

A HAPPY idea, very ingeniously carried out, is the Pharmaceutical or Medico-Botanical Map, of the World, produced by Mr. George Barber, of Liverpool. In a very clearly printed and carefully-coloured map we are shown at a glance the *habitats* of all the medicinal plants and drugs in general use, as well as the mean annual temperature of the countries whence they are obtained. The map is published by Simpkin, Marshall, and Co.

M. E. LIPPMANN has communicated to the *Annales Industrielles* an account of the operations for sinking the Artesian Well at La Chapelle. The engineers employed by the authorities of the city of Paris to execute this great work, are MM. Degosée, Laurent, and Co. When completed, this well will supply water to one of the most populous quarters of Paris. It is intended that the well shall not only strike the water-bearing stratum—at a depth of about 2,000 feet—into which the great well at Passy penetrates, but shall extend through the stratum to a total depth of 2,950 feet. In this way, other water-bearing layers will be intersected. The work was at first commenced by the ordinary method of sinking a masonry shaft 2 metres (6ft. 3½in.) in diameter to a depth of 445 feet through the tertiary strata which lie above the chalk. Many difficulties presented themselves, chiefly due to the looseness of the earth through which the excavation penetrated, and to the insufficient pumping-power. After two years of persistent labour, it was decided to try another system. At this period the shaft had reached a depth of 113 feet; new boring machinery driven by steam power was now set up, and until the present time the work has proceeded most satisfactorily.

ASTRONOMY

Prizes for the Discovery of Comets

THE following circular has been issued by the Imperial Academy of Sciences at Vienna:—

For several years past there have been remarkably few discoveries of new comets. The cause of this fact, which seems inconsistent with that of the wider distribution of telescopes suitable for such discoveries, may be due to the special attention that has been given to the small planets. It is, however, much to be regretted that there has been such slight increase in our knowledge of the comets, in view of the recently established connection between the shooting stars and the comets. It is exceedingly desirable that we should know more than two or three hundred out of the many thousands of comets which undoubtedly belong to our system, especially as most of those which we know move in parabolic orbits. Were our knowledge of comets more complete we should surely know of more meteor streams and comets belonging one to the other. Mindful of Herr Schumacher's words "it is natural that astronomers intrusted with the administration of a well furnished observatory should have no time left for sweeping the sky so minutely and so perseveringly as is necessary for discovering these faint bodies, whilst, on the contrary, it seems certain that to the many amateur astronomers who have less extensive means of observation hardly any more useful kind of activity could be recommended," the Imperial Academy of Sciences at Vienna is induced to propose for the discovery of comets during the three years from May 31, 1869, to May 31, 1872 eight prizes annually, consisting, as the receiver may choose, of a gold medal, or of twenty Austrian ducats representing its value in money.

The award of these prizes will be subject to the following regulations:—

1. The prize will be given only for the first eight comets discovered in each of the three years named, and only for such comets as are telescopic at time of discovery, that is, invisible to the naked eye. The comet must not have been before seen by another observer, and must be one whose appearance could not be predicted with certainty.

2. The discovery must be communicated immediately and without waiting for further observations, to the Imperial Academy of Sciences, by telegraph if practicable; and otherwise by the earliest post. The Academy undertakes to transmit the news immediately to other observatories.

3. The time and place of discovery with the plan and course

of the comet must be given as exactly as possible with the first notice. This first notice is to be supplemented by such later observations as may be made.

4. If the discovery should be confirmed by other observers, the prize will not be awarded unless the observations of the discoverer suffice for the determination of the orbit.

5. The prizes will be awarded in the general meeting of the Academy held at the end of May of each year. In case the first notice of a discovery arrives between the 1st of January and the end of May, the final award of the prize will be deferred till the general meeting in May in the following year.

6. Application for the prize must be made to the Academy within five months from the time of the arrival of the first notice. Later applications will not be considered.

7. The Imperial Academy will procure the decision of the permanent astronomers of the Observatory at Vienna as to the fulfilment of the conditions in Nos. 1, 3, and 4.

The New Planet (109)

In the *Astronomische Nachrichten*, 1779-80, there is a long and important article on Piazzi's observations by M. Argelander; also the approximate place of this planet, discovered by Prof. Peters of Clinton, New York.

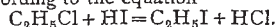
The following elements of the Planet are by Prof. Peters, and are considered by him to be nearly accurate. We print in a parallel column the elements for the same planet as furnished by Prof. Axel Möller, of Lund. The latter are calculated from observations taken at Clinton on Oct. 13th, Leipzig Nov. 8th, and Lund Nov. 26th, 1869:—

Epoch 1869,	Oct.	0.0 Berlin mean time.
M <sub>0</sub> = 337°	1' 3.35"	350° 53' 28.6"
π = 55°	53' 48.0"	
Ω = 4°	51' 45.4"	4° 57' 30"
i = 7°	56' 50.55"	8° 3' 57.8"
φ = 17°	25' 14.13"	17° 27' 51.0"
μ = 809"	580	800.476
log a = 0.4278314.		

CHEMISTRY

Transformation of Chlorinated into Iodated Compounds

AD. LIEBEN has made important experiments on this kind of transformation. Ethyl chloride, mixed in a sealed tube with three or four times its weight of strong hydriodic acid, sp. gr. 1.9, and heated for five hours to 130°, is almost wholly converted into ethyl iodide, according to the equation—

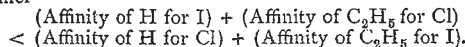


In like manner ethylated ethyl chloride (butyl chloride), and amyl chloride are converted by strong hydriodic acid into the corresponding iodides, without formation of secondary products.

Ethyl-chlorinated ethyl oxide  $C_2H_5(C_2H_5Cl)O$  is converted,

by an excess of strong hydriodic acid, chiefly into ethyl iodide, and ethylated ethyl iodide (butyl iodide); but there are also some secondary products formed, viz. butyl chloride, alcohols, and a substance having a carbonaceous aspect, the quantity of these secondary products increasing as the hydriodic acid is less concentrated and present in smaller quantity.

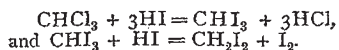
To determine whether the action of hydriodic acid is a simple double decomposition or a case of the action of masses, the converse reaction was tried by heating ethyl iodide with a considerable excess of hydrochloric acid in a sealed tube to 130°. A small quantity of ethyl-chloride was thereby obtained, together with hydriodic acid and free iodine, showing that the inverse of the first-described reaction does really take place; but the quantity of ethyl chloride, which it yields, is very small, even when the action is continued for 50 hours. The result of the two supplementary experiments, namely, the decomposition of ethyl chloride by hydrogen iodide, and of ethyl iodide by hydrogen chloride, may be represented, though somewhat crudely, in the following manner—



The decomposition of ethyl chloride, and its homologues by the action of hydriodic acid, is analogous to the decomposition of silver iodide by the same reagent.

As an example of the action of hydriodic acid on organic chlorides of other series, chloroform  $CHCl_3$  was introduced, together with 11 times its weight of hydriodic acid of sp. gr. 1.9,

into a sealed tube, and heated for 7 hours to 125°. The principal results of this reaction were hydrochloric acid, free iodine, and methylene iodide  $\text{CH}_2\text{I}_2$ . Now, remembering the fact, demonstrated by Kekulé, that iodides, submitted to the action of hydriodic acid, undergo an inverse substitution, the reaction just described may be explained by supposing that the chloroform is in the first instance converted into iodoform, which is then converted into methylene iodide by the action of the hydriodic acid, thus—



In other cases, the action represented by the second equation goes so far as to remove all the iodine from the iodated product formed in the first instance, and convert it into the corresponding hydride. Such, indeed, is the case with compounds belonging to the aromatic series. Berthelot [Bull. Soc. Chim. (2) ix. 30] has shown that Julin's chloride of carbon, or perchlorinated benzene,  $\text{C}_6\text{Cl}_6$ , is converted into benzene,  $\text{C}_6\text{H}_6$ , when heated to 280° with a large excess of hydriodic acid; and Lieben finds that monochlorobenzene,  $\text{C}_6\text{H}_5\text{Cl}$ , heated to 235°, for 15 hours, with from three to five times its weight of hydriodic acid, likewise yields benzene.

The action of hydriodic acid on organic chlorine-compounds appears, then, to exhibit two cases:—(1.) The chloride is easily converted into the corresponding iodide by double decomposition, whereas the transformation of the iodide into the corresponding hydride is difficult, and takes place only at high temperatures. In this case, if the experiment is well conducted, an iodide is obtained without a trace of hydride. Such is the case in the action of hydriodic acid on the chlorides of the series  $\text{C}_n\text{H}_{2n+1}\text{Cl}$ . (2.) The chloride is attacked by hydriodic acid with difficulty, and only at a high temperature, whereas the conversion of the iodide into hydride takes place easily, and at a comparatively low temperature. In such cases, as with the chlorides of the aromatic series, the product of the reaction is a hydride without any trace of iodide. In some cases, as that of chloroform, intermediate products are obtained, only part of the iodine being removed by the inverse reaction. [Giornale di Scienze di Palermo, v. 130.]

### SCIENTIFIC SERIALS

THE *Archives des Sciences Physiques et Naturelles* for December 15, contains a paper by Professor Heer, on the Miocene Flora of Spitzbergen. The writer gives a preliminary account of the fossil plants collected and sent to him by the Swedish Polar Expedition of 1868. The number of species found in the Spitzbergen Archipelago amounted to 131, of which 123 were phanerogamic, and 8 cryptogamic. Figures and a detailed description of these are promised to appear in the *Memoirs of the Stockholm Academy*. The next paper is an extract of Thomsen's Thermochemical Researches (taken from Poggendorff's *Annalen*), to which Marignac has appended some valuable comments. Prof. Marignac adds a paper of his own, on the influence of water on the double decompositions of salts, and on the thermal phenomena which accompany them. The author was induced to publish this preliminary memoir in consequence of the appearance of Thomsen's results. He points out some interesting cases of retardation of chemical equilibrium, and intends to investigate them further. The rest of this number—the last of the year—is occupied by the usual *Bulletin Scientifique*, Meteorological Observations, and an index to the volume (xxxvi. N. S.)

In Polli's *Annali di Chimica applicata alla Medicina* for December, we observe, among other papers, a note on the action of hydric sulphate on iodides, by Dr. Vitali. It is generally supposed that the action referred to terminates with the production of sulphurous oxide and iodine; but Vitali has noticed, in addition, the formation of hydric sulphide and sulphur—fresh instances, consequently, of the reducing energy of hydric iodide. In a paper on Ferric Albuminate, Peretti shows that albumen is capable of dissolving Ferric oxide. The filtered solution, if evaporated at a gentle heat, dries up to a rose-coloured pellicle, which can be again dissolved in water, and coagulates at 75°. Details are given as to some of the reactions of the solution. Bellini contributes an article on the therapeutic (pharmaceutical) formulæ of sulphur. There are also several papers on dietetics, hygiene, and pathology, &c., taken from other journals, and an index to the volume, of which the present is the concluding number.

THE last two numbers of the *Revue des Cours Scientifiques* (Dec. 25, 1869, and Jan. 1, 1870), contain an elaborate paper on Vaccination, by M. Brouardel; a translation of Dr. Bence Jones's Croonian Lectures; an account of Schimper's Researches in Vegetable Palæontology, by M. Ch. Grad; and a lecture given by M. Bouchardat at the Paris Academy of Medicine "On the Mortality of Foster-children."

### SOCIETIES AND ACADEMIES

LONDON

Geological Society, December 22, 1869.—Prof. Huxley, LL.D., F.R.S., in the chair. Messrs. Hopkinson, J. Sanders, and Jabez Church, C.E., were elected Fellows of the Society. The following communications were read:—1. "On the Iron-ores associated with the Basalts of the North-east of Ireland." By Mr. Ralph Tate, Assoc. Linn. Soc., F.G.S., and John S. Holden, M.D., F.G.S. The authors introduced their account of the iron-ores of the Antrim basalts, by stating that since 1790 an iron band had been known in the midst of the basalt of the Giant's Causeway, but that only within the last few years have further discoveries been made, which have developed a new branch of industry in the north-east of Ireland. The iron-ore of the numerous exposures was considered to represent portions of one sheet extending uniformly throughout the basalt and over a very large area. Indeed everywhere the iron band and its associated rock-masses present identical features, from which the authors deduced the following generalised section:—The underlying basalt gradually passes upwards into a variegated lithomarge of about 30 feet thick, graduating insensibly into a red or yellow ochre or bole of about 5-6 feet in thickness, which passes into a dense red ochreous mass of about 2 feet, charged with ferruginous spheroids consisting chiefly of a protoxide and peroxide. The spheroids are of the average size of peas; they increase in number and size towards the upper part of the band, and not unfrequently constitute that portion of it. The line of junction between the iron band and the overlying, and usually more or less columnar basalt, is in all cases well defined, and in a few instances exhibits decided unconformability. The authors discussed the several theories that may be suggested to account for the origin of the present condition of the pisolitic ore, and proceeded to point out what appear to have been the several stages of metamorphic action by which the pisolitic ore had been elaborated out of basalt. From field observations and chemical analysis, they have been led to consider the bole and lithomarge as the resultants of aqueous action in combination with acidulated gases, which, dissolving out certain mineral substances, has effected the decomposition of the basalts; and to assume that the bole underlying the iron band was a wet terrestrial surface, and that the subsequent outflow of basalt effected, by its heat, pressure, and evolved gases, a reduction of the contained oxides of iron into the more concentrated form in which they occur in the pisolite, the aggregation of the ferruginous particles being a result of the same actions. The ferruginous series, with interstratified plant-beds at Ballypalidy, was next described, and demonstrated to be of sedimentary origin; the ferruginous conglomerate resulting from the degradation of the pisolitic ore, of which it is chiefly reconstructed, and of the underlying ochres. Many additions were made to the list of plant remains from these beds; and priority of discovery of plants in the Antrim basalts was accorded to Dr. Bryce, F.G.S. Mr. D. Forbes was not prepared to admit some of the theoretical conclusions of the authors, and objected to calling in metamorphism to account for all that was hard to be understood. He could not recognise the division of beds so similar in character into two classes. He wished to know, assuming that the iron-ore merely resulted from the decomposition of the basalt, what became of all the silica and alumina which constituted three-fourths of the mass. The origin of the pisolitic ores was in fact organic. In Sweden certain lakes were regularly dredged each year for the pisolitic ore still in course of formation by means of confervoid algae. He therefore regarded the whole of these beds as in a certain sense sedimentary, and though due to organic agency, yet still deriving their original mineral matter indirectly from the basalt. The basalt contained a considerable amount both of phosphorus and sulphur; and if the ores had been derived directly from the basalt, both these substances would have been present in them. This was an argument against any direct metamorphism. The presence of vanadium afforded additional reasons for regarding these ores as formed in the same manner as bog iron and