into the text brief statements of the laws of Gay-Lussac, Arogadro, Dulong, and Petit, and by adding an appendix upon the determination of atomic and molecular weights. Still, it strikes us that these alterations in the text might have been carried farther with advantage. As it is, the student can hardly fail to be confused by the passage from equivalent to atomic weights; and the book should have recalled to his memory a discussion of molecules and molecular weights in order to make the transition intelligible. The subsequent chapter upon valence makes this omission all the more noticeable.

NOTES AND NEWS.

Commander Bartlett's annual report on the operations of the U. S. hydrographic office makes a good showing for activity and enterprise. Lists of light-houses and 'notices to mariners,' in which bearings are given in degrees from true north, instead of magnetic bearings in points, as formerly, have been liberally published; the official correspondence with other hydrographic offices has been increased; and a complete set of the charts issued by all nations is kept on file, and is always at the service of the public for the determination of any questions relating to hydrography. The only vessel engaged in making surveys during the year was the Ranger, on the west coast of Mexico and Central America; but it is strongly recommended that new surveys be undertaken in several regions where they have long been wanted. The charts of the northern coast of South America are mostly based on old Spanish surveys dating back to 1794. 'Watson's rock,' latitude 40° 17′ north, longitude 53° 22′ west, in the path of North-Atlantic traders, has been reported so many times that its existence ought to be definitely settled or unsettled. The recommendation of previous hydrographers with regard to surveys of the Caroline and Marshall Islands, in the equatorial Pacific, should no longer be neglected: they lie in the belt of the trade-winds and westerly current, the natural highway of vessels crossing the ocean to Japan, China, and the East Indies, and require immediate examination. In the North Pacific alone there are over three thousand reported dangers that need decisive observation. In many cases the same island has half a dozen different positions, with as much as fifty miles between the extremes. It is urged that every naval vessel be provided with modern sounding-apparatus, by which even deep-sea measures can be quickly made, and required to sound wherever the charts show no depths reported within twenty miles on any side; and it is desired that a ship should be fitted out expressly to make investigations into ocean temperatures at all depths, and thus obtain data necessary to complete the determination of the actual oceanic circulation.

— In an attractive volume entitled 'Higher education in Germany and England' (Kegan, Paul, & Co.), which may be read through at a sitting, Mr. Charles Bird has given an account of what is done in Stuttgart, Germany, for the promotion of higher education. In a recent visit to the capital of Wurtemberg, it occurred to him to describe the educational equipment of a German town, and to institute a comparison between what is already done in Germany, and what is hoped for in England. All three varieties of high schools, — the gymnasium, the real-gymnasium, and the real-school, — corresponding very closely in their purposes to our colleges and scientific schools, are maintained in Stuttgart; but the university is wanting. There is, however, a *Polytechnicum*, which, as most of our readers are aware, has nearly the same relation to the real-schools as the universities have to the gymnasia.

The book, being written by an expert for a specific public purpose, is excellent reading. Among many things which we might cull, we select a table showing where the school population of Stuttgart may be found. It is estimated that one-seventh of the population, or 17,000 persons, should be under instruction; and of this number, 15,550 are thus accounted for: —

At universities	100
At the polytechnic	350
At the baugewerk schule	600
At the art school	300
At the two gymnasiums	1,300
At the real-gymnasium	900
At the realschule	1,100
At the two girls' high schools	900
At the burger school for boys	1,000
At the burger school for girls	1,000
At the volkschulen for boys	4,000
At the volkschulen for girls	4,000
Total	15,550

Higher than elementary, 7,550; elementary, 8,000.

How would our American towns bear comparison with Stuttgart?

— It is now proposed to carry the railway-trains across the English Channel on steamers; and the London, Brighton, and South coast railway company is having constructed at Glasgow two propellers suitable for the purpose.

— Stenographic notes of Sir William Thomson's course of eighteen lectures at the Johns Hopkins university, on molecular dynamics, were taken by Mr. A. S. Hathaway, B.S., Cornell university, lately a mathematical fellow of the Johns Hopkins university; and these notes, with additions subsequently made by the lecturer, have been carefully reproduced by the papyrograph plate process. A bibliography of the subjects considered will also be given with the lectures. In all, there will be about three hundred and fifty pages quarto. A few copies are offered for sale at five dollars net. The edition is strictly limited to three hundred copies; and orders should therefore be sent at once to the publication agency of the Johns Hopkins university, Baltimore, Md.

— A third series of Johns Hopkins university 'Studies in historical and political science,' comprising about six hundred pages in twelve monthly monographs devoted to American institutions an

economics, is offered to subscribers at the former rate, three dollars. As before, a limited number of 'studies' will be sold separately, although at higher rates than to subscribers for the whole set. Special announcements will be made in December as to the subjects of the early numbers in the third series, for which subscriptions will now be received. In general it may be said, that the new series will include papers on local and municipal government, state and national institutions, and American economic history. The very limited number of complete sets of the first series now remaining in the hands of the publication agency of the university, compels the announcement that no further subscriptions for that volume can be received at the original rate of three dollars. A few sets, bound in cloth, will be sold at five dollars net, by the publication agency only. The future interests of the work represented by this journal will require the agency to give preference, in disposing of the remainder of the first series, to libraries, specialists, and other patrons who are likely to prove continuous subscribers to the 'studies.'

— At the requisition of the Paris prefect of police, Messrs. Dujardin, Beaumetz, Pasteur, and Roux performed experiments with the view of ascertaining what would be the best gas for disinfecting rooms in which patients have suffered from contagious affections, and have come to the conclusion that sulphurous-acid gas would be the most efficacious for such purposes; but instead of simply burning sulphur, as is done in the barracks and military hospitals, they recommend the burning of bisulphide of carbon as being the least expensive, and the least injurious to the furniture, or articles of metal, in the room. This recommendation is not new, but it is satisfactory to have it stamped with the authority of the distinguished Frenchmen.

— Among recent deaths we note the following: J. A. Barral, agricultural chemist, editor of Arago's works, at Paris, in his sixty-fifth year; Dr. J. J. Woodward, U. S. A., microscopist, well known for his micro-photographs, at Washington; Dr. Th. Köstlin, formerly professor of natural history, Sept. 1, at Stuttgart; Dr. Heinrich Schellen, physicist, author of 'Spectral-analyse,' 'Magnet- und dynamo-electrische maschinen,' 'Electro-magneticher telegraph,' etc., Sept. 3, at Cologne, in his sixty-sixth year; O. J. Fahraeus, coleopterist, May 28, at Stockholm, in his eighty-eighth year; George Brettingham Sowerby, conchologist, author of 'Thesaurus conchyliorum,' July 25, at London, in his seventy-second year; Dr. A. Foerster, a well-known hymenopterist, Aug. 13, at Aachen, in his seventy-fourth year.

— The Imperial sanitary department at Berlin has been arranging for a series of investigations dealing with the practical dangers arising from the use of petroleum, in comparison with the point of ignition as fixed by Abel's apparatus. The ignition of gases which are to be found above the oil, and the nature of such ignitions as are caused by injury to the oil-reservoir, or by throwing down the lamps, will also receive attention. As all artificial trials of this kind are more or less unreliable in the results obtained, the investigations will deal with the cases of petroleum ignition which have actually taken place. The examination will deal with hanging-lamps, standing-lamps, cooking-appliances, etc.

— The Ainos are distinguished from all the Mongolian peoples surrounding them by their dark complexion, their luxuriant growth of hair, their thick, long beard, heavy mustache, and their European rather than Asiatic features. During his journey in Kamtchatka, Dybowski visited the Island of Saghalin, and took the opportunity of collecting some bones of the Ainos. The following account of the graveyards of the Ainos he sent to Koperniki: —

Unfortunately, almost all the graves have already been rifled by the Russian soldiers, who hoped to find gold and silver buried with the bodies: hence I have found, outside the graves, skulls without the lower jaw. Many, indeed, are broken into small pieces. Very few graves are left entirely undisturbed; viz., those only which are covered with turf, and consequently more difficult to find, and which can hardly be opened without implements; but with these one is not allowed to enter the graveyard, for the opening of graves is forbidden. On account of this prohibition, the search of the graves was made very difficult for me, as I was forced to dig with my hands, or only with a small stick. Fortunately the graves of the Ainos are not deep: they extend north and south, the head buried towards the north. On the right side of the grave, which is covered with turf, are embedded three low pillars about three inches thick and one and a half feet long. On the left side, at the foot of the dead, is found a thin, pointed stick, thrust deep into the earth. The upper end of it is cut in the form of a human head, with two inclined lines running downwards and outwards, as if they were intended to indicate two streams of tears, or perhaps only the eyes. A yard and a half under the sward are found split (not sawn) planks, which rest upon other planks that make the walls of the grave, so that the corpse lies in an empty space. The dead is in the same clothes which he wore when alive, and is provided with the same ornaments which he then carried On the planks over the head of the dead, I have always found three lacquered wooden boxes, and near the feet one large box, also lacquered. On the body I have always found a knife, a tinder-box, a piece of touch-wood, and a pipe.

According to the accounts of eye-witnesses, the religious conceptions of the Ainos appear to be a degenerate and crude feticism. These conceptions are based upon a worship of numerous good and bad spirits or gods, as god of the sun, of the stars, of the sea; worship of the family guardian, of sea and land animals and plants, as also of forest animals. The Ainos have no conception of the continuation of the soul after death, and consequently no service for the dead.

— At the first monthly meeting, Oct. 15, this winter, of the Russian geographical society, the secretary mentioned that the observations of the polar

station at Sagastyr (mouth of the Lena) were ended, and the greater number of the party expected to return this autumn. Only Dr. Bunge staid behind, on account of an entire mammoth, which has been known for some years to exist not far from Sagastyr, and which he was eager to secure. This work, on account of the frozen soil, proved to be a rather arduous task, and he is not expected back until next winter. Leaving seven men of his party at Zaïdam, Prjevalski has started for the sources of the Yellow River. He was expected to return to Zaïdam in August. According to the latest news, Potanin was about to start from Peking, going to Kukuchoto, not by the ordinary road already visited by Europeans, but by Utaë. This place is interesting on account of a Buddhist monastery, a famous place for pilgrimages, and on account of the proximity of mountains said by the Chinese to be ten thousand feet high. The secretary also mentioned the ethnographical travels of three members, — Istourine, who visited Archangel; and Houetz and Wolter, who travelled among the Letto-Lithuanian population of the government of Wilna, Witebsk, and Kowno.

This was followed by a communication on a partial ascent of the Elborus by the mining engineer, Iwanof, well known for his travels in the Pamir in 1883. The natives are convinced that the ascent is impossible; yet the south-eastern summit was ascended in 1869 by Freshfield, Moore, and Tucker; the north-western, by Grover, Gardiner, etc., in 1874; and the western, by Dechy in 1884. Unfortunately these travellers were not scientific men. Russian travellers were less fortunate in their attempts, but their work was more useful to science; for example, that of Muschketone who explored the glaciers on the south-east of the mountains. Iwanof could not ascend farther than 15,700 feet, being prevented by a severe snow-storm. He was obliged to go with his travelling companion only above 13,000 feet, their native porters refusing to go farther, notwithstanding the steepest slopes were below; the gradient from that place upward being very easy, mostly 10° and below. At nearly 15,000 feet, before the snow-storm was reached, the temperature was rather high, —1½° C. Iwanof thinks, that, though access from other directions may be easy, the Elborus will be ascended from the south-east, as on that side there is a considerable population to an elevation of more than 8,000 feet; and thus supplies, porters, etc., may easily be obtained, and the great drawback of mountain travelling in the Caucasus avoided. He mentions especially the assistance which can be obtained here from a native gentleman, Prince Ismael Uruskief, through his practical knowledge of the mountains.

— The *Oil and colourman's journal* for October contains an interesting article on the Scottish mineral-oil trade. It is only about thirty years since James Young began his famous Bathgate oil-works, and only about twenty since the attempt was first made to start shale distilling-works. Now the amount of oil shale brought to the surface daily is about 5,000 tons. The whole of that is distilled for the production of solid paraffine, paraffine-oil, and collateral products yielding at the rate of 50,000,000 gallons of crude oil and 14,000 tons of sulphate of ammonia per annum. From that vast quantity of crude oil there are prepared about 500,000 barrels (each containing 40 gallons) of burning-oil, 30,000 tons (or upwards of 800,000 gallons) of lubricating-oil, and 19,000 tons of solid paraffine. Not less than £2,000,000 has been invested in the Scottish oil-works, most of which yields a handsome return. The annual value of the trade is now about £1,750,000, and the number of persons who directly get their living by the industry cannot be fewer than 9,500. The enormous American oil trade, however, makes skilful working a necessity to the Scotch. Continuous distillation has been the object in view now for many years, and this has at last been obtained through the process patented by Mr. Horman M. Henderson of the Broxburn oil company, which has now been in operation more than a year. Under this process the stills are found to work steadily, continuously, and uniformly. Impurities and heavy oil never accumulate, and the quality of the products is improved. The purified once-run oil is fractionated continuously in a connected series of three cylindrical stills.

— The producers of petroleum on the western shore of the Caspian Sea, it is said, have been seriously contemplating laying a pipe-line entirely across Persia to the Persian Gulf. If this were done, they claim that they would have the Asiatic market to themselves. This pipe-line would have to be something more than seven hundred miles long to reach the coast; and as it would for a long distance pass through a territory of savage Kurds, and other nomadic tribes, it is feared that it could not easily be kept in operation.

— The municipality of Issoudun has resolved to erect a monument to Nicholas Leblanc, the pioneer in the artificial soda industry. A hundred years ago the French government consulted the academy as to the best means of replacing the soda-supply, for which they had been dependent on Spain; and a prize of twelve thousand francs was offered to the inventor of a successful process for extracting the alkali from sea-salt. When Leblanc had fulfilled the conditions of the prize, the academy had ceased to exist: the inventor was obliged to renounce his rights, to close his factory, and to live in the extreme of penury, until finally he committed suicide.

— The council of the re-organized Archaeological institute of America met in New York, Nov. 20, and elected Prof. C. E. Norton of Cambridge, president; Prof. H. Drissler of New York, vice-president; Mr. George Wigglesworth of Boston, treasurer; and Dr. Frothingham of Baltimore, secretary.

— Mr. F. de la Touche, of the geological survey of India, has written a report on the Langrin coalfield, which is situated in the south-west Khasia hills, Assam. Mr. de la Touche says the coal-bearing rocks are exposed over an area of nearly eighty miles, and he thinks there is a large amount of coal available within a short distance of the plains. Limestone is also to be found in many parts of the country, and,

after being quarried in the coal season, is taken down to Sunamganj, on the Surma River, where it is burnt in holes in the river-bank, reeds being used as fuel. The lime is finally taken to Calcutta, but an interval of two years elapses from the time the stone is quarried until it is sent to market. It is suggested, that, if the coal on the spot were used in properly constructed kilns, a great saving of the time and expenditure would be effected.

— The French minister of instruction has despatched the following scientific missions: Mr. Brau de St. Pol Lias is sent to Sumatra and Malacca to make collections; Professor Guardia, to study the Balearic dialects; Mr. Étienne Gautier, to make investigations in natural history and anthropology in Asiatic Turkey and Persia; and Professor Henri Lerwis, to study leprosy in Norway.

— The composition and properties of the light emitted by insects of the Pyrophore genus form the subject of a paper recently presented to the Paris academy of sciences by Aubert and P. Dubois. The spectrum of the light, examined by the spectroscope, is very beautiful, but destitute of dark bands. When, however, the intensity diminishes, the red and orange disappear, and the green and yellow only remain.

— Admiral Cochrane of the English navy has recently suggested a novel plan for the defence of vessels of commerce from attacks of men-of-war. He proposes that these vessels should be armed with a pair of mortars of considerable range, placed in the same plane fifty to eighty feet apart, and so arranged that they may be simultaneously discharged by electricity. The mortars are each to be loaded with a small charge of powder; and on this is to be placed a buoyant, concussive torpedo of light weight and thin metal, which is to contain a bursting charge of gun-cotton or other high explosive. The torpedoes are to be connected by a light but very strong line from a hundred to two hundred feet long, the surplus of which is to be coiled about the torpedoes when in the mortar. When the mortars are discharged, the torpedoes will diverge slightly, and fall into the water some distance apart, where they will float with the line between them. If then the man-of-war in pursuit continues in a direct path toward her intended prey, she will run foul of the line, and the torpedoes will be drawn under her sides, and explode on contact.

— Some interesting fulgurites have been received by the National museum from Whiteside county, Ill. The largest one found measured two inches in diameter: it was unfortunately broken in transportation. The largest specimen of those received intact measures one inch and a half in diameter and four inches in length. Mr. Abbott, the donor of these specimens, states that he traced the tubes to a depth of seven feet in the sand.

— Past assistant surgeon H. G. Beyer, U.S.N., is giving a course of twelve illustrated lectures before the Naval medical society of Washington upon the development of vertebrate animals.

— A somewhat novel device for illustrating the microscopic structure of rocks has been brought into use in the geological department of the National museum. A series of photomicrographs was prepared from twelve thin sections of typical rocks, and the former were then thrown upon glass, forming transparencies twelve inches in diameter. The latter were afterwards colored by hand, the artist taking his tints from an examination of the sections themselves under the microscope and in polarized light. The transparencies thus produced are highly artistic in effect, and, on account of their accuracy and attractiveness, must prove an important addition to the educational series of the museum.

— The increasing interest in good methods of library administration is illustrated by a call for a conference of western librarians, to be held at Rock Island, Ill., Dec. 3, and to continue in session during two days. Mr. W. F. Poole of the public library in Chicago is the president and convening officer.

— To supplement the building-stone collection of the National museum in the way of illustrating the adaptability of certain kinds of stone to architectural purposes, a series of photographic negatives of some of the important stone buildings of the country has been obtained, from which enlarged prints (thirty inches by forty inches) have been prepared. These prints have been painted in a manner to show the natural colors of the stone of which the buildings are constructed. Among the prominent buildings represented are the Smithsonian institution, the University of Pennsylvania, the residence of Mr. William H. Vanderbilt (New York), and the Harvard law school (Cambridge).

— It is reported in Berlin that Dr. Koch has succeeded in transferring the cholera bacilli to several rabbits, which have died with all the symptoms of genuine cholera. The priority of success in this experiment is disputed by two Swiss physicians, Messrs. Nicati and Ritsch.

— The Japanese native papers are crying out at the extinction of the lacquer industry of the country. The trees from which the varnish is obtained are disappearing. Formerly, like the mulberry-tree on which the silk-worm feeds, it was protected by law. Each family of the upper classes was obliged to rear a hundred trees, the middle classes seventy, and the lower classes forty. Since this law became a dead letter, the cultivation of the lacquer-tree has rapidly declined. The trees were cut down without care, and none were planted to replace them, so that they have become exceedingly rare, while the price of lacquer has enormously increased. Similar complaints are heard of the process of deforestation going on in Japan since the ancient law, which required every one who cut down a tree to plant two in its place, was abolished.

— A Chinaman, named Chen-Ki-Souen, has written a monograph on the famous Chinese ink, commonly known as India ink, from a translation of which the *Oil and colourman's journal* prints the following abstract. The Chinese writer describes every stage of the preparation of India ink with great accu-

racy and elaborate detail. The author states that a kind of pigment ink was discovered somewhere between 2697 and 2597 B.C. It was employed for writing on silk with a bamboo rod. Afterward an ink was prepared from a certain stone, which is still known in China as Che-hei. It was not until about 260 B.C. that they began to make an ink from soot or lampblack. The soot was obtained by burning gum-lac and pine wood. This ink was made first in round balls, and very soon supplanted the stone ink. For a considerable period the province of Kiang-Si appears to have had a monopoly of ink-making. Under the dynasty of Tang, 613 to 915 A.D., there was a special officer, called an inspector, who had charge of its manufacture. He had to furnish the Chinese court with a certain quantity of this ink annually. Some of the factories seem to have been 'Royal Chinese' factories. The emperor Hinan Tsong (713–756 A.D.) founded two universities, to which he sent three hundred and thirty-six balls of ink four times a year. The most celebrated factory in China is that of Li-Ting-Kovei, who lived in the latter part of the reign of Tang, and made an excellent article. He made his ink in the shape of a sword or staff, or in round cakes. The test of its authenticity consisted in breaking up the rod, and putting the pieces in water: if it remained intact at the end of a month, it was genuine Li-Ting-Kovei. Since the death of this celebrated manufacturer, there seems to have been no perceptible advance made in the making of India ink. In the manufacture of lampblack, nearly every thing is used that will burn. Besides pine wood, we may mention petroleum, plant-oils, perfumed rice-flour, pomegranate bark, rhinoceros horn, pearls, and musk. Nor does fraud seem to have been entirely wanting. According to the best Chinese authorities, the best India ink smells like musk, and the addition of musk not only serves to give poor goods the resemblance of finer ones, but also actually makes them more serviceable. The binding-agent is the most important ingredient next to the lampblack. In former times glue made from the horns of the rhinoceros and of deer was employed: now only ordinary glue and isinglass are used. Good Chinese ink improves with age, and should not be used until a few years after it is made, but must be entirely protected from moisture. In using, it should only be rubbed backwards and forwards, as, for some unexplained reason, rubbing it round and round hardens it.

— D. Wedding, says the *Athenaeum*, has been making experiments showing that the capacity for welding increases with the amount of silicon present, and decreases with any excess of manganese. The latter acts by interfering with the crystalline structure of the iron, and confirms Ledebur's idea that all adventitious bodies influence welding in proportion to their amount.

— Capt. Walker of the steamship Para at Philadelphia, Nov. 17, reports that on two successive occasions he thinks his vessel was saved by the use of oil. In one instance he was running before a heavy gale in the Formosa Channel, China, and the sea was remarkably high. His vessel was in great danger of being pooped, as she was coal laden and very deep. He concluded to try oil, and hung two canvas bags upon each quarter. Sufficient oil oozed through the canvas to answer his purpose, and the sea ceased breaking at once. Only four or five gallons of oil were expended in twelve hours.

Capt. Petersen of the Norwegian bark British Queen reports that about one year ago he commanded a vessel which was trying to make the port of Valencia, Spain, in heavy weather. Just before making the breakwater, the wind hauled ahead, and he was forced to let go his anchor. The storm increased, and seas swept over the vessel fore and aft. He lowered a canvas bag of oil from the jibboom, and the seas no longer broke over the vessel.

— The students of Berlin university have organized a new association among themselves, — a society of students of the science of dentistry. They have added the American stars and stripes to their banner in acknowledgment of the debt this science owes to the United States.

— Mr. Spence Paterson, British consul at Reykjavik, writes to the London *Standard* that on Sept. 9 he visited Cape Reykjanes, the south-west point of Iceland, in order to observe the volcanic island which recently appeared off that cape. It was first seen by the light-keeper at Reykjanes on July 29, and had then the shape of an irregular truncated cone, with a slight hollow on the top, and a projecting shoulder on the north side. No earthquakes or other volcanic manifestations accompanied its appearance; but on Aug. 5 a series of severe shocks occurred, which split the walls of the lighthouse, and damaged the lamps. For several days rain and fog obscured the island. When next seen, its shape had altered: part of the south side had fallen down into the sea, forming two little mounds, and leaving a steep, almost perpendicular face on the south. The height of the island is about two-thirds of its length. It lies about west-south-west of Reykjanes. Two officers of a French war vessel, who recently visited Reykjanes, estimate its distance from the coast at nine or ten miles, but Mr. Paterson believes it to be considerably greater. When first seen, the upper part of the island was perfectly black; but it has now begun to whiten, owing to the droppings of the myriads of sea-fowl which frequent the adjacent coast and neighboring islands, and seem already to have taken possession of the new land. The neighborhood of Reykjanes is noted for volcanic manifestations. Islands have from time to time risen and sunk there; and only a couple of years ago a violent eruption occurred near the spot where the new island lies: columns of smoke and steam rose out of the sea, and large quantities of pumice were thrown up, and floated ashore on the neighboring coast. *Nature* of Nov. 13 gives pictures of the past and present appearance of the island.

— Dr. Finsch, the German explorer, left Sydney in the Samoa on Sept. 10, to explore the Phoenix and Union Islands.