conclusions. The nature of breeching-up of barrel and body, whether abnormally tight or loose, makes a considerable difference; correct breeching-up must be enforced if regular and consistent shooting is to be maintained. Alterations in the muzzle velocity make but little difference in the general characteristic of the vibration curve for any given rifle.

WITH reference to the American milk depôts or stations mentioned in the article on tuberculosis and the milk supply in NATURE of November 7 (p. 281), Mr. Wilfred Buckley writes to point out that the milk supplied is not certified milk in the sense in which the term is here understood, but is an "inspected" or "controlled" milk, which can be delivered at these stations at a cost of about 5*d*. per English quart.

THE Cambridge University Press has recently taken over the publication of *The Biochemical Journal* which has now become the property and the official organ of the Biochemical Society. The journal, which will be isued from six to eight times a year, will be under the editorship of Prof. W. M. Bayliss, F.R.S., and Dr. A. Harden, F.R.S.

THE Royal Insurance Company, Ltd., of Liverpool, has issued a sixth edition of its handy little publication, "Rules of Golf." The rules as now printed were approved by the Royal and Ancient Golf Club of St. Andrews at its autumn meeting on September 24 last. The alterations of rules and the new features decided upon at that meeting are clearly set out. The manager of the Royal Insurance Company will, so long as the stock lasts, forward a copy of the book free on application.

MESSRS. E. T. NEWTON AND SON, LTD., of Camborne, Cornwall, have issued a new list of scientific and mathematical instruments manufactured by them. Special attention is devoted to instruments required by the surveyor in the various branches of his work, and the catalogue provides well-illustrated particulars of a variety of patterns of theodolites and accessories.

MESSRS. J. M. DENT AND SONS, LTD., have added to their series of scientific primers, published at the price of 1*s*. net, one on astronomy, by the Astronomer Royal, Dr. F. W. Dyson, F.R.S. This primer is a condensation of Dr. Dyson's "Astronomy: a Handy Manual for Students and Others," which was reviewed in our issue for September 29, 1910 (vol lxxxiv., p. 393). It is devoted almost entirely to the bodies in the solar system, the chapter devoted to the stars occupying only six pages.

HAZELL'S Annual for 1913 is the twenty-eighth issue of this useful and handy work of reference, which deals with everyday topics and activities. An interesting section of the book is called "The March of Science," and provides a brief account of the Dundee meeting of the British Association, condensed summaries of the work done and progress made in the various branches of science, short descriptions of recent great engineering schemes and of aërial navigation in 1912, as well as particulars of the various scientific societies.

OUR ASTRONOMICAL COLUMN.

SUN-SPOTS.—During the past week a large group of sun-spots has been visible on the solar disc. First seen on the eastern limb on December 12, the group was nearly central on December 17, its length being about one-tenth of the solar diameter; on the latter date a second, smaller group appeared in the N.W. quadrant.

THE INTERNATIONAL TIME CONFERENCE.—This important conference, referred to in our issue of October 31, duly met at the Paris Observatory, under the presidency of M. Bigourdan, and was divided into four separate commissions, each charged with the discussion of an important group of questions affecting the general problem.

From *The Observatory* (No. 455) we learn that, among other points, the conference agreed to use Greenwich time universally, to send out signals at exact hours, and to arrange that there shall be no overlapping; an agreement as to the most suitable wave-length to employ in the transmission of the signals by wireless telegraphy was also arrived at.

The States represented at the conference were Austria, Belgium, Brazil, France, Great Britain, Greece, Holland, Italy, Monaco, Portugal, Russia, Spain, Sweden, Switzerland, and the United States, and it is to be proposed to them that a "Commission Internationale de l'Heure," with an executive bureau in Paris, shall be established. Among other functions the bureau will endeavour to secure uniformity at the different stations, and will compare the various signals received with the object of improving their general accuracy. Nine "sending" stations, distributed round the globe, have been selected, and the times for each to send out its signals have been arranged; it is proposed to inaugurate the general scheme on July 1, 1913. The question of the perturbation of radio-telegraphic signals by atmospheric agents is, we learn, to be especially studied at a powerful station now being constructed at Laeken.

ELEMENTS AND EPHEMERIS FOR COMET 1912*c* (BORRELLY).—From recent observations made by Prof. Strömgren, a corrected set of elements for comet 1912*c* has been calculated by Prof. Kobold, and is published, with a daily ephemeris extending to January 6, 1913, in No. 4616 of the *Astronomische Nachrichten*. According to the ephemeris the comet is now (December 19) some 8′ east of β Aquarii, and is moving slowly in a direction east of south. Its calculated magnitude is 10·4, but Prof. Strömgren's observations show it to be extraordinarily faint; the following is an extract from the ephemeris:—

Ephemeris for 12h. (M.T. Berlin).

1912	α	δ	log r	log Δ	Mag.
	h. m.	° ′			
Dec. 21	20 34·7	−6 35·1	0·1693	0·3160	10·4
25	20 40·8	−7 55·4	0·1811	0·3363	10·6
29	20 46 6	−9 6·8	0·1928	0·3550	10·7

THE INFLUENCE OF SPECTRUM ANALYSIS ON COSMICAL PROBLEMS.—A very interesting lecture, by Prof. Max Wolf, on the influence that spectrum analysis has exercised in the solution of cosmical problems is reprinted in an abstract from the *Zeitschrift für Elektrochemie*, No. 12.

The subjects briefly discussed by Prof. Wolf are far too numerous even to mention here, but they include the cosmical application of the Doppler and Zeeman effects, the determination of the gaseous character of some nebulæ by Huggins, the Lockyer-Janssen daylight observation of prominences in 1868, the progressive successes of Hale and Deslandres in the photography of the sun's upper atmospheric layers

while the sun is not eclipsed, the observation of the helium (D_3) line in the chromosphere by Lockyer, twenty-five years before the element was discovered terrestrially, and even the very recent work of Dr. Nicholson in the theoretical construction of such spectra as those of the unknown cosmical elements nebulium and coronium. This brief enumeration will serve to show that Dr. Wolf's paper is not only comprehensive, but also up to date, and should be read by all interested in astrophysics.

ELEMENTS OF RECENTLY DISCOVERED MINOR PLANETS.—In No. 4607 of the *Astronomische Nachrichten*, Dr. Cohn gives the elements and permanent numbers of eighteen minor planets discovered during 1911–12. Four of these have been identified with older discoveries to which no numbers had been allotted, and eleven of the "discoveries" made during 1911 have since been identified with planets previously included in the official records. The total number thus included, as shown by the present list, is 732.

THE PHYSICAL SOCIETY'S EXHIBITION.

THE eighth annual exhibition of physical apparatus under the auspices of the Physical Society of London was held on Tuesday, December 17, at the Imperial College of Science, and attracted the usual large attendance. At both the afternoon and evening sessions a short discourse was given by Mr. S. G. Brown on "Some Methods of Magnifying Feeble Signalling Currents." The lecturer described several instruments designed by himself for magnifying the currents received through Atlantic cables, by the use of which largely increased speed of signalling had been made possible. The most interesting of these was one in which the original signalling current moves a thermo-electric junction into and out of a small flame, the thermo-electric current thus produced being twenty-seven times that of the signalling current. The magnifying power is approximately constant for all currents, an advantage over the ordinary form of relay in which the current of the local circuit is constant and is merely made or broken by the signalling current. Other mechanical methods of achieving the same result were also described.

Exhibits of apparatus were shown by some thirty firms of manufacturers. The principal exhibit of the Cambridge Scientific Instrument Co. was a complete cardiograph outfit, composed of an Einthoven string galvanometer, projection apparatus, camera with moving plate or continuous paper for cases where long records are necessary, and a switchboard by which the standardisation of the galvanometer, compensation for skin currents, and measurements of body resistance could be quickly made. By an auxiliary apparatus, records of the heart sounds could also be obtained. Another of their exhibits was a Wilson cloud apparatus for showing the path of α particles or X rays by the condensation of water upon the ions. Messrs. J. J. Griffin and Sons had an interesting exhibition of motor-gyrostats with models for illustrating the Schlick method of steadying ships, and the gyrostatic mono-rail car. Mr. C. V. Boys's rainbow cup for showing the colours of thin films was also exhibited in action. In addition to the usual laboratory instruments, Messrs. Gambrell Bros. exhibited a new convection radiometer by Mr. F. W. Jordon for measuring small, steady rates of evolution or absorption of heat. The convection current of gas produced by the source of heat deflects two very light suspended mica vanes the deflection being shown in the usual way by a mirror. The Marconi Co. exhibited instruments for use in wireless telegraphy, including a portable knapsack receiving and transmitting set for communicating across distances of fifteen miles. The Helsby Wireless Telegraph Co. showed a vibration-proof detector and a rotary quenched spark discharger.

Microscopes for ultra-microscopic and for metallurgical work were exhibited by Messrs. R. and J. Beck, Messrs. E. Leitz, and Messrs. Carl Zeiss. The last firm also had an example of its projection apparatus at work. The principal exhibits of Messrs. Alexander Wright and Co. consisted of various forms of Dr. Leonard Levy's apparatus for the examination of mine air according to the provisions of the Coal Mines Act of 1911. They also exhibited some good examples of palladium and platinum plating on metals and gold plating on glass.

Messrs. Kelvin and James White, Ltd., exhibited a compass for use on aeroplanes. It was of the floating type, and said to be entirely unaffected by the vibrations of the engines. A Fullarton vibrometer for obtaining the frequency and intensity of vibrations produced by any form of machinery was also shown. It consists of a vibrating reed which can be adjusted to the frequency of the vibration to be measured, the intensity being shown by the amplitude of the vibration of the reed. An Aitken portable dust counter for quickly estimating the number of dust particles in the air, based on the method of condensation of moisture on them, was exhibited by the same firm. Mr. R. W. Paul had a large exhibit of electrical measuring instruments, including several new types. Among them was a string galvanometer somewhat similar to the Einthoven, but with the string in a horizontal position. The Irwin optiphone was shown in use. This is an instrument for magnifying the motion of a vibrating body, such as the diaphragm of a telephone, the wave-form of the motion being obtained by the revolving mirror method.

Messrs. A. Gallenkamp showed some cheap electric furnaces and various laboratory apparatus for heat experiments, including a student's optical bench for radiant heat experiments. They also exhibited a sensitive flame for working at the low pressure of an ordinary gas supply, designed by Prof. S. P. Thompson. The Westminster Engineering Co. exhibited a small useful projection arc lamp for photographic work and optical lanterns. Resistance testing sets were shown by Messrs. Crompton and Co., Evershed and Vignoles, and Nalder Bros., and a large range of switchboard instruments was exhibited by the Weston Co.

RIVERS, GLACIERS, AND THE ICE-AGE.

BRUNO DIETRICH, of Potsdam, has made a geographical study of the Moselle valley ("Morphologie des Moselgebietes zwischen Trier und Alf," *Verhandl. des naturhist. Vereins der preuss. Rheinlande*, 1911, for 1910, p. 83). Basing his description on the geological structure and history of the district, he shows how the valley has been cut in a pre-Miocene surface of denudation. The meanders that arose on this fairly even surface are now traced as winding ravines (p. 120), owing to the elevation of the country and the consequent lowering of the base-level of the Moselle. The tributaries of the left bank, however, are held to have been incapable of forming such large meanders as are now seen in the forms of their ravines. At present they wander somewhat aimlessly in the flat land of their floors, now cutting back one valley-wall, now the other. Their valley-flats (*Talauen*) are attributed to lateral erosion at a time when the land remained stationary for a time (p. 130), and we gather that these flats have become per-