operate in the international work asking consent to the proposed change. Favourable replies are being received; and there is little doubt that the change will be made, probably Jan. 1, 1885. It should be remembered that the international observation is made largely by observers who kindly cooperate with the chief signal officer, but who are not under his orders: a change of this kind cannot, therefore, be summarily ordered, but must be made by mutual consent."

THE Commissioners on Technical Education have now practically concluded their labours, and are likely to have only one more meeting to formally sign their Report, the greater part of which is in type. It will consist of at least five octavo volumes, it being found impracticable, even after careful consideration, to bring the mass of evidence and information within smaller compass. It is stated that any *résumé* of the series of conclusions and recommendations at which the Commission have arrived would not be useful or fully intelligible to the public without the explanatory details with which they will be accompanied. It is, however, hoped that the complete Report may be presented soon enough to permit of the House of Commons proceeding during the present session with such legislation, based upon the recommendations, as may be thought necessary. Meantime it is understood that technical training will form an important part of the measures of which the Government and Mr. A. O'Connor have given notice with regard to education in Ireland.

MESSRS. W. EAGLE CLARKE and W. Denison Roebuck, Leeds, are preparing a supplement to their "Handbook of the Vertebrate Fauna of Yorkshire," and would be glad to have notes of additions or corrections to that work, or notices of the occurrence of any species of quadrupeds, birds, reptiles, or fishes in Yorkshire which their friends may be pleased to communicate. As they wish to publish in the April magazines, it is hoped that the desired information may be sent in immediately. Communications may be addressed to No. 9, Commercial Buildings, Park Row, Leeds.

AT the Royal Institution Prof. Tyndall will begin a course of six lectures on "The Older Electricity—its Phenomena and Investigators," on Tursday next (February 28), illustrated by experiments; and Capt. Abney, R.E., will begin a course of six lectures on "Photographic Action, considered as the Work of Radiation," on Saturday (March 1). Prof. Hughes will give a discourse on Friday evening next, on "The Theory of Magnetism," illustrated by experiments.

WE have already referred to the International Ornithological Congress which is proposed to be held in Vienna on April 16–23, under the protectorate of the Crown Prince Rudolf. It is now announced that arrangements are in progress for an International Ornithological Exhibition, which is to precede the Congress, and which will occupy from April 4–14. Single specimens and collections of living birds of all kinds, including domestic birds; all apparatus serving for the protection, cultivation, breeding, and conveyance of birds; implements used in bird catching and bird shooting, falconry, carrier-pigeon-post; aviaries, and bird cages; scientific objects and products which originate in or refer to the feathered world, will all be included in the programme of the Exhibition. All details will be furnished to intending exhibitors or partakers in the Congress by the Secretary of the Vienna Ornithological Society, Dr. Gustav von Hayek, III. Marokkanergasse 3 Vienna. The main subjects to be discussed at the Congress are—(1) An international law relating to the better protection of birds; (2) the establishment of a system of ornithological observing stations all over the inhabited globe; and (3) investigations concerning the origin of the domestic fowl, and measures for the amelioration of the cultivation and breeding of domestic birds generally.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus* ♂) from India, presented by Miss Furniss; two Common Roe (*Capreolus capræa* ♀ ♀) from Dorsetshire, presented by Messrs. Charles Hambro and J. C. Manuel Pleydell; a Passerine Owl (*Glaucidium passerinum*), European, presented by Mr. G. R. Lake; a Naked-necked Iguana (*Iguana delicatissimus*), a Banded Basilisk (*Basilicus vittatus*) from Nicaragua, presented by Mr. Albert Vidler; two Prairie Marmots (*Cynomys ludovicianus*) from North America, a Shaw's Gerbille (*Gerbillus shawii*) from North Africa, a Military Macaw (*Ara militaris*) from South America, two Iceland Falcons (*Hierofalco islandus*) from Sweden, deposited; a Red-eared Monkey (*Cercopithecus erythrotis* ♀) from Fernando Po, two Slow Loris (*Nycticebus tardigradus*) from the Malay Countries, a Red-eyed Ground Finch (*Pipilo erythropthalmus*) from South America, an Eyebrowed Weaver Bird (*Hyphantornis superciliosus*) from West Africa, four Asiatic Quails (*Perdicula asiatica* ♂ ♂ ♀ ♀) from India, purchased.

OUR ASTRONOMICAL COLUMN

AUSTRALIAN OBSERVATORIES.—The eighteenth Annual Report of the Director of the Observatory at Melbourne to the Board of Visitors (who in their turn report to the Governor of Victoria) has been issued. The new transit-circle was expected in a short time, and would find the new circle room ready to receive it, but the instrument which had been in use for twenty years continued to give excellent and trustworthy results; nevertheless each year had forced upon Mr. Ellery the necessity of greater optical scope for the meridian work. The inevitable loss of reflective power in the great telescope increases a little year by year, but does not yet sensibly affect the work upon which it is employed. Indeed, Mr. Ellery says, "Some photographs of faint objects obtained lately are clear evidence of the immense light-gathering power it still possesses, and of the trivial loss occasioned so far by the slight tarnish apparent." The instrument had not been kept quite so closely to its special work—the revision of the southern nebulæ—as before, owing to the number of nights occupied with the great comet and in experimenting in celestial photography. Among the subjects of observation Mr. Ellery refers to the transit of Venus, the Port Darwin Expedition for determination of longitude of Australian observatories, and measures of differences of declination of the minor planets *Sappho* and *Victoria* for determination of the solar parallax, according to the scheme arranged by Mr. Gill. The great comet of 1882 was kept in view for 250 days, or until April 26. A large portion of the work connected with the telegraphic determination of the longitude of Australian observatories from Greenwich fell upon the Melbourne establishment, which is now assumed to be in longitude 9h. 39m. 53·37s. E., subject perhaps to some very small correction. As soon as the new transit-circle was properly adjusted, it was Mr. Ellery's intention to devote it to the revision of a rather large catalogue of stars at the request of the "Astronomische Gesellschaft," besides its more special work. The great telescope would be applied more exclusively to the continuation of the revision of Sir John Herschel's nebulæ, several of which, by the way, the Melbourne observers have not been able to find.

Mr. H. C. Russell sends us an historical account of the Observatory at Sydney and of the observations which preceded the erection of the present one in that colony. With the details of the actual observatory the reader will be probably acquainted through the volumes of results which have been issued therefrom; that for 1877–78 contains a general view of the building; but Mr. Russell mentions circumstances attending the erection of the first observatory on Australian soil which are perhaps little known. He extracts from the "History of New South Wales," by Col. Collins, the following note:—"Among the buildings that were undertaken shortly after our arrival [that of the first colonists in 1788] must be mentioned an observatory which was marked out on the western point of the cove, to which the astronomical instruments were sent, which had been sent out by the Board of Longitude for the purpose of observing the comet which was expected to be seen about the end of this year. The construction of this building was placed under the direction of Lieut. Dawes, of the Marines, who, having made

this branch of science his peculiar study, was appointed by the Board of Longitude to make astronomical observations in this country." The observatory was erected as soon as the colonists landed, but, being found small and inconvenient, a new one for the better reception of the instruments and the residence of Lieut. Dawes was built of stone, for which ample materials were found upon the spot.

The comet to which reference is here made was that of 1661, supposed to have been identical with the comet of 1532, and again expected about the end of 1788 or beginning of 1789. It is not difficult to explain how this body came to be associated with the arrival of the first Australian colonists. Halley, who had calculated the orbits of the comet observed by Apian in 1532, and that observed by Hevelius in 1661, gave very similar elements in his "Synopsis of Cometary Astronomy." Pingré considered the comets identical, and thought he had recognised several previous appearances, as detailed in his "Cometographie," which was published in 1783. Maskelyne appears to have adopted Pingré's opinion, and was at the trouble of preparing sweeping ephemerides, which he communicated to the Royal Society, and we may conclude that it was through his interest with the Board of Longitude that Lieut. Dawes was supplied with instruments and charged with a search for the comet. Mr. Russell says there is no record of what was done at the Dawes' Point Observatory, but since the comet was not observed as expected, we may infer there were only negative results to be reported, though Lieut. Dawes did occupy himself in other ways to assist in the progress of the colony.

CHEMICAL NOTES

THE water supply of Boston (U.S.A.) became contaminated about a year ago with some substance or substances which imparted to it a peculiarly nauseous odour and taste. Chemical examination resulted in showing a large percentage of "albuminoid ammonia," and also that the "free ammonia" increased somewhat rapidly when the water was kept. The production of ammonia, and also the odour and taste, was finally traced to the decomposition of a freshwater sponge (*Spongilla fluviatilis*, Auct.) present in large quantities on the sides and bottom of one of the storage basins; removal of this sponge was followed by improvement in the water (see *Analyst*, viii. p. 184).

PROF. CLEVE describes, in the August number of the *Journal of the Chemical Society*, methods for extracting and purifying the earth *samaria*. From determinations of the amount of sulphate obtained from quantities of this oxide, Cleve deduces the number 150 as the atomic weight of the metal *samarium*. Various salts of samarium are described; the metal is closely allied to didymium.

HARTLEY showed some time ago (*C.S.J. Trans.* for 1882, p. 84 *et seq.*) that the ultra-violet spectra of elements belonging to the *same series* (in the nomenclature of the periodic law) exhibit fairly marked analogies as regards general character; recent observations of the spectrum of beryllium and comparison of this spectrum with that of allied metals have led Hartley to the conclusion that this metal probably belongs to the group which contains magnesium, calcium, &c., and not to that containing aluminium, scandium, &c. But if this is so, oxide of beryllium must be represented as BeO, and the atomic weight of the metal—about which there has lately been so much dispute—must be taken as 9 (*C.S.J. Trans.* for 1883, p. 316).

V. MEYER has recently separated, from benzene oils, a compound to which he gives the name of *Thiophen*. The composition of this body is represented by the formula C_4H_4S; it presents the closest analogy in general reactions with benzene, yielding a sulphonic acid, a methyl derivative, &c.; it reacts with diketones to form highly coloured compounds. The further study of this interesting compound, now being carried on in Prof. Meyer's laboratory, is likely to lead to important results (*Berichte*, xvi. 2968).

OSTWALD has recently made a further advance in his study of chemical affinity. He has examined the action of acids on methylic acetate, determining the velocity-coefficients of various acids, and from these calculating the relative affinities of the acids in terms of hydrochloric acid taken as 100. His results are entirely in keeping with the theory of Guldberg and Waage, and confirm the supposition that each acid possesses a specific affinity constant. The determination of affinity constants for groups of compounds must evidently be a work of preeminent importance to chemical science. Ostwald's results, *e.g.* for acetic and trichloracetic acids, enable us to see that in these constants we shall find materials for constructing a theory which will represent the connection between molecular structure and reactions as resting on a real basis, and not, as is done at present, on a purely formal conception (*J. für pract. Chem.* (2) xxviii. 449).

A NUMBER of redeterminations of atomic weights have recently been published. The most important are these:—

Thorpe,	Ti = 48·0,	*Berichte*, xvi. 3014.	
Baubigny,	Ni = 58·75,	*Compt. Rend.* xcvii. 951.	
,,	Cu = 63·46,	,, ,,	906.
Brauner,	Te = 125·0,	abstract in *Berichte*, xvi. 3055 (original in Russian).	
Marignac,	Bi = 208·16,	*Archiv. des Sci. Phys. et Nat.* (3) x. 5.	
,,	Mn = 55·07,	,, ,,	,,
,,	Zn = 65·29,	,, ,,	,,
,,	Mg = 24·37,	,, ,,	,,
Löwe,	Bi = 207·33,	*Zeitschr. Anal. Chem.* xxii. 489.	

IT is known that Dr. Landolt, after laborious researches into the refracting power of chemical compounds, arrived at the conclusion that it may be expressed, for organic bodies, by a very simple equation: the refracting power of the compound is equal to the sum of the same powers of carbon, hydrogen, and oxygen, multiplied each by the number of atoms of each of these bodies which enter into the compound. This law proved, however, not to be quite exact with regard to several organic bodies, and the researches of Herr Bruhl established that in the lower compounds the refracting power received from the equation must be increased by two units for each double pair of atoms of carbon. These results had been arrived at with liquid compounds. As to the solid ones, which were the subject of the researches of Dr. Gladstone, it was desirable to pursue these researches to the same degree of accuracy as the researches of Landolt and Bruhl. M. Kanonnikoff has prosecuted this work on a great many solid bodies belonging to both groups of the fatty series, the aromatic series and the group of terebenes and camphors. He publishes now in the *Memoirs* of the Kazan University and (abridged) in the *Journal of the Russian Chemical Society* (vol. xv. fasc. 7) the results of his researches. It appears from them that the method of determining the refracting power of a solid from its solution, applied by Dr. Gladstone, is quite satisfactory, the dissolved body not changing its refrangibility when dissolved, and that the laws discovered by Landolt and Bruhl for liquid bodies are quite true also with regard to solids. This inquiry at the same time enables M. Kanonnikoff to arrive at most interesting conclusions as to the structure of the investigated bodies.

THE atomic weight of tellurium not corresponding to what it ought to be according to Prof. Mendeléeff's theory of periodicity, M. Brauner has tried to determine it again with greater accuracy. The chief difficulty is to have the tellurium free from selenium, but this difficulty has been overcome, and the body has been obtained in beautiful crystals. As to Berzelius's method for the transformation of tellurium into anhydride, M. Brauner discovered that it is liable to considerable losses, and to avoid them he has had to take the most minute precautions. The process was controlled also by transforming tellurium into a new salt, $Te_2O_4SO_3$, and by the synthesis of the telluric copper, Cu_3Te. The results are four series of figures varying from 124·94 to 125·40, which would give, on the average, an atomic weight of 125, that is, corresponding to the theory.

WE find, in the last number of the *Journal of the Russian Chemical Society*, an interesting theory of solutions, by M. Alexeyeff; the forces of gravitation, cohesion, and chemical affinity being considered as three different degrees of one single force, which differ from one another only by the distances at which the action of the force is exercised. M. Alexeyeff asks, Which of these two last forces, of cohesion or of chemical affinity, is manifested in solutions? and pronounces himself for the former. The simplest cases of solutions are, in fact, those where there is no chemical affinity between the bodies dissolving and dissolved. Such cases were well known long since for gases and solid bodies. The solution of gases in solid bodies is quite analogous to imbibition of solids with liquids, and the much greater solubility of gases in liquids may be easily explained by the easier penetration of gases between the molecules of a liquid; the law of solubility of gases given by Dalton is perfectly agreeable with the supposition that the dissolved gases maintain