flections in the instrument or other causes. The simple method suggested by Mr. Twyman of altering the focussing, when true lines should go out of focus and spurious lines behave irregularly, seems not to have been applied by any of the earlier observers. The favourite method has been to combine two instruments giving dispersions at right angles to each other, the two producing a series of interference points. Dr. L. Janicki, of the Reichsanstalt, using two Lummer plates, one of which was slightly wedge-shaped, has recently shown in this way that the 5461 line consists of twelve components, the line previously regarded as the principal line consisting really of a group of five.

THE study of the characteristics of the motion of a train during the accelerating period has assumed an importance indicated by the fact that the actual choice of a method of traction for services of a suburban character depends upon the suitability of the tractor to work the train during the accelerating period. Prof. W. E. Dalby, in a paper read at the Institution of Mechanical Engineers on October 25, describes a useful method by means of which time-speed, time-distance, speed-distance, and energy-distance curves may be derived from a curve of tractive force expressed as a function of the velocity. A method of reducing the data obtained from a dynamometer-car record is also considered, together with the illustration, by means of a dynamical diagram, of the principles underlying the practice of braking. The accuracy of the curves deduced can be easily checked. The whole family may be drawn rapidly by means of the integraph, starting with a curve of tractive-force.

A SECOND edition of "The A.B.C. Guide to Astronomy," by Mrs. H. Periam Hawkins, has been published by Messrs. Simpkin, Marshall, Hamilton, Kent and Co., Ltd. The book has been brought up to date, and a photograph of the zodiacal light, taken by Prof. Douglass, at Flagstaff Observatory, Arizona, U.S.A., has been included as a frontispiece. The price of the little volume is 1*s.* 6*d.* net.

A CHEAP edition of Captain Mayne Reid's "The Naturalist in Siluria," has been published by the Year Book Press. The price of the volume is 2*s.* net. From his house in the Woolhope district, the author could look over the whole series of Upper Silurian rocks, from near Hereford in the north to their southern projection by Gorstley, in Gloucestershire. Many dwellers in this naturalist's paradise, as Mayne Reid called it, will welcome this reprint of his observations.

PROF. S. W. WILLISTON'S "American Permian Vertebrates," which was reviewed in NATURE of October 24, was published in 1911. There was no date on the title-page, and therefore we printed the letters "n.d." with the bibliographical particulars at the head of the notice. The manager of the Cambridge University Press now points out that at the back of the title-page it is stated that the volume was published in Chicago in October, 1911. We cannot attempt, however, to do more than give particulars from the title-pages themselves at the head of notices in our review columns.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES FOR NOVEMBER:—

Nov. 4. 15h. om. Mars in conjunction with the Sun.
5. 21h. om. Pallas in conjunction with the Moon (Pallas 0° 26′ N.).
7. 15h. 59m. Venus in conjunction with Jupiter (Venus 1° 43′ S.).
8. 13h. 28m. Mars in conjunction with the Moon (Mars 3° 7′ N.).
10. 6h. 50m. Mercury in conjunction with the Moon (Mercury 1° 54′ N.).
11. 1h. 21m. Jupiter in conjunction with the Moon (Jupiter 5° 5′ N.).
,, 8h. 21m. Venus in conjunction with the Moon (Venus 3° 21′ N.).
13 to 15. Maximum of Leonid Meteor Shower.
14. 7h. 59m. Uranus in conjunction with the Moon (Uranus 4° 27′ N.).
19. 1h. om. Mercury at greatest elongation east of the Sun (22° 14′).
20. 16h. 54m. Mercury in conjunction with Jupiter (Mercury 2° 47′ S.).
22. 18h. om. Saturn at opposition to the Sun.
24. 3h. 47m. Saturn in conjunction with the Moon (Saturn 6° 17′ S.).
27. 20h. 49m. Neptune in conjunction with the Moon (Neptune 5° 33′ S.).

SCHAUMASSE'S COMET 1912*b*.—The identity of the comet discovered by M. Schaumasse on October 19 with Tuttle's comet, last seen in 1899, is shown by the elements for its orbit, published in Circular No. 136, from the Kiel Centralstelle, and given below in the first column:—

	1912*b* (Fayet and Schaumasse)		Tuttle's (Rahts)	
π	= 113° 50′ 20″	1912·0	= 116° 29′ 3″	1900·0
☊	= 270 23 58		= 269 49 54	
i	= 53 52 34		= 54 29 16	
q	= 1·0506		= 1·0191	

According to the new elements, perihelion passage took place on October 25·3153 (Paris M.T.), when the comet was some 97·6 million miles from the sun. The previously calculated time of perihelion was January 3, 1913, and thus, as a writer in *The Times* (October 24) points out, the present revolution is the shortest on record, as was also the case with the last return of Halley's comet. The difference of seventy days between the calculated and actual returns will probably be disclosed when the planetary perturbations during the last cycle are taken into account.

The ephemeris given in the Centralstelle circular indicates that the comet will not become brighter, is travelling southwards rapidly, and will not be visible in the northern hemisphere after November 23.

Ephemeris 12*h.* (*M.T. Paris*).

1912	α h. m.	δ ° ′	1912	α h. m.	δ ° ′
Oct. 30	10 30·9	−12 41	Nov. 7	10 54·5	−22 2
Nov 3	10 42·6	−17 25	,, 11	11 6·7	−28 37

GALE'S COMET 1912*a*.—A number of observations of comet 1912*a* are published in No. 4606 of the *Astronomische Nachrichten*, and a photograph by Mr. H. E. Wood at Johannesburg is reproduced. On September 13 the comet was visible to the naked eye, magnitude 5, and had an almost stellar nucleus surrounded by an even coma 4′ in diameter. The tail was fan-shaped, with an angle of about 60°, the branch to the south being 40′ long, while the south-following branch had a length of 1°. On a photograph taken with the Franklin-Adams camera, exposure 40m., the former branch is the same length, but

the latter is 4° long, and slender, having a contortion 0·75° from the nucleus. On September 15 this contortion was 1·4° from the head, and the tail, 5¼° long, was clearly double 2½° from the head.

Ephemeris 12h. M.T. Berlin.

1912	α (true) h. m.	δ (true)	log r	log Δ	Mag.
Oct. 31	16 2·1	+23 55·2			
Nov. 2	16 3·8	+25 21·6	9·9605	0·0988	7·0
4	16 5·4	+26 45·8			
6	16 7·0	+28 8·3	9·9832	0·1052	7·2
8	16 8·6	+29 29·5			
10	16 10·3	+30 49·7	0·0057	0·1105	7·3
12	16 12·0	+32 9·0			
14	16 13·7	+33 27·8	0·0280	0·1145	7·5

Dr. Ebell calculated the brightness, by the formula $1/r^2\Delta^2$, on the assumption that on September 26 the magnitude was 6·0, but Mr. Franks found it to be a little more than 4·0 on October 11, while, in a good sky, M. Gonnessiat estimated it as 5·5 for the whole comet, on September 29. There appears to be definite evidence for an intrinsic brightening while near perihelion.

THE TOTAL SOLAR ECLIPSE OF OCTOBER 10.—A telegram from Prof. Morize to the *Astronomische Nachrichten* (No. 4606) states that the observations of the total eclipse at Christina (Minas Geraes, Brazil) were spoiled by rain although some selenium-cell observations of brightness were made by Dr. Ristenpart. Prof. Perrine, cabling to Prof. Pickering from Brazil, also states that rain prevented observations. A further telegram, published in No. 4607 of the same journal, announces that the eclipse was observed under favourable conditions at Quito by Señor Tufiño.

INTERNATIONAL STANDARD TIME.—The *Revue générale des Sciences* (No. 19) gives an outline of the present state of the question of the international standardisation of time, and the programme prepared for discussion at the International Conference which met at the Paris Observatory on October 15. The acceptation by France of the international *réseau* removed the last great obstacle to the unification of standard times, and the general distribution of time-signals by wireless telegraphy makes this unification more than ever necessary. It has been found that signals sent from different stations show inconsistencies amounting to several seconds, not very serious in ordinary affairs, but fatal in matters demanding scientific precision. To remedy this state of affairs the Bureau des Longitudes invited the International Conference to reassemble in Paris, and drew up a tentative programme of the matters for discussion. Under seven main headings this programme practically exhausts the debatable points concerning the determination of time, the methods of keeping it, and of distributing it by radio-telegraphy and otherwise, the precision necessary for different purposes, and the general question of how to organise internationally in order to gain these ends.

THE ORIGIN OF LIFE.

ONE of the most interesting of the recent meetings of the British Association at Dundee was that devoted by the joint sections of Zoology and Botany to the discussion of the problem of the origin of life. It should be remarked that this was not a discussion of the President's address; it was arranged before the subject of the presidential address had been made known. The President (Prof. E. A. Schäfer), who occupied the chair at this meeting, explained at the outset that his address had been written and printed before he knew that this discussion was to take place.

Prof. E. A. Minchin, in opening the discussion, pointed out that the problem of the origin of life involved two inquiries, both of which were at present of a speculative order, namely: (1) the nature and characters of the earliest living beings, and (2) the manner in which the primordial form of life took origin and maintained its existence upon the earth. The first of these problems could be considered with profit, but the second, owing to the inadequacy of the data available, appeared to him o be scarcely ripe for discussion. He observed that the cell, which might be defined as an individualised mass of protoplasm containing at least one nucleus, was generally regarded as the simplest type of organism, and as the vital unit in the composition of living beings, whether plants or animals. It was improbable that the earliest forms of life came into existence as organisms composed of two distinct structural elements—the nucleus and the cytoplasm (body-protoplasm). Which of these—the cytoplasm or the nucleus—was to be regarded as representing or containing the most primitive elements of the living substance? By most biologists the cytoplasm had been considered to represent the true living substance, and the earliest living organisms—the so-called Monera—had been supposed to be formless masses of protoplasm without nuclei.

Prof. Minchin proceeded to advance reasons for believing that the chromatin substance invariably present in the nucleus, or occurring as grains (chromidia) scattered in the cytoplasm, represented the primary and essential living matter. In support of this view he pointed out that chromatin is always present in the bodies of living organisms of all kinds, that cells cannot continue to live if deprived of their nuclei, that in reproduction by fission the chromatin divides first and is distributed among the daughter-individuals, that the complex process of division of the nucleus known as karyokinesis may be regarded as a mechanism gradually evolved and perfected for ensuring an exact quantitative and qualitative partition of the chromatin between the daughter-nuclei—an indication that the chromatin is of prime importance—that the chromatin-substance plays an essential part in syngamy (fertilisation) and probably also in heredity (as carrier of the characters of the organism), that the nucleus is essential for the continuance of the secretory activities of the cell, and, finally, that in some of the minutest living organisms—*e.g.* spirochætes and the male gamete of the malaria parasite—the body appears to consist mainly or entirely of chromatin, and cytoplasmic elements are reduced to a minimum or are altogether absent. Prof. Minchin quoted from a communication received recently from a correspondent, who pointed out that the protein molecules of the nucleus are simpler in constitution than those of the cytoplasm, and therefore may be regarded as more primitive. Further, the amido-acids characteristic of the nucleus are of the open-chain order and free from complexity, while those of the cytoplasm are of the closed order and could only have arisen from the type of acids present in the nucleus. For these reasons Prof. Minchin regarded the chromatin as the primitive living substance, and held the view that the earliest forms of life were very minute particles of chromatin, round which, in the course of evolution, achromatinic substances were formed. Within the cytoplasmic envelopes thus produced the chromatin-grains increased in number, and organisms of the degree of structural complexity of a true cell arose finally by concentration of the chromatin-grains into a compact organised mass—the nucleus proper.

As regarded the origin of the earliest living beings, it was only possible to frame vague speculations, in the present state of our knowledge, concerning the