common Rhea (*Rhea americana*) from Uruguay, presented by Mr. F. R. S. Balfour; a Common Kestrel (*Tinnunculus alaudarius*), British, presented by Mr. A. Lidbury; a Wood Owl (*Syrnium aluco*), British, presented by Mrs. W. Duncan; two Horned Lizards (*Phrynosoma cornutum*) from Texas, presented by Mr. John G. Witte; two Marbled Newts (*Triton marmorata*) from France, presented by Mr. G. H. King; two Viverrine Cats (*Felis viverrina*), an Indian Otter (*Lutra nair*), an Indian Darter (*Plotus melanogaster*), a Hamilton's Terrapin (*Clemmys hamiltoni*), three Indian Gazelles (*Gazella bennetti*) from India, deposited; two Natterjack Toads (*Bufo calamita*), four Marbled Newts (*Triton marmorata*), four Short-nosed Sea Horses (*Hippocampus anti-quorum*), from France, purchased; a Black Wolf (*Canis niger*) from India, received in exchange; an Eland (*Oreas canna* ♀), born in the Gardens.

OUR ASTRONOMICAL COLUMN

D'ARREST'S COMET.—Although M. Leveau's elements of this comet for the approaching return to perihelion were communicated to the Academy of Sciences of Paris on January 22, they were unaccompanied by predicted places, and it would appear that the ephemeris has had only a very limited circulation, being confined, if we are rightly informed, to those observers who are in possession of the larger instruments. Hence comparatively few persons may have become acquainted with the circumstances under which this return of the comet to perihelion takes place, and it may not be without interest if we briefly examine the conditions as compared with those of former appearances.

Assuming as usual the intensity of the comet's light (I) to be represented by the reciprocal of the product of the squares of the distances from the earth and sun, we find the following values:—

	I.
1851. Last observation at Berlin, Oct. 6	0.590
1858. Last observation at the Cape, Jan. 18	0.151
1870. Last observation at Athens, Dec. 20	0.154
1877. Last observation at Athens, Sept. 10	0.127

The greatest distance from the earth at any of these dates was 1.93 on January 18, 1858.

M. Leveau's elements for the approaching return apply to 1883, June 12.0 M.T. at Paris; neglecting, of course, the small effect of perturbation in the interval, the perihelion passage is found to take place 1884, January 13.5765 M.T. at Greenwich. The coordinate constants for apparent equinox of 1883, May 1, are:—

$$x = r. [9.99502] \sin (v + 50 \text{ } 13' 7).$$

$$y = r. [9.99308] \sin (v + 321 \text{ } 48' 0).$$

$$z = r. [9.36631] \sin (v + 280 \text{ } 38' 1).$$

Hence we have the following approximate positions and distances of the comet, with the corresponding values of the theoretical intensity of light, taking dates near the time of new moon:—

12h. G.M.T.	R.A.		Decl.	Distance from		I.
	h.	m.		Earth.	Sun.	
June 6 ...	13	9.6	+12 48	2.037	2.615	0.035
July 4 ...	13	13.7	+10 12	2.185	2.415	0.036
Aug. 2 ...	13	37.0	+ 5 42	2.321	2.204	0.038
Nov. 29 ...	17	58.6	- 16 55	2.281	1.427	0.094
Dec. 29 ...	19	45.7	- 18 8	2.244	1.338	0.111

When it will be seen that even when most favourably circumstanced, towards the end of the year, the intensity of light will be less than the lowest value at which the comet has hitherto been observed, viz. 0.127. On November 29 the comet sets about 2h. 8m. after the sun. It was missed at the return in 1864, and the chances of observation at its present visit are by no means encouraging.

Mr. Common informs us that he has made a thorough search or the comet with his large reflector, but without success up to May 7. He remarks that the number of faint nebulae about its track is surprising.

The orbit of this comet almost intersects that of the lost comet of De Vico, 1844; in heliocentric longitude 339° 37', with the elements of 1851, the distance between the orbits was only 0.0055 or 507,000 miles.

TEMPEL'S COMET, 1873 II.—The corrected elements of this body by M. Schulhof, from observations at its last appearance in 1878, indicate that, neglecting perturbations, it may be again in perihelion about November 20. The positions calculated on this assumption show that the comet will be very unfavourably placed for observation, and it may escape detection at this return.

RULES AND REGULATIONS FOR THE PREVENTION OF FIRE RISKS ARISING FROM ELECTRIC LIGHTING¹

THESE rules and regulations are drawn up for the reduction to a minimum, in the case of electric lighting, of those risks of fire which are inherent in every system of artificial illumination, and also for the guidance and instruction of those who have, or who contemplate having, electric lighting apparatus installed on their premises.

The difficulties that beset the electrical engineer are chiefly internal and invisible, and they can only be effectually guarded against by "testing," or probing with electric currents. They depend chiefly on leakage, undue resistance in the conductor, and bad joints, which lead to waste of energy and the dangerous production of heat. These defects can only be detected by measuring, by means of special apparatus, the currents that are either ordinarily or for the purpose of testing, passed through the circuit. Should wires become perceptibly warmed by the ordinary current, it is an indication that they are too small for the work they have to do, and that they should be replaced by larger wires. Bare or exposed conductors should always be within visual inspection and as far out of reach as possible, since the accidental falling on to, or the thoughtless placing of other conducting bodies upon such conductors, would lead to "short circuiting," and the consequent sudden generation of heat due to an increased current in conductors not adapted to carry it with safety.

The necessity cannot be too strongly urged for guarding against the presence of moisture and the use of "earth" as part of the circuit. Moisture leads to loss of current and to the destruction of the conductor by electrolytic corrosion, and the injudicious use of "earth" as a part of the circuit tends to magnify every other source of difficulty and danger.

The chief dangers of every new application of electricity arise from ignorance and inexperience on the part of those who supply and fit up the requisite plant.

The greatest element of safety is therefore the employment of skilled and experienced electricians to supervise the work.

I. THE DYNAMO MACHINE

1. The dynamo machine should be fixed in a dry place.
2. It should not be exposed to dust or flyings.
3. It should be kept perfectly clean and its bearings well oiled.
4. The insulation of its coils and conductors should be practically perfect.
5. All conductors in the dynamo room should be firmly supported, well insulated, conveniently arranged for inspection, and marked or numbered.

II. THE WIRES

6. Every switch or commutator used for turning the current on or off should be constructed so that when it is moved and left it cannot permit of a permanent arc or of heating.
7. Every part of the circuit should be so determined, that the gauge of wire to be used is properly proportioned to the currents it will have to carry, and all junctions with a smaller conductor should be fitted with a suitable safety fuse or protector, so that

¹ Recommended by the Council of the Society of Telegraph Engineers and of Electricians in accordance with the Report of the Committee appointed by them on May 11, 1882, to consider the subject. Members of the Committee:—Prof. W. G. Adams, F.R.S., Sir Charles T. Bright, T. Russell Crompton, R. E. Crompton, W. Crookes, F.R.S., Warren De La Rue, D.C.L., F.R.S., Prof. G. C. Foster, F.R.S., Edward Graves, J. E. H. Gordon, Dr. J. Hopkinson, F.R.S., Prof. D. E. Hughes, F.R.S., W. H. Preece, F.R.S., Alexander Siemens, C. E. Spagnoletti, James N. Shoolbred, Augustus Stroh, Sir William Thomson, F.R.S., Lieut.-Col. C. E. Webber, R.E.