II. In any one metal the force of cohesion varies inversely as the square of the distance between the centres of its atoms.

We may expect these facts to be of great use in the study of the properties of matter. For, knowing the size and weight of the atoms and the velocity with which they move, all that was wanting to enable us to calculate the behavior of the atoms of matter, in the same way as we do the motions of the planets, was a knowledge of the laws of the force which holds them together; and, from the evidence given above, I have no doubt that you will agree with me in saying that we have at least made a beginning in that direction.

A few words might be said about Poisson's ratio. It is, as I said, not fair to argue from the behavior of cork or india rubber that there is no relation between longitudinal extension and lateral contraction or between *a* and *b*. When we compress a cork we are not compressing the substance which forms the cork any more than we are compressing a piece of paper when we crumple it up in our hand. A cork is like a dry sponge, and when we squeeze a sponge up in our hand we are simply doubling up the cell-walls, not compressing the substance of the sponge. The only way in which we can determine the compressibility of cork is to soak it in ether or some substance which fills all its pores and then subject it to hydrostatic pressure. In the same way when we stretch india rubber, or ivory or jelly, the longitudinal extension of the piece of rubber is not in the least a measure of the longitudinal extension of the substance of the rubber. All such substances are made up of two parts; rubber, for instance, of a hard elastic skeleton, insoluble in most solvents, and of a soft plastic substance, soluble in many solvents, by use of which the two parts may easily be separated, similarly ivory and jelly. Let us take a square cell as in Fig. 3, the walls of which are of elastic material and the contents an incompressible plastic substance. Suppose it to be extended till its length is 4 centimeters and its breadth and thickness each 2 centimeters, as in Fig. 4. The total area of cell-wall is 40 square centimeters, and the total volume of incompressible contents is 16 cubic centimeters. Imagine the cell to be released, it will regain its position as in Fig. 3, and form a cube of side 2.52 centimeters. In this case, the volume being the same, the cell area will be 38.1 square centimeters. So we find that by stretching the cell till its length was 60 per cent greater than before, we have only had to stretch the cell-walls 5 per cent. This gives us the explanation of the well-known fact that stretched rubber contracts when heated. For if we heat the cell shown in Fig. 4 the incompressible contents will expand and tend to make the cell-walls take that shape in which they can hold the most. This is obviously that of the original cube, therefore the result will be a contraction.

Of course the formulæ, derived from this theory of cohesion, give us the means of calculating the physical properties of metals which have never been examined, or even discovered. For example, it shows us that we have at our disposal a metal far superior to any metal yet known, one which is stronger than iron, lighter than aluminium, and a better electrical conductor than silver. Aluminium, in spite of its lightness, is too weak mechanically and too poor a conductor to be used in many cases. But this new metal is four times as strong as aluminium, and is twice as good a conductor of electricity. The metal referred to is glucinum or beryllium. All that is known about it is that it has an atomic weight of 9.1 and a density of 1.7 to 2, the exact figures not being known. But from these scanty data we can deduce the following figures:

Metal	Rigidity	Tensile st'gth	Conductivity	Sp. gr.
Alumin.	250×10^9	18 Kgms	50	2.75
Silver	280	27	100	10.5
Iron	750	42-65	14	8
Calculated for Glucinum	1300	65	105	2

We also see why diamond is so hard, and that there is only one other thing that might possibly scratch it, and that is a crystal of manganese. With the exception of glucinum, none of the other metals, either discovered or to be discovered, are likely to be any better than those we have now.

NOTES ON LOCAL HEMIPTERA-HETEROPTERA.

BY E. B. SOUTHWICK, PH.D.

IN the CORISIDÆ *Corisa Harrisii* Uhl. is very common in our park lakes, and the drag-net brings many of them to land at every haul. Another species as yet undetermined is about one-third the size of *Harrisii*, and equally abundant.

In NOTONECTIDÆ *Notonecta undulata* Say. is very common. This was at one time known as *variabilis* Fieb., a name quite appropriate, for they are variable to a marked degree, some of them being nearly white, while others are very dark. *Notonecta irrorata* Uhl. is also common, and is a very beautiful insect, and more uniform in coloration.

In NEPIDÆ *Ranatra fusca* Pal. Beauv. is our only representative, as far as my observation goes; this was at one time known as *R. nigra* H. Schf.

In BELOSTOMATIDÆ we have two species. *Benacus griseus* Say., that giant among Hemiptera. This much-named creature has been known as *B. haldemanus* Leidy, *B. harpax* Stal., *B. ruficeps var.* Duf., *B. distinctum* Duf., and *B. augustatum* Guer.; but at last has settled down to *B. griseus*, which name, I hope, gives credit where it belongs. *Zaitha fluminea* Say. is very common in our lakes, and the females are often taken with their backs completely covered with eggs, deposited in regular rows upon the elytra; at the same time the young of all sizes will be brought up with the drag-net.

In the family HYDRODROMICA and sub-family SALDIDÆ I have but one representative species, *Salda orbiculata* Uhl., and it is exceedingly rare.

In the sub-family HYDROBATIDÆ I have taken three species, viz., *Limnoporus rufoscutellus* Lat., *Limnotrechus marginatus* Say., and *Hygrotrechus remigis* Say; they are all about equally common on the waters of our lakes and in ditches and pools.

In the family REDUVIDÆ the sub-family PIRATINA is represented by *Melanolestes picipes* H. Schf., which is quite common under stones along with *Carabidæ*.

In the sub-family REDUVIINA we have three species. *Diplodus luridus* Stal. is very common with us, but in Professor Uhler's list it is only given as from Mexico. *Acholla multispinosa* is also common; this has been known as *A. sexspinosus* Wolff., and *A. subarmatus* H. Schf.

Sinea diadema Fabr. is not rare with us; this insect has had a number of names, and has been studied as *S. multispinosus* De G., *S. hispidus* Thunb., and *S. raptatorius* Say. I have a pair of insects from this State labelled *Harpactor cinctus* Fabr., which are probably what is now known as *Milyas cinctus* Fab. They are of a beautiful pinkish-white color, and have the limbs banded with black.

In the sub-family CORISINA three species of *Coriscus* are represented. *Coriscus subcoleoptratus* Kirby, a very common and curious insect, and formerly known as *C. canadensis* Prov., *C. annulatus* Reut, which is very rare, and *C. ferus* Linn, rather common.

In the family PHYMATIDÆ the sub-family PHYMATINA is represented by that very common and curious insect *Phymata Wolffii* Stal. *Phymata erosa*, which is quoted as common throughout the State of New Jersey, I have never found here.

In the family TINGITIDÆ and sub-family TINGITINA I have *Corythuca arquata* Say. as one of the most common. This species of Tingis is found on the butternut, and was at one time known as *Tingis juglandis* Fitch, and Dr. Riley found it on the white oak.

Corythuca ciliata Say, formerly known as *Tingis hyalina* H. Schf., is, I believe, the one so common on the button-wood, *Platanus*. I have a species taken from the paper mulberry *Broussonetia* and another species from *Stophylea*, both new to me.

In the family ACANTHIDÆ and sub-family CIMICINA we have *Acanthia lectularia* Linn., which is very abundant and well distributed all over our city. In the family CAPSIDÆ we are quite well represented. *Plagiognathus obscurus* Uhl. is very common. *Episcopus ornatus* Reut is quite rare; I have only taken about a dozen specimens. *Garganus fusiformis* Say is rather common, and *Hyaliodes vitripennis* Say is exceeding rare.

Capsus ater Linn. is also rare, but is conspicuous on account of its shining black color. *Orthops scutellatus* Uhl. is very rare indeed; I have only taken about half a dozen specimens. *Comptobrochis grandis* Uhl. is also very rare. *Poecilocapsus goniphorus* Say. is very common; this has been known as *P. dislocatus* Say. and *P. melaxanthus* H. Schf. *P. lineatus* Fabr. is more common than *goniphorus*, and destroys a great variety of plants. *Poeciloscytus basalis* Reut., formerly known as *P. sericeus* Uhl., is also common. *Lygus pratensis* Linn., which much resembles the last, is exceedingly common; this was formerly known as *L. lineolaris* Pol. Beauv, and *L. oblineatus* Say. *Calocoris rapidus* Say. is common, and was formerly known as *C. multicolor* H. Schf. *Neurocolpus nubilis* Say. is very rare with us; I have but three specimens representing it. *Phytocoris eximius* Reut. is also very rare, and a species of *Phytocoris*, not determined, more common. *Lopidea media* Say. is very rare, as is *Resthenia insignis* Say. *Collaria meilleurii* Prov., which Uhler gives as *Trachelomiris meilleurii* Prov., is quite rare. *Leptopterna dolobrata* Linn. is common everywhere where there are grass and weeds. *Miris offinis* Reut., formerly known as *M. instabilis* Uhl., is not common. *Trigonotylus ruficornis* Fall. is rare with us, making about twenty species of CAPSIDÆ taken here, which is probably only about one-third of the species that occur with us.

OBSERVATIONS AT BOSSEKOP.[1]

THE close connection between the Aurora and magnetism induced Herr O. Baschin to accompany Dr. Brendel to Bossekop for the purpose of observing this phenomenon. On January first of this year they entered the Alten Fiord, at the end of which lies Bossekop. It is built on the slope of one of the raised beaches so common on the shores of the fiord and in the adjacent valleys. An elevation of the shore amounting to 43 inches is said to have taken place during the last fifty years, but the calculations are not beyond suspicion. Dr. Brendel succeeded in obtaining photographs of different forms of the Aurora, the only ones at present in existence. Violent magnetic disturbances have often been observed during displays of the Northern Lights, and the close relation of these phenomena is further demonstrated by the fact that the centres of the arcs of light lie on the magnetic meridian, and that the corona, the most splendid form of Aurora, lies in the magnetic zenith. The most remarkable disturbances took place on February 14, accompanied by an unusually gorgeous display of the Aurora, when the magnetic declination was observed to vary more than 12° — the greatest deviation ever noticed — within eight minutes. At the same time the disturbances in Europe and North America were so great that most of the self-registering instruments were unable to record them. It is not possible at present to determine with certainty the cause of these striking phenomena, but it seems probable that the great sun-spot, seventeen times as large as the surface of the earth, which was at the time visible even to the naked eye, was connected with the disturbances mentioned.

The meteorological observations also presented much that was interesting. The temperature on the west coast of Norway does not fall nearly so low as might be expected in such high latitudes. Even at the North Cape the mean of the coldest month is only 23° F., whereas in West Greenland on the same latitude the temperature sinks every winter to – 40°. As, however, the distance from the coast increases, the temperature falls rapidly. The minimum observed at Gjesvar, near the North Cape, is – 2° F.; at Bossekop, 33 miles from the open sea, – 22°; and at Karasjok, further south but 120 miles from the coast, – 60°. Thus the influence of the Gulf Stream, which prevents the fiords from freezing over, does not penetrate inland. The fall of snow in winter is not very large at Bossekop, but also increases towards the interior. In very cold weather the snow does not come down in flakes, but takes the form of crystals of ice, which, having no cohesion, are blown about by every puff of wind.

The Lapps may be divided into two classes, — the very poor fishermen of the coast and the nomadic Lapps of the mountains, who often possess considerable property. Of late years a third class has sprung up, which has settled in two inland places, Karasjok and Kautokeino. At the beginning of March the Lapps gather to a great fair at Bossekop, where many thousand ptarmigan, several tons of reindeer flesh, besides butter and tongues, change hands. Herr Baschin drove to Karasjok in a reindeer sledge, a vehicle that requires a deal of management, in order to inspect the dwellings of the Lapps settled there. The village is situated on a stream of the same name, one of the headwaters of the Tana, the second largest river of Norway, and contains about 200 inhabitants — all, with few exceptions, Lapps. Their dwellings are conical tents, 13 to 16 feet in diameter, with openings at the top to let out the smoke from the fire in the centre. Many Lapps own 2,000 to 3,000 head of reindeer. These people are not so powerful, intelligent, and honest as the Eskimo, and give the Norwegian Government much trouble through their propensity to steal reindeer. In Karasjok Herr Baschin found Balto and Ravna, the two Lapps who accompanied Dr. Nansen on his journey across Greenland, and on his voyage home he inspected that explorer's new vessel, which is being built at Laurvig. It has a nearly semi-circular cross-section, and is rigged as a three-masted schooner. It is of 250 tons register, and is constructed almost entirely of German oak. A small engine will enable it to make six knots an hour during calms.

[1] From the Scottish Geographical Magazine.

LETTERS TO THE EDITOR.

*** *Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Laboratory Teaching.

IN a recent number of *Science* there appeared an excellent article by Professor Chas. F. Mabery upon "Aims of Laboratory Teaching," in which occurred the following sentence: "Probably the earliest attempt in this country to give systematic laboratory instruction, to classes of any magnitude, was made in 1865 at the Massachusetts Institute of Technology."

Professor Mabery is surely in error upon this point, as such instruction had been given the students of the Rensselaer Polytechnic Instituie for many years previous to the date quoted. Our present laboratory, which is very complete and accommodates seventy-six students at a time in analytical chemistry, was built in 1862, to replace the one destroyed by fire in that year. Permit me to quote from a letter just received from Professor James Hall, geologist of the State of New York, who graduated from this institution many years ago: "In regard to systematic laboratory instruction in chemistry, I can only say that when I entered the Rensselaer School in 1831 there were already laboratories fitted up for giving systematic instruction in chemistry, and each student of the class