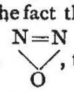
refraction, calculated from the mean of all these determinations, is 2·21. As the simplest type of nitrogen compound ammonia gas is next considered, in which the three affinities of the nitrogen are attached by single linkage to the three hydrogen atoms. The molecular refraction of ammonia calculated from its refractive index is 5·65. Now, if it is admitted that the hydrogen in this simple compound possesses the same atomic refraction (1·05 for sodium light) as in the free state and in other ordinary combinations, an admission in support of which Prof. Brühl has previously adduced a considerable amount of experimental evidence, then the atomic refraction of the nitrogen in ammonia is 2·50. The compounds of nitrogen with oxygen are next discussed. The atomic refraction of oxygen for sodium light is 2·05, the molecular refraction of the free gas O_2 being 4·09. If one calculates the molecular refraction of nitric oxide, NO, by adding together the atomic refractions of the gaseous elements 2·21 and 2·05, the number 4·26 is obtained. It is interesting to find that the molecular refraction of nitric oxide, calculated from the values obtained experimentally by Dulong and by Mascart for the refractive index of the gas, is very nearly the same, 4·47. Hence in nitric oxide both elements retain about the same refractive power as in the free state. The case of nitrous oxide, N_2O, however, is quite different and leads to an interesting conclusion. Its molecular refraction calculated from the observed refractive index of the gas is 7·58. The value, however, obtained by summation of the values of its components, 2 × 2·21 and 2·05, is only 6·47. The very considerable increase of 1·11 is due to the fact that we are here dealing with a case of double linkage, , the two nitrogen atoms being mutually attached by two of their affinities. Indeed the increase is probably more than this, for the atomic refraction of oxygen in organic compounds of this type has been found by Prof. Brühl to be less than the value above ascribed to it. The atomic refraction of the nitrogen in N_2O is therefore at least 2·77. It is thus found that nitrogen as singly linked in ammonia possesses an atomic refraction of 2·50, when doubly linked, as in nitrous oxide, 2·77, and when trebly linked, as it probably is in the free gas, 2·21. The value therefore increases with double linkage, but curiously enough diminishes again with treble linkage, unlike that of carbon, which still further increases with treble linkage, and showing that there is some very essential difference between the nature of the two elements. Prof. Brühl concludes his interesting paper by discussing the various values of nitrogen when combined with carbon. When it is attached with only one of its valencies to a carbon atom, as in the tertiary amines, its atomic refraction is found to be 2·90, a very high value, higher than that of the diazo nitrogen in nitrous oxide. When doubly linked to carbon, C : N, as in the oxims, there is a much larger increase still, the exact amount of which Prof. Brühl prefers to state after carrying out further determinations on a larger number of compounds. In case of cyanogen gas, N ⋮ C · C ⋮ N, where triple linkage of nitrogen occurs, there is also a very considerable increment (1·52) in refraction. In the case of hydrocyanic acid, however, the molecular refraction corresponds almost exactly with that calculated from the empirical formula HCN, showing that the cyanogen in this compound and in cyanogen gas are quite different in molecular structure, a point which Prof. Brühl hopes further to elucidate by observations of the refraction of the nitriles and other allied organic nitrogen compounds.

Erratum.—In our chemical note of last week (p. 39) $SObl_2$ and Hbl should read $SOCl_2$ and HCl.

NOTES from the Marine Biological Station, Plymouth.—Last week's captures include the Anthozoa *Gorgonia verrucosa* and *Caryophyllia Smithii*, the Nemertine *Drepanophorus rubrostriatus*, the Mollusca *Sepia rupellaria* (= *biserialis*), *Galvina tricolor* and *Antiopa cristata*, and the Ascidians *Corella larvæformis* and *Fragarium elegans*. Several swarms of the medusa *Obelia lucifera*, full-grown and mature, were taken in the townets during the latter half of the week. Polychæte larvæ, so abundant earlier in the year, are now very scarce. Zoææ of *Porcellana*, on the other hand, have increased in numbers, and every townetting contains a variety of Decapod larvæ in different stages of development. The Hydroids *Eudendrium capillare* and *Antennularia antennina*, and the Polychæte *Sabellaria spinulosa* are now breeding.

THE additions to the Zoological Society's Gardens during the past week include two Red-winged Parrakeets (*Aprosmictus erythropterus*, ♀ ♀) from Australia, presented by Mr. H. Goodchild; two Ravens (*Corvus corax*) British, presented by Mr. Philip A. Wilkins; a Ducorp's Cockatoo (*Cacatua ducorpsi*) from the Solomon Islands, presented by Mr. R. Armitage; a Changeable Lizard (*Calotes versicolor*) from Ceylon, presented by Mr. H. L. Gibbs; a Vervet Monkey (*Cercopithecus lalandii*) from South Africa, a Common Peafowl (*Pavo cristatus*, ♂) from India, deposited; a Yellow-cheeked Lemur (*Lemur xanthomystox*) from Madagascar, eleven Green Lizards (*Lacerta viridis*) South European, purchased; a Senegal Touracon (*Corythaix persa*) from West Africa, received in exchange; a Japanese Deer (*Cervus sika*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE GREATEST BRILLIANCY OF VENUS.—Dr. G. Müller, whose work on the brightness of the major and some of the minor planets we referred to in this column two weeks ago (p. 15) contributes to *Astronomischen Nachrichten*, No. 3162, some interesting results with reference to the greatest brilliancy of Venus. That this planet does not appear brightest at the time of conjunction, but some days before or after, has been shown by the work of Halley, Lambert, &c., and the values, as obtained from their formulæ, are:—

Formula used.	The greatest brilliancy occurs at Angle of phase.	Elongation.	No. of days before or after inf. conj.	Greatest brilliancy.
	° ′	° ′		
Halley	117 56	39 43	36	4·263
Lambert	103 46	44 38	51	2·126
Bremiker	115 15	40 52	39	2·772
Seeliger	116 0	40 33	38	3·018

Referring to the curves of the observed and computed brightnesses, as here set forward by Dr. Müller, several important points may be noticed. In the former the maximum brightness takes place at a phase angle of 119°, decreasing very gradually to 140°, and after that more rapidly. At the maximum the curve is moderately flat, only a very small variation being noticed between position angle 100° and 140°, a period of 36 days.

Dr. Müller remarks that the statements of epochs given in the astronomical ephemerides have no practical interest. As an example showing the deviations of the values therein stated from those computed by his formula he works out the next epoch of the greatest brilliancy of Venus, which will be in inferior conjunction on February 15, 1894. The values for the brightness and the corresponding times result as follows:—

Jan. 9	oh. G.M.T.		$h = -4·3776$
10	,,	,,	$-4·3798$
11	,,	,,	$-4·3809$
12	,,	,,	$-4·3809$
13	,,	,,	$-4·3802$
14	,,	,,	$-4·3782$

which give for the epoch of greatest brilliancy January 11, 15h. M.T.G. The times of epoch, as given by the ephemerides, are:—

Berliner Ast. Jahrbuch	Jan. 8	16h. M.T.G.
Nautical Almanac	11	2h. ,,
Connaissance des Temps	12	1h. ,,

FINLAY'S PERIODIC COMET.—This comet, which was discovered by Finlay in 1886, is one, if not the only one, of the