The New Metal "Gallium."

A lecture was recently delivered by Professor Odling at the Royal Institution on the new metal "gallium." The professor said that the number of kinds of matter known to chemists which they have not succeeded in decomposing, but can trace undecomposed through distinct series of combinations, is 64. These have been roughly classified into metals, semi-metals, and non-metals, the first class being considerably the most numerous, and the several classes merging gradually into one another. The latest known of the non-metallic elements is bromine, which was discovered in 1826 by the eminent French chemist, recently deceased, M. Balard. Within the last 20 years, however, five new metallic elements have been discovered, being at the average rate of one new element every four years; while some evidence of the identification also of yet a sixth new metallic element has recently been put on record. But the latest known of the fully made out new elements is gallium, which was first recognized by M. Lecoq de Boisbaudran in the autumn of the year 1875, and so named by him in honor of the land of its discovery, France. Like its four predecessors made known within the last 20 years, gallium was discovered by the process of spectrum analysis, applied in this instance in a special manner contrived by the ingenuity of M. de Boisbaudran himself, long eminent as a spectroscopist. The spectrum of gallium is characterized by two marked violet lines, the less refrangible of them being especially brilliant. Hitherto the new metal has been recognized only in certain varieties of zinc blende, that of Pierrefitte in the Pyrenees having furnished the chief portion of gallium hitherto obtained from any source whatever—nearly half a ton of this ore having been employed by M. de Boisbaudran to furnish the dozen grains or so of metal wherewith he has been able to establish the leading properties of the element. In its appearance gallium manifests a general resemblance to lead, but is not so blue tinted or quite so soft, though it is readily malleable, flexible, and capable of being cut with a knife. Like lead again, and unlike zinc, gallium is not an easily volatile metal. Unlike lead, however, it acquires only a very slight tarnish on exposure to moist air, and undergoes scarcely any calcination at a red heat. The specific gravity of gallium is a little under 6, that of aluminum being 2·6, that of zinc 7·1, and that of lead 11·4. A most remarkable property of gallium is its low melting point. It liquefies completely at 86° Fah., or below the heat of the hand; and, still more curiously, when once melted at this temperature, it may be cooled down even to the freezing point of water without solidifying, and may be kept unchanged in the liquid state for months. Indeed, in the original communication of its discovery to the French Academy, it was described as a new liquid metal, similar to mercury; but on touching with a fragment of solid gallium a portion of the liquid metal in this state of so-called sur-fusion it at once solidifies. Unlike lead, again, gallium is a highly crystalline metal, its form being that of a square octahedron. In its chemical habitudes the rare element gallium shows the greatest analogy to the abundant element aluminum. In particular it forms a sort of alum not to be distinguished in its appearance from ordinary alum, but containing oxide of gallium instead of oxide of aluminum or alumina.

But the chief interest of gallium, from a scientific point of view, is connected with the history of its discovery. All previously known elements have been discovered, so to speak, accidentally, and their properties have been not in any way foreseen, but rather met with as subjects of surprise; but the blende of Pierrefitte was deliberately taken up for examination by M. Lecoq de Boisbaudran in the expectation of finding a new element—an expectation to which he was led, in the course of his study of the spectra of known elements, by a train of speculation of which he has not yet made known the details. The existence of an element having the characteristic properties of gallium was, moreover, upon entirely different grounds, predicted very definitely by a Russian chemist, M. Mendelejeff, in 1871, and in a more general way several years earlier by an English chemist, Mr. Newlands. This double prediction was based on a study of the relations of the known atomic numbers of the elements. These numbers have only lately been perceived to form a tolerably continuous seriation, which, again, is associated in a remarkable manner with the seriation in properties of the elements themselves. In the series of numbers, however, certain terms are here and there missing, and in particular a number was missing which should belong to an element having properties intermediate between those of aluminum and iridium. What these properties would be was predicted in most minute detail by M. Mendelejeff in 1871. He predicted, for example, that the specific gravity of the missing metal would prove to be about 5·9. Operating on very small quantities, M. de Boisbaudran, in the first instance, found the specific gravity of gallium to be 4·7; but on repeating his determination in 1876, with special precautions and on a somewhat larger though still very small scale, he found it to be exactly 5·935, certainly a most remarkable fulfillment of the prediction with regard to it.

Eight Hours a Day.

Under a recent order of the Secretary of the Navy, the pay of all workingmen is fixed on the basis of ten hours for a day's work, and consequently those who work only eight hours a day will be paid one fifth less. The promulgation of this order has brought a large delegation from the various Navy Yards to interview the Secretary and induce him to revoke the order. The delegation was informed by the Secretary that, in his opinion, labor under the Government should have no advantages over, and should be placed on the same basis as, that engaged in private industries. In view of this, under the present interpretation of the law, he should be compelled to enforce his order. If Congress, however, would more clearly define the law and fix eight hours as a full day's work, he would not in any way interfere with its execution.

In this connection it may be stated that the House Committee on Education and Labor has agreed to report a joint resolution declaratory of the meaning of the eight hour law, to the effect that, while that law stands on the statute book, a full day's pay shall be paid for eight hours' work in the Government service.

ASTRONOMICAL NOTES.

BY BERLIN H. WRIGHT.

PENN YAN, N. Y., Saturday, April 6, 1878.

The following calculations are adapted to the latitude of New York city, and are expressed in true or clock time, being for the date given in the caption when not otherwise stated.

PLANETS.

	H.M.		H.M.
Mercury sets	7 52 eve.	Saturn rises	5 01 mo.
Venus rises	3 47 mo.	Uranus in meridian	8 52 eve.
Mars sets	11 07 eve.	Uranus sets	3 44 mo.
Jupiter rises	2 37 mo.	Neptune sets	8 01 eve.

FIRST MAGNITUDE STARS.

	H.M.		H.M.
Antares rises	11 01 eve.	Sirius in meridian	5 39 eve.
Regulus in meridian	9 01 eve.	Procyon in meridian	6 32 eve.
Spica rises	6 55 eve.	Aldebaran sets	10 26 eve.
Arcturus in meridian	1 13 mo.	Algol (2d-4th mag. var.) sets	11 08 eve.
Altair rises	0 18 mo.	Capella sets	2 19 mo.
Vega rises	8 38 eve.	7 stars (cluster) sets	10 08 eve.
Deneb rises	9 41 eve.	Betelgeuse sets	11 13 eve.
Alpheratz sets	6 53 eve.	Rigel sets	9 39 eve.

REMARKS.

Mercury is rapidly approaching his eastern elongation, and six days hence, April 12, will be most brilliant. He can, however, be seen at present, as he is 1h. 22m. high at sunset, and somewhat north of the sun's path. From April 10 to 15 will be a very favorable opportunity to observe this planet, owing to his extreme northern latitude and the short twilight. Near Neptune April 9, being 4° north. Mars will be nearest the moon April 7, being 3½° south. Uranus will be nearest the moon April 12, 10h. 33m. evening, being only about 1°, or double the moon's apparent diameter, north.

Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations in the following notes are by students of Vassar College. Although merely approximate, they are sufficiently accurate to enable the observer to find the planets.

M. M.

Position of Planets for April, 1878.

Mercury.

On April 1 Mercury rises at 6h. 12m. A.M., and sets at 7h. 22m. P.M. On April 30 Mercury rises at 5h. 19m. A.M., and sets at 7h. 43m. P.M.

Mercury should be looked for some 8° or 9° north of the point of sunset. It will be in the best position about the middle of the month.

Venus.

The morning skies in April will be as rich in the number and brilliancy of the planets as were the evening skies in the preceding autumn. Venus will be very brilliant all through the month.

On April 1 Venus rises a little before 4 A.M., and sets near 3 P.M. On April 30 Venus rises at 3h. 15m. A.M., and sets in the afternoon near 3 o'clock.

Venus can probably be seen with the naked eye, at meridian passage, between 9h. A.M. and 9h. 30m. A.M. through the month.

Mars.

Mars is still a noticeable object in the evening skies. It rises on April 1 at 8h. 17m. A.M., and sets at 11h. 14m. P.M. On the 30th Mars rises at 7h. 33m. A.M., and sets at 10h. 47m. P.M.

Mars will be 7° north of Aldebaran and have nearly the same right ascension on April 2.

Jupiter.

On April 1 Jupiter rises at 2h. 57m. A.M., and sets at 27m. after noon. On the 30th Jupiter rises at 1h. 13m. A. M., and sets at 10h. 50m. A.M.

Although Jupiter is far south, it cannot fail to attract the attention of any one who looks out upon the morning skies.

Saturn.

On April 1 Saturn rises at 5h. 19m. A.M., and sets at 4h. 52m. P.M. On the 30th Saturn rises at 3h. 33m. A.M., and sets at 3h. 15m. P.M.

In the latter part of the month Saturn, Venus, and Jupiter will all be brilliant in the morning. Saturn rises later than Venus, and keeps very nearly the same diurnal path; it will seem pale and small when compared with Venus, but can be recognized, being much brighter than the stars around it.

Uranus.

Uranus comes to the meridian in the evening, and is favorably situated for every observer. It is no longer so near to Regulus as to come into the same field with a glass of any considerable magnifying power. But it can be found by sweeping around Regulus, and will be known by its pale white moon-like disk.

On the 1st Uranus comes to the meridian at 9h. 12m., while Regulus comes to the meridian at 9h. 21m. Uranus is 1°7′ above Regulus. The sweep of the telescope should be 2¼° west of Regulus and 1° 7′ above that star. If the planet is found, its place can be easily kept, as its apparent motion among the stars is exceedingly slow; it is moving a little toward the west and slowly increasing in altitude.

On April 1 Uranus sets about 4 A.M., and on the 30th a little after 2 A.M.

Sun Spots.

The year 1878 is that of the minimum of sun spots. The first group seen this year was found on March 14, and photographs were taken on the 15th and 16th. It consisted at this time of eight small spots connected by the gray surrounding known as penumbra. This group must have passed out of sight by the 17th.

The Brain of the Chimpanzee.

We are favored by Dr. E. C. Spitzka with a more detailed report of the autopsy of the dead chimpanzee recently made at the New York Aquarium before many distinguished surgeons and scientists of this city.

Species, Troglodytes niger (chimpanzee); *sex,* male; *age,* about two years. All the organs greatly resemble those found in the human race. When the brain was removed all present were struck by its being almost indistinguishable from that of a human infant, especially at the base. The cerebrum was richly convoluted and overlapped the cerebellum about one third of an inch.

It had also the same lobes, and was as rich in convolutions as the brain of a Bechuana, possessing also a well developed island of Reil. Careful examination, however, showed that it had also an operculum of the occipital lobe, which is not found in the human subject. One of the most interesting features of this brain was the absence of a trapezium, and the presence of the olivary bodies.

Now, although a rudimentary olivary body exists in the lower mammalia, yet it causes no perceptible prominence of the medulla, and such a prominence is first indicated in the baboon.

But in this chimpanzee it was as full and large as in the human race, a fact in full accord with the high development of the lateral lobes of the cerebellum, for the olivary bodies keep pace in development throughout the animal kingdom with the development of the cerebellar hemisphere.

The island of Reil, whose relations to the higher faculties are strongly documented by the prevailing physiological belief that it is subservient to the faculty of speech, was also in this instance large and well developed.

Dr. Spitzka, who is making observations on the brains of other animals, will make a special microscopical study of the present specimen, the result of which will be published later.

Recent Experiments on Digestion.

Professor Garrod, in a recent lecture on the "Protoplastic Theory of Life," observed:

"It has now been for some time known, that though gastric juice will not dissolve the walls of the stomach during life while the blood is circulating through them, as soon as death occurs they are themselves the subject of the action of the juice. Both in *post mortem* examinations and in observations on newly killed rabbits this has been clearly proved." Professor Garrod exhibited a suggestive apparatus he had devised to illustrate how the walls are preserved.

A small furnace was made of coils of metal gas piping, and so arranged that a supply of water circulated through the tubing. In this furnace a fire was maintained at a great heat.

The piping was not apparently affected. As soon as the water supply was cut off, however, the piping began to melt and soon fell away. The stoppage of the flow of water was intended to represent the stoppage of the circulation of the blood in the walls of the stomach, while the fire would illustrate the action of the gastric juice.

Some experiments of Claude Bernard were also explained, by which he was able to determine the function of the pancreas.

The pancreatic juice acts mainly on the starchy foods, and also helps to change fats into materials that can permeate through the walls, and so get from the alimentary canal into the blood system.

The effect was illustrated by taking two moist filter papers containing oil. To one some pancreatic emulsion had been added an hour previously, and here a passage through the filter paper had occurred. In the other case, without anything added to the oil, nothing had passed.

Bernard's researches on the liver appeared to suggest that most probably the bile is partly a secretion and partly an excretion, the result of the selective process of the liver on the blood as it passes through it.

Formula for Making Citrate of Magnesia.

Jenning's carbonate of magnesia	4 ounces.
Citric acid	8 "
Oil of lemon	25 drops.
Sugar	14 ounces.
Water	q. s.

Drop the lemon oil on 4 ounces of carbonate of magnesia, scrape it, and place, together with the citric acid and six parts of water, in a wide mouth bottle. In the course of a few hours the solution will be effected. Add the sugar, and dissolve by frequent agitation. Filter through paper, and divide the clear liquid into twelve suitable bottles. Lastly, these bottles must be nearly filled with filtered water, and to each of them is added, immediately before corking, forty grains of chemically pure bicarbonate of soda.