

temperature the warm summers are often followed by the mildest winters, during the great periods of relative warmth, and that during the cold periods, the severest winters often occur after cool summers. As it seems probable that the same rule will hold good in the future, as obtained in the past, it may be expected that the next great period of relative warmth, which should begin about the end of the present century, will be marked by a series of warm summers, with occasional very mild winters, in Western Europe.

WE have received the *Sitzungsberichte der K. Academie d. Wissenschaften* (Band. cv.), containing papers read before the Vienna Academy of Sciences in 1896. Among the numerous papers printed in the various parts into which the volume is divided, according to the sections before which they were read, we notice the following:—The secular acceleration of the moon, by the late Dr. E. v. Haerdtl; a discussion of observations of two large meteors seen on January 16 and 25, 1895, and an estimation of their paths, by Prof. G. v. Niessl; the influence of selective absorption on the extinction of light in the atmosphere, by Prof. J. v. Hepperger; the deflection of kathode rays, by G. Jaumann; the ultra-violet spark-spectra of metallic elements, by Prof. Franz Exner and E. Haschek. The results now described and illustrated by heliogravure reproductions of photographs are in continuation of those given in the preceding volume. The lines investigated are comprised between about $\lambda = 2200$ and $\lambda = 4600$. Further studies of projectiles, by Dr. Ludwig Mach. This paper is illustrated with several fine reproductions of photographs of moving bullets. On the indispensability of atomism in science, by Prof. Ludwig Boltzmann; magnetisation in two dimensions and hysteresis in a rotating field, by Prof. August Grau and Dr. Richard Hiecke; on the deviation of saturated water-vapour from the Mariott-Gay-Lussac law, by O. Tumlirz; on the effect of low temperatures (down to 0° C.) upon the transpiration of plants, by Hans. Molisch; on the scaling of the reproduced tail in lizards, by Dr. Franz Werner; geo-morphological observations in Norway, by Dr. Eduard Richter; morphological and biological investigations of lichens, by H. Zukal; physical-oceanic investigations in the Red Sea, by Prof. J. Luksch; remarks upon some problematic fossil structures, by Theodor Fuchs; new fossil plants in the Radoboj collection of the Liège University, by Prof. C. v. Ettingshausen; geological exploration of North Greece, by V. Hilber; zoological results of the expedition of the *Pola* to the northern part of the Red Sea, by Dr. F. Steindachner; on the blood corpuscles of vertebrates, by P. Knoll; the absorption of bacteria after local infection, by Dr. J. Halban; on the comparative anatomy of the larynx of mammals, by Dr. H. Albrecht; synthetic investigations of topaz, by A. Reich; on the occurrence of argon in the gases from a spring at Perchtoldsdorf, near Vienna, by Dr. Max Bamberger. Many other chemical papers (mostly organic) appear in Abtheilung ii. b of the volume just published.

THE additions to the Zoological Society's Gardens during the past week include a Black-eared Marmoset (*Hapale penicillata*) from South-east Brazil, presented by Mr. Samson Clark; a Laughing Kingfisher (*Dacela gigantea*) from Australia, presented by Mr. W. L. Chrystie; a Painted Terrapin (*Clemmys picta*) from North America, presented by Mr. C. R. Fisher; an Algerian Tortoise (*Testudo ibera*) from North Africa, presented by Captain A. Carpenter, R.N.; a Black-headed Lemur (*Lemur brunneus*, ♀) from Madagascar, two West African Love Birds (*Agapornis pullaria*) from West Africa, deposited; a Golden-crowned Conure (*Conurus aureus*) from South-east Brazil, purchased; a Yak (*Pachagus grunniens*, ♀), a Wapiti Deer (*Cervus canadensis*), two Saffron Finches (*Sycalis flaveola*), two Crested Pigeons (*Ocyphaps lophotes*), two Triangular Spotted Pigeons (*Columba guinea*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

NEW SOUTHERN VARIABLES.—Dr. Gill records the discovery of four new variable stars by Mr. R. T. Innes at the Cape Observatory (*Astron. Nachr.*, No. 3441). The first three have a variation of about 1 magnitude, while the range of the fourth is as yet uncertain. Here are the facts:—

Star.	R.A. (1875°)			Decl. (1875°)	Mags. 9°0-9°7
	h.	m.	s.		
C P. D. -32° 1376	7	4	46.4	-32 43.6	„ 6.8-7.8
Cord. L.C. 8°679h.	8	8	16	-34 12.1	„ 8.7-9.9
Th. -27° 7724	10	45	22	-27 50.2	Certainly
Th -33° 8559	12	34	12	-33 53.1	changed 9.1-9.5

The second of the stars in the above list has a period of probably forty-five days.

COMET 1886 V.—Several provisional elements of this comet, which was discovered by Mr. W. R. Brooks, have been calculated, and all have led to the assumption of a parabolic orbit. Mademoiselle Klumpke has, however, undertaken a determination of the definite orbit, using all the available data, and publishes a preliminary result of this computation in the *Bulletin Astronomique* for August. She has found that after two trials a parabolic orbit is untenable, but in her third attempt an elliptic orbit with a period of less than 1000 years was more conformable with the data. The elements finally deduced, but still subject to slight modifications, owing to the discussion of 250 observations now in hand, are as follows:—

T = 1886 June 7, 391319, Paris M. T.

$\pi = 33$	54	49.77	} M. Equin. 1886°0.
$\delta = 192$	37	27.37	
$i = 87$	40	23.67	
$\log e$	9.998572		
$\log q$	9.431056		
R.	745 years.		

Mademoiselle Klumpke mentions that in her computation she has met with numerous difficulties in consequence of the great inclination of the orbit, and of the large heliocentric movement, which reached 245° .

EFFECT OF PRESSURE ON SERIES IN SPECTRA.—Prof. J. S. Ames and Mr. W. J. Humphreys publish in the *Johns Hopkins University Circular* (No. 130) a brief account of the results of an investigation to find out the effect of pressure on the lines composing series in the spectra of certain elements. To this end photographs were taken of the arc spectra of all the elements which give series at both ordinary and increased pressures. Eye observations were also made. The results were as follows: The lines of any one series of a particular element are shifted alike, that is, according to the same law which is given as

$$\Delta\lambda = \lambda\beta (\rho_1 - \rho_0)$$

where λ represents the wave-length, $\Delta\lambda$ the shift produced by the increase of pressure $\rho_1 - \rho_0$, and β is a constant for any one series of a definite element. The constant β is different for the different series of the same element, the change being such that, very nearly, β for the principal series is one-half β for the first subordinate, and one-quarter that of the second subordinate. Further, the constant β is different for the same series of different elements, and one apparent regularity which demands attention is that, approximately, the value of β for similar elements (that is, zinc, cadmium, mercury) varies as the cube root of the atomic weight.

In the same journal Mr. Humphreys communicates another note on changes of wave-length due to pressure, which contains some new and interesting observations; and some of the relations which he has found to hold good, may be briefly referred to here.

The shift towards the red is directly proportional to the total pressure of the gas. This shift seems nearly or quite independent of temperature (cyanogen bands excepted). The shifts of similar lines of a given element are proportional to the wave-lengths of the lines themselves. Analogous or similar lines of elements belonging to the same half of a Mendelejeff group shift proportionately to the cube roots of their respective weights. The wave-lengths of those substances which, in the solid form, have the greatest coefficients of linear expansion, have the greatest shifts. Finally, the shift of similar lines is a periodic function of atomic weight, and consequently may be compared with any

other property of the elements which itself is a periodic function of their atomic weights.

We may mention that Mr. Humphreys has employed in this investigation several hundred photographs of almost every known metallic element at various pressures, and has carefully measured a large number of the lines of each.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE number of matriculated students attending German universities during the summer semester of this year is indicated by the first figures, the whole number of hearers by the second figures, and the number of women among the hearers by the third figures in the following list, which we reprint from the New York Nation: Berlin, 4705, 344, 114; Bonn, 1889, 103, 13; Breslau, 1541, 83, 22; Erlangen, 1140, 13; Freiburg, 1449, 95; Giessen, 663, 29; Göttingen, 1123, 72, 34; Greifswald, 834, 19; Halle, 1534, 101, 6; Heidelberg, 1230, 92; Jena, 704, 50; Kiel, 727, 37; Königsberg, 695, 31, 11; Leipzig, 3664, 157; Marburg, 1042, 48, 7; Munich, 3871, 160, 2; Academy of Münster, 487, 10; Rostock, 499, 10; Strassburg, 1016, 31; Tübingen, 1289, 12; Würzburg, 1430, 13. The whole number of matriculated students was 30,982, and hearers 1519, of whom 207 were women; students of theology 4326, of law 8368, medicine 8232, and philosophy 10,006. There was a marked decrease of students of theology and medicine, and an increase of students in the philosophical department, especially in philology and natural science.

THE current number (August 21) of the Lancet is devoted entirely to information of value to students who are about to commence the study of medicine. The numerous medical schools in the British Isles are described; and short articles are given upon the great continental schools which offer opportunities for post-graduate study. The regulations of the medical examining bodies in the United Kingdom, and some notes on the openings for medical men, show the students what they have to face before the goal of qualification is reached, and what prospects exist beyond. The advantages which a practical knowledge of photography afford practitioners is now generally recognised, and the Lancet is wise in advising medical students to become practical photographers. The student is enjoined to practise photography "because it tends to sharpen his powers of observation, to lead him to make faithful records, and to cultivate in him the artistic method. . . . At most medical schools now dark rooms are provided and other facilities afforded for taking photographs, since a knowledge of practical photography is found to be extremely useful in the dissecting room, in the post-mortem room, in the ward, and in the operating theatre, while the capacity to take a micro-photograph is essential to the practical study of bacteriology and physiology."

SCIENTIFIC SERIALS.

Symons's Monthly Meteorological Magazine, August.—Fromondus and his notes on the weather. A recent number of Ciel et Terre gave extracts from these observations, made in 1614 and 1625, and the author (Prof. Monchamp) regarded the record as "the earliest kept in Belgium, if not in the world." Mr. Symons refers to the earlier records of Tycho Brahe, for 1582-97, and to Merle's observations, 1337-44, of which a facsimile copy was published in 1891.—Recent storm rains. Some remarkable rainfall records during thunderstorms in July last are quoted: On the 20th, at Oxford, 1.30 inch fell in an hour and a quarter; at Totterd, in Devonshire, 2.75 inches fell in seventy minutes. On the 21st, 2 inches fell at Crouch End, between 2.0 and 5.0 p.m.; at Ipswich, 4.20 inches fell in one hour, and 5.02 inches in 2½ hours. On the 26th, at Southgate, Herts, 2.50 inches fell in less than an hour and a half.—Some old storms. These are accounts of remarkable thunderstorms in Suffolk, in 1557, and in Yorkshire, in 1741 and 1745.—Whirlwinds on June 30 and July 16. On the first date there was a storm of considerable fury in Birmingham, during which a shower of frogs fell in the suburb of Moseley, having evidently been absorbed in a small waterspout that passed over Birmingham during the passage of the storm.

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SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 17.—"Studies in the Morphology of Spore-producing Members. Part III. Marattiaceae." By F. O. Bower, Sc.D., F.R.S., Regius Professor of Botany in the University of Glasgow.

PARIS.

Academy of Sciences, August 16.—M. A. Chatin in the chair.—Observations of the periodic comet of D'Arrest made at the observatory of Toulouse, by M. F. Rossard.—Researches on simple kathode rays, by M. H. Deslandres. A continuation of the author's work on the kathode spectrum and kathode rays obtained by the use of the apparatus previously described.—Action of Röntgen tubes behind screens opaque to the X-rays, by M. Abel Buguet. Certain phenomena are described, and attributed to the diffusion of the X-rays in the air or other media, or possibly to the fluorescence produced therein.—The last stages of the development of the Pedipalpi, by Mlle. Sophie Pereyaslawzewa.—On the Pleistocene and recent deposits of the coast of Lower Normandy, by M. A. Bigot.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—A Bibliography of Science: W. S. Sonnenschein (Sonnenschein).—The A.B.C. of the X-Rays: W. H. Meadowcroft (Simpkin).—British Rainfall, 1866: G. J. Symons and H. S. Wallis (Stanford).—The "Opus Majus" of Roger Bacon: J. H. Bridges, 2 Vols. (Clarendon Press).—Volcanoes of North America: Prof. I. C. Russell (Macmillan).—Elements of the Comparative Anatomy of Vertebrates: Prof. R. Wiedersheim, adapted by Prof. W. N. Parker (Macmillan).—Citizen Bird: Scenes from Bird-Life in Plain English for Beginners: M. O. Wright and E. Cones (Macmillan).—The Principles of Fruit-growing: L. H. Bailey (Macmillan).—The Vivarium: Rev. G. C. Bateman (L. U. Gill).—Leçons sur l'Électricité: E. Gerard, cinquième édition, 2 Vols. (Paris, Gauthier-Villars).—Agricultural Statistics of British India for the Years 1891-92 to 1895-96 (Calcutta).—Fourteenth Annual Report of the Bureau of Ethnology, Parts 1 and 2 (Washington).

PAMPHLETS.—Microsismografi dell' Istituto di Fisica della R. Università di Padova: G. Pacher (Venezia, Ferrari).—Programm und Forschungsmethoden der Entwicklungsmechanik der Organismen: Prof. W. Roux (Leipzig, Engelmann).—Bromide Enlargements, and how to make them: J. Pike (Lund).—Bourne's Handy Assurance Manual, 1897 (E. Wilson).

SERIALS.—Quarterly Journal of Microscopical Science, August (Churchill).—American Journal of Psychology, Vol. viii. No. 4 (Worcester, Mass.).—Atlas der Himmelskunde: A. T. v. Schweiger-Lerchenfeld, Liefer. 1 to 8 (Wien, Hartleben).—Journal of the Asiatic Society of Bengal, Vol. lxxv. Part 3, 1896; Ditto, Vol. lxxvi. Part 2, No. 1, 1897 (Calcutta).—Proceedings of the Bath Natural History and Antiquarian Field Club, Vol. viii. No. 4 (Bath).—Bulletin of the American Mathematical Society, July (New York, Macmillan).—Proceedings of the Indiana Academy of Science, 1894-95 (Indianapolis).—Schriften der Naturforschenden Gesellschaft in Danzig, Neunter Band, Zweites Heft (Danzig).—Annals of the Astronomical Observatory of Harvard College, Vol. xxvi. Part 2 (Cambridge, Mass.).

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