A SECOND edition of Prof. Tait's "Light" (A. and C. Black) has been issued. The author says that in revising the work he has made use of various notes jotted down from time to time on his own copy, mainly as the result of questions asked, or of difficulties pointed out, by students who were reading the book with care. Suggestions of this kind he has found to be almost always of value, as they tend to make the book better suited to the wants of the class of readers for whom in particular it was designed.

PERSONS interested in ferneries and aquaria will find much to attract them in a little volume entitled "Ferneries and Aquaria: a Complete Guide to their Formation, Construction, and Management," by George Eggett, Sen. This is one of a series of "practical guide-books" issued by Messrs. Dean and Son.

THE third volume (new series) of the *Reliquary* (Bemrose and Sons) has been issued. It opens with an interesting illustrated article on two Assyro-Phœnician shields from Crete, by the Rev. Joseph Hirst. Mr. John Ward contributes three illustrated papers of scientific value—on Rains Cave, Longcliffe, Derbyshire; on relics of the Roman occupation, Little Chester, Derby; and on recent diggings at Harborough Rocks, Derbyshire.

MESSRS. DULAU AND CO. have sent us a "Catalogue of Zoological and Palæontological Works." It includes works on Reptilia and Amphibia, and on Pisces.

THE atomic weight of palladium has been redetermined by Dr. E. H. Keiser (*Amer. Chem. Journ.*). Among all the atomic weights at present adopted by chemists, that of palladium has been one of the most imperfectly determined, for the discrepancy between the results of the various previous investigations is most unsatisfactory. In 1826, Berzelius obtained the value 113·63 from a consideration of the proportion in which palladium combines with sulphur. Two years later, the same distinguished chemist derived a much lower value from analyses of potassium palladious chloride, $2KCl . PdCl_2$; known quantities of this salt were heated in a current of hydrogen, and the residuary potassium chloride and reduced palladium weighed. Recalculated by Profs. Meyer and Seubert, utilizing all the refined corrections of the present day, these analyses yield the value 106·2—a number which is almost identical with the atomic weight obtained by Dr. Keiser. In 1847, however, Quintus Icilius also investigated the subject, and, from determinations of the loss in weight which potassium palladious chloride undergoes when heated in a current of hydrogen, obtained the value 111·88. No other determinations having since been attempted, and the number 112 or 113 being certainly too high from considerations of the position of palladium among the metals, the number 106·2 obtained from Berzelius's second analysis recalculated by Meyer and Seubert has been universally adopted. To place the subject out of all doubt, Dr. Keiser has re-examined it from a totally different standpoint. The double chlorides of palladium and the alkalies, such as $2KCl . PdCl_2$ and $2NH_4Cl . PdCl_2$, are found to be unsuitable for atomic weight determinations; they retain water of decrepitation with great tenacity, and, after drying, are too hygroscopic for accurate weighing. On the other hand, the yellow crystalline salt, palladammonium chloride, $Pd(NH_3)_2Cl_2$, is a much more suitable substance. It is eminently stable, can be obtained in a state of practically perfect purity, contains no water of crystallization, does not retain water after drying in a desiccator, and the dried salt is not hygroscopic. Weighed quantities of it contained in a platinum boat were introduced into a combustion tube and heated in a stream of pure hydrogen. The hydrogen was rapidly absorbed, changing the bright yellow colour into black, metallic palladium and ammonium chloride being formed. The absorption of hydrogen occurred so readily that it was only necessary to warm one end of the boat when the heat of the reaction was found sufficient to complete the reduction of the whole. $Pd(NH_3)_2Cl_2 + H_2 = Pd + 2NH_4Cl$. Af er raising the temperature so as to volatilize the ammonium chloride, the finely divided palladium adhered together in the form of a porous bar having the shape of the boat. It was allowed to cool before weighing until just below a red heat in the current of hydrogen so as to prevent oxidation, and afterwards the hydrogen was displaced by dry air to prevent its occlusion. Two series of determinations were made, the salt for the second series being prepared from the reduced palladium of the first. The mean of eleven experiments in the first series gave the number 106·352, and of eight in the second series 106·350. The maximum value obtained was 106·459, and the minimum 106·286. The mean result 106·35 practically confirms that obtained by recalculating the results of Berzelius's second analyses.

IN our note in these columns three weeks ago (vol. xl. p. 655), upon pinol, the new isomer of camphor, it was pointed out that the nitrosochloride of pinol forms with β-naphthylamine an interesting base, $C_{20}H_{24}N_2O_2$, isomeric with quinine. This base, however, is not the first isomer of quinine which has been prepared, for an artificially prepared base of the same empirical formula was described by Dr. Kohn, of University College, Liverpool, in the Journal of the Chemical Society for 1886, p. 500.

THE additions to the Zoological Society's Gardens during the past week include three Rhesus Monkeys (*Macacus rhesus* ♂ ♂ ♂) from India, presented respectively by Colonel Cuthbert Larking, Mr. James T. Wilson, and Mrs. Charles Sainsbury; a Hairy-rumped Agouti (*Dasyprocta prymnolopha*) from Guiana, presented by Mr. Henry E. Blandford; a Common Polecat (*Mustela putorius*) from Norfolk, presented by the Earl of Romney; a Northern Mocking Bird (*Mimus polyglottis*) from North America, presented by Miss E. Breton; two White Pelicans (*Pelecanus onocrotalus*), a Crested Pelican (*Pelecanus crispus*) from Roumania, a Common Boa (*Boa constrictor*), a Neck-marked Snake (*Geoptyas collaris*) from Panama, a Mocassin Snake (*Tropidonotus fasciatus*) from North America, deposited; two Common Siskins (*Chrysomitris spinus*), two Twites (*Linota flavirostris*), two Lesser Redpoles (*Linota rufescens*), four Snow Buntings (*Plectrophanes nivalis*), two Knots (*Tringa canutus*), a Bar-tailed Godwit (*Limosa lapponica*), British, a Rosy-billed Duck (*Metopiana peposaca* ♂) from South America, purchased.

OUR ASTRONOMICAL COLUMN.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at 10 p.m. at Greenwich, November 14 = 1h. 36m. 45s.

	Name.	Mag.	Colour.	R.A. 1890.	Decl. 1890.
				h. m. s.	° ′
(1)	G. C. 385	—	—	1 35 30	+50 50
	G. C. 386	—	—	1 36 29	+50 51·5
(2)	57 Ceti	6	Yellowish-red.	1 54 36	−21 16
(3)	ζ Ceti	3	Yellow.	1 45 32	−10 55
(4)	δ Cassiopeiæ ...	3	Bluish-white.	1 18 36	+59 40
(5)	7 Schj.	7·0	Reddish-yellow.	1 10 5	+25 11
(6)	R Pegasi	Var.	Red.	23 1 7	+ 9 57
(7)	V Tauri	Var.	Reddish.	4 45 50	+17 21

Remarks.

(1) This is one of Herschel's double nebulæ. Dr. Huggins notes that both components give a gaseous spectrum, but could only be certain of the presence of the chief nebula line near 500, although 495 was strongly suspected. He notes, also, that there

is a faint continuous spectrum at the preceding edge of No. 386. The point chiefly requiring attention at present is the character of the line near 500. Many recorded observations describe this line as having a fringe of light on the more refrangible side, whilst others state that it is perfectly sharp on both edges. Low dispersion only should be employed in making this observation. The observation of continuous spectrum in a special part of the nebula 386 is also worthy of attention; the spectrum should be examined for maxima of brightness, as in the case of the nebula in Andromeda.

(2) Dunér records this as a star of Group II. (see below), but states that the spectrum is very feebly developed. The star is probably, therefore, either just condensing into a fully-developed star of Group II., or is just passing into Group III. If the former, there will practically be nothing but very narrow bands, and if the latter, absorption *lines* will accompany the bands. In the earlier stages of this group, the bands in the blue are strongest, whilst in the later stages red bands are strongest, and this point should also receive attention. As a check, the colour of the star should be noted at the time of observation.

(3) This star belongs to either Group III. or to Group V., and the criteria (see p. 20) should be observed in order to determine which.

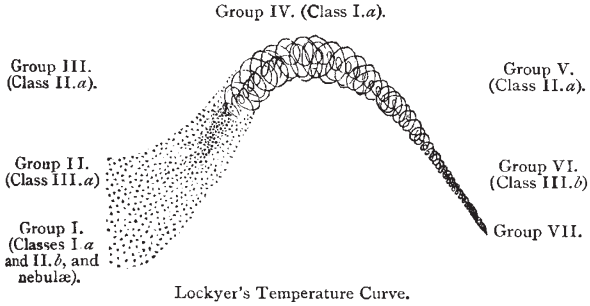
(4) According to Vogel, the spectrum of this star is of the same type as α Lyræ, *i.e.* Group IV. The relative intensities of the metallic lines and those of hydrogen, which vary from star to star, should be noted for future classification of the stars of this group according to temperature.

(5) This is a star of Group VI. Dunér describes the spectrum as consisting of four zones, the zones being the bright spaces between the dark carbon flutings. The presence of slight traces of carbon absorption in the solar spectrum indicates that stars of this group only differ in temperature from stars like the sun. The passage from one group to the other will probably be found to be very gradual, and the widths of the carbon flutings and the presence or absence of other absorptions should therefore be noted.

(6) Period given by Gore as 382 days, and magnitude at maximum (November 13) as 6·9–7·7. The spectrum has not yet been recorded, and the present maximum may, therefore, conveniently be taken advantage of.

(7) Period given by Gore as 168 days, and magnitude at maximum (November 15) as 8·3–9. Spectrum not yet recorded.

Note.—Lockyer's classification will, in future, be exclusively used, so that there will be no necessity for a double reference. The relation of this to Vogel's classification is shown in the following diagram:—



Lockyer's Temperature Curve.

The temperature increases from Group I. to Group IV., and then decreases to Group V. On the ascending side of the "temperature curve" we have probably to deal with condensing meteoritic swarms; and, on the descending side, with gradually condensing masses of meteoritic vapours.

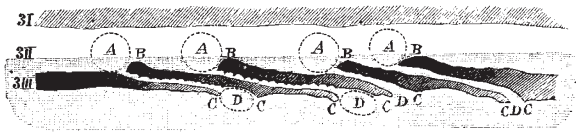
A. FOWLER.

LARGE-SCALE CHARTS OF THE CONSTELLATIONS.—Mr. Arthur Cottam has projected a series of thirty-six most excellent charts of the constellations from the North Pole to between 35° and 40° of south declination, and showing stars in half magnitudes down to 6½ by disks of various sizes. Although the primary object in constructing these charts was to make them companions to Webb's "Celestial Objects for Common Telescopes" and Smyth's "Cycle of Celestial Objects," their scope has been considerably enlarged, and a number of double, multiple, and variable stars have been laid down which are not included in either of the above-mentioned works. The Earl of Crawford's (Dun Echt) summary of F. G. W. Struve's Dorpat Catalogue included 2248 double and multiple stars, and of them, 2130 are shown upon these charts. In addition to this, 275 of the double stars discovered by Mr. S. W. Burnham have been mapped, this being the whole of those included in his first four catalogues, and a selection from his other catalogues. The maps have been drawn to a scale of one-third of an inch to a degree, which is a much larger scale than any hitherto published, and as each map includes but a small portion of the heavens, there is practically no distortion, whilst the epoch being 1890, the positions will hold good, without any serious errors, for fifteen or twenty years beyond that date. The projection is conical, or, in those charts which extend any distance both north and south of the equator, cylindrical. Hence it will be easy to lay down any additional objects that may be required. There is no doubt that these charts will be eminently useful, one of their great advantages being that they will enable possessors of telescopes mounted on altazimuth stands or without circles to find with ease a large number of interesting objects, and thus will help to extend the knowledge of the heavenly bodies and to popularize the most fascinating of sciences. We may say that the publisher of these charts is Edward Stanford, Cockspur Street, S.W., and that the first issue is limited to 200 sets, many of which have been already subscribed for.

BARNARD'S COMET, II. 1889, MARCH 31.—The following ephemeris is given in *Astronomische Nachrichten*, No. 2931:—

1889.	R.A. h. m. s.	Decl. ° ′	1889.	R.A. h. m. s.	Decl. ° ′
Nov. 6	1 8 54	−16 30·2	Nov. 22	0 28 2	−17 25·4
7	5 49	−16 37·2	23	26 3	−17 25·7
8	2 49	−16 43·6	24	24 8	−17 25·6
9	0 59 53	−16 49·5	25	22 17	−17 25·2
10	57 1	−16 54·9	26	20 29	−17 24·7
11	54 13	−16 59·8	27	18 45	−17 23·9
12	51 29	−17 4·1	28	17 5	−17 22·8
13	48 50	−17 8·1	29	15 28	−17 21·6
14	46 15	−17 11·6	30	13 55	−17 20·0
15	43 44	−17 14·8	Dec. 1	12 25	−17 18·3
16	41 17	−17 17·4	2	10 58	−17 16·3
17	38 55	−17 19·7	3	9 34	−17 14·3
18	36 36	−17 21·5	4	8 13	−17 12·0
19	34 21	−17 22·9	5	6 56	−17 9·7
20	32 11	−17 24·0	6	5 41	−17 7·1
21	30 5	−17 24·9	7	4 29	−17 4·4
22	28 2	−17 25·4	8	3 20	−17 1·5

THE STRUCTURE OF JUPITER'S BELT 3, III.—This dark band appears under ordinary conditions to be made up of two parallel bands, but Dr. Terby (*Astronomische Nachrichten*, No. 2928) says this appearance of parallelism is the result of the special structure represented in the accompanying figure, and



Structure of Jupiter.

that, therefore, the band 3, III., is composed of a lot of dark bands inclined in the same direction. The circular parts A are distinguished by Dr. Terby as emitting a sort of diffused light of an entirely different character from the white equatorial spots, properly so called; these luminous balls seem always to occur at the interval between two of the inclined bands, and touching what is generally their darkest part, B. The brilliant white spots D also appear at the dissolution of two successive bands, and occupy by preference their northern extremities. When the definition was very good, Dr. Terby observed that the interval between two of these fragmentary bands had the appearance of a series of globules, as shown in the figure. The structure appears so general and regular that it may be the means of adding considerably to our knowledge of the physical constitution of this planet.

GEOGRAPHICAL NOTES.

AT the first meeting of the session of the Royal Geographical Society, the paper was on Cyprus, by Lieut.-General Sir Robert Biddulph, G.C.M.G., C.B. The island of Cyprus is the third largest in the Mediterranean, being inferior in size only to Sicily and Sardinia. Its area is 3584 square miles. Its principal