gathered; and they will be obtained as nearly identical as practicable, according to a scale adopted by the survey. Eventually, therefore, two hundred suites, of about a hundred specimens each, will be made up. They are to be accompanied by descriptive text, and issued to colleges and other educational institutions. The work of collection will be divided among the members of the survey, and will be distributed through about two years' time.

Additions to collections. — During the season of 1883 two hundred boxes of specimens were sent in to the main office of the survey by the various field-parties. They included rocks, minerals, fossils, and mineral waters. This number by no means comprises all the collections made, as a large number have not as yet been forwarded to Washington.

In the Rocky Mountain district, in charge of Mr. S. F. Emmons, with headquarters at Denver, Col., twelve hundred specimens of rocks from the Silver Creek mining-district were collected, and series of the type-specimens of hypersthene-andesite of Buffalo Peaks were secured.

After the close of field-work in the Yellowstone National Park, Mr. Joseph P. Iddings was sent to the Eureka district in Nevada to make collections of rocks for the educational rock series. He obtained sufficient material for two hundred cabinet specimens of five characteristic rocks. Three of them illustrate types of igneous rocks from the Great Basin, and two belong to the sedimentary series. They will all be fully described in the 'Geology of the Eureka district.'

Harvard college herbarium.

Additions. — Of the 8,755 sheets incorporated during the year, over 5,000 (holding probably 7,000 specimens) were derived from the rich herbarium of the late George Curling Joad of Wimbledon, near London, from which at least 3,000 more are still to be selected. For this most valuable collection of the plants of Europe and adjacent parts of Africa and Asia, or rather for such portion of it as will be retained, the herbarium is indebted to Sir Joseph Hooker, director of the Royal gardens at Kew, to which establishment it was bequeathed, and by whom, after certain selections had been made from it for the Kew herbarium, it was generously made over to this herbarium for the supply of its needs, the residue to be passed on to the National museum at Washington. So rich and abundant this collection proves to be, — containing, as it does, the principal published *exsiccata*, and most of the critical or local species of Europe, in authentic and attractive specimens, — that, notwithstanding the ample appropriation on our part, the materials which pass from our hands will still well represent the principal part of the European flora. This collection is supplemented by the presentation (in continuation of former gifts) of several hundred plants of Algeria and Tunisia, on the part of Dr. Cosson of Paris, who is engaged upon a Flora of Algeria.

The demand which such foreign collections make upon the time of the curator, Mr. Sereno Watson, and the director, Dr. Asa Gray, although very considerable, is small in comparison with that which has to be devoted to the critical examination and naming of the multifarious collections, large or small, which are incessantly poured in from all parts of our own country. A response to these demands cannot be avoided, generally cannot be deferred, in justice to the collectors and donors, and without risk of diverting the streams, which, flowing in ever since its establishment, have enriched this herbarium, and rendered it adequate to its leading purpose. But they press so heavily and unceasingly upon the officers, that they greatly retard progress in the preparation of works undertaken, and which ought to be proceeded with.

RECENT PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Ottawa field-naturalists' club, Canada.

Feb. 14. — Mr. W. Hague Harrington presented a list of Coleoptera captured in the neighborhood of the city during the past six years, and read a brief paper introductory to it. The list was stated to contain 926 species; but, as a large number remain yet undetermined, the list, when published, will include about 1,050 species. Many species are recorded which were formerly unknown in Canada, and there are three or four beetles which are probably new species. Mention was made of a few of the rarer forms which had been captured, such as Chrysobothris pusilla, Phymatodes thoracicus, Fornax badius, F. Hornii, and Sarpedon scabrosus. Of the latter, two females had been taken, which were now in the respective collections of Drs. Horn and LeConte. The collection was stated to be poor in Carabidae, Dytiscidae, etc., and comparatively rich in Buprestidae, Elateridae, Cerambycidae, and other families which had been specially investigated as containing species destructive to vegetation. The Ottawa fauna was briefly compared with that of several other districts, and was shown to resemble most closely that of Lake Superior. —— Mr. J. B. Tyrrell read a paper on the 'Revision of the Suctoria,' giving an outline of the different opinions held by entomologists in regard to the fleas, and the results of his own microscopical researches. A brief mention was made of some of the species which occur upon Canadian animals, and of the fact that other species had been found, both on mammals and birds, which it had been as yet impossible to determine. —— After an interesting discussion, the report of the conchological branch was read by Mr. F. R. Latchford. One species, Patula asteriscus Morse, had been added to the list of shells, and additional specimens of several very rare species had been obtained. Of the new shells, several specimens had been obtained by Mr. Harrington while sifting moss for small Coleoptera; and with it occurred a number of other species, including Hyalina milium Morse, Pseudohyalina exigua Stimpson, Vertigo milium Gould, and V. Gouldii Binney. Among many other interesting and valuable facts was reported the rapid increase, in and around the city, of Limax agrestis Linn. In 1882 a single individual of this species was found in a garden. During the past summer it was found in hundreds in this garden, and other gardeners complained of its destructive attacks. The advent in Ottawa of this voracious species of foreign origin (long known in cities along the Atlantic coast) is a fact of much economic as well as scientific interest. After the reading and discussion of this report, the members spent some time in examining the specimens exhibited by Messrs. Harrington, Tyrrell, and Latchford, in connection with the papers and report.

Torrey botanical club, New York.

Feb. 12. — Dr. Newberry gave an account, continued from a previous meeting, of the vegetation bordering the line of the Northern Pacific railroad. Many of the trees are undoubtedly specifically the same as eastern ones, although considered and described as distinct. They should probably be referred to varieties of the same species. All are, no doubt, descended from the same ancestors, although now altered by the difference in surrounding circumstances. Many of the smaller plants are identical, but generally the aspect of the vegetation is very distinct and striking. The Douglass spruce (Abies Douglassii, Lindl.) and Pinus Lambertiana, Doug., are scarcely less in size than the famous 'big trees' of California. Some of the former are three hundred feet high and six feet in diameter. The annual rings are sometimes half an inch wide, showing very rapid growth. One specimen, about five feet in diameter, showed five hundred annual rings. Mountain mahogany (Cercocarpus ledifolius, Nutt.) has a very hard, dense wood, considered superior to coal for making a bright, hot fire. Several species of the genus Berberis are conspicuous features, owing to the showy racemes of berries. They are called indiscriminately 'Oregon grape.' Several species have apparently not been described. The 'Manzanita,' a name given to several species of Arctostaphylos, produces a fruit resembling a small apple, which is used as a food by the Indians. No hickory-trees are found, and only one hazel (Corylus rostrata, Ait.). The berries of Gaultheria Shallon, Pursh., are much used by the natives, as are also the fruit of the 'service-berry' (Amelanchier alnifolia, Nutt.) and several species of Vaccinium. Spirea millefolium, Torr., is very abundant and conspicuous: it would make a very ornamental garden-shrub. Artemisia tridentata, Pursh., is the common sage-brush of the region. Kalmia glauca grows the same as with us; and Rhododendron Californicum, Hook., is hardly different from our R. maximum, L.

Amongst the herbaceous plants are to be seen, particularly, three species of Mimulus, — cardinalis, Lewisii, and luteus. Antennaria dioica is very conspicuous with its red flowers. Many species of the genus Phlox are abundant and conspicuous. The showy genus Castilleia is also well represented. One of the most extensively represented genera is Eriogonum, — more than twenty species in this region. Many species of Ribes are to be seen, some of which have apparently not been described. Fire has devastated immense tracts of forest, and completely altered the appearance of the landscape in many places. Where the ground has been burnt over, there generally springs up a thick growth of Pteris and Vaccinium.

Peucedanum ambiguum, Nutt., is an important food-staple, the root being dried and powdered.

Cincinnati society of natural history.

Feb. 5. — Mr. W. H. Knight read a paper on the motions of fixed stars and on non-luminous bodies of space. —— Dr. W. A. Dun exhibited a series of relics from the Swiss lake dwellings, and read a short paper describing them. —— Prof. Joseph F. James gave a brief account of some observations on the common Caladium. After cutting off a growing, healthy leaf, a jet of water shot out from the apex of the unfolding leaf, and continued flowing with a rhythmical movement at the rate of a hundred and eighty pulsations per minute for several hours.

Academy of natural sciences, Philadelphia.

Jan. 10. — Miss S. G. Foulke stated that the modes of reproduction of Clathrulina elegans are four in number, — by self-division, by the instantaneous throwing-off of a small mass of sarcode, by the formation and liberation of minute germs, and by the transformation of the body into flagellate monads. The fourth mode is significant in bringing to light a new phase in the life-history of the Heliozoa. The Clathrulina, in which the phenomena were observed, withdrew its rays, and divided into four parts, as in the ordinary method; but the sarcode instantly became granular and of a rough surface. Then followed a period of quiescence, in this case of five or six hours' duration, although in other instances lasting three days and nights; after which one of the four parts began slowly to emerge from the capsule, a second following a few moments later. While passing through the capsule, these masses of sarcode seemed to be of a thicker consistence than the similar bodies, which, in the ordinary method, instantly assume the Actinophrys form. After both had passed completely through, for nearly a minute they lay quiet, gradually elongating meanwhile. Then a tremor became visible at one end, and a short prolongation of the sarcode appeared waving to and fro. This elongated at the same time into a flagellum, the vibrations becoming more rapid, until, at the same moment, both the liberated monads started away through the water. They were followed for about ten minutes, when both were lost to sight among a mass of sediment, and the fear of mistaking one of the common monads for them led the observer to abandon the search. Another monad was followed through various movements, and finally seen to attach the tip of its flagellum to the glass, and revolve swiftly for a few moments, when instantly the whole body became spherical, rays were shot out, and the transformed monad was in no point, except that of size, to be distinguished from its Actinophrys-like relative. The whole development, from the time when the monad began its free life, occupied two hours and some seconds.

Prof. H. C. Lewis called attention to a mass of cast-iron from the Emaus iron-works, near Allentown. The iron contained crystals of graphite, which, again, held portions of cast-iron in their interior. The composition of cast-iron, which permits the formation of graphitic carbon, was considered, and compared with that of steel. Although the mass of iron must have been at one time in a molten state, it yet contained pieces of unaltered anthracite coal, which undoubtedly remained unconsumed in consequence of the entire absence of the oxygen necessary for its combustion. The presence of such unconsumed pieces of coal in a mass of molten iron might be held as illustrating the way in which carbon may exist in meteorites, or chalcopyrite in trap rocks.

Dr. Benjamin Sharp, referring to his recent communication on the visual organs of Solen ensis, stated that he had since determined the presence of similar organs in the mantles of the clam, the oyster, and the sand-clam. Their presence was made evident by the retraction of the mantles when shadows are passed over them. The structure of the peculiar cells, supposed to be primitive eyes, was the same as that of the cells before described in the siphon of Solen, including the presence of the transparent portion at the end of each.

Chicago academy of sciences.

Jan. 14. — The committee, consisting of Dr. H. A. Johnson and B. W. Thomas, appointed to investigate the bowlder-clays underlying the city, made its report upon a disk-shaped organism found both in the clays, and also in the filtrate from the water-supply, of Chicago. They were yellow, apparently flat or concavo-convex, and varied in size from $\frac{1}{85}$ to $\frac{1}{250}$ of an inch. Similar organisms have been found by several naturalists in the Devonian rocks of North and South America; and they were described by Dr. Dawson under the name of 'Sporangites,' and considered by him as macrospores of some acrogenous plant. Professor Orton of Ohio believes there are several species of varying sizes. We have, however, say the committee, none so large as discovered by Professor Orton. Our largest forms are not more than $\frac{1}{85}$ of an inch in diameter, and our smallest about $\frac{1}{250}$ of an inch. We have two, and possibly more, varieties. One has a well-marked ledge or zone around it, and extending, perhaps, an eighth of the way across it. Within this are the spines noted below. Others have no such markings, and do not, as a rule, have spines; and while some are a very light yellow, and almost transparent, others are of a dark reddish brown, and almost opaque. Whether these differences are sufficient to justify a separation of them into different species seems to be at present doubtful. So far, no forms have been met with by either of us, having any thing like a stem or point of attachment. Nor have we found any of the spherical or oval sacs which were contained in the collections of Mr. Derby, in Brazil.

There are found here, however, what we believe have not been found elsewhere; namely, on many of the disks, well-marked spines. These are, as a rule, clustered together, occupying a central portion, the diameter of which is three-fourths of the entire breadth of the disk, but in some instances the spines cover the entire surface. Along with these disks are, in quite large quantities, broken pieces of what seem to have been leaves, perhaps pinnate in form. Besides these, dark globular masses, which seem to be possibly spores or microspores, are frequently seen on the disks, and also scattered among them. These are — at least, in some cases — also contained within the substance of the disk. They are regular in form, and vary in size from $\frac{1}{600}$ to $\frac{1}{3000}$ of an inch in diameter. They are evidently organized; for in some cases there is seen a reticulum, or net-work, within the dark substance of the body. With these microspores, if such they are, are also masses of dark matter that, at least in some cases, are made up either of these globular forms alone, or of these and other organic material, such as the stems described by both Professor Dawson and Professor Orton. The clay beneath the city of Chicago and in the vicinity is full of bowlders of various sizes, from that of a walnut up to several cubic yards; and on many of these bowlders are well-defined ice-markings. Some of the smaller bowlders are shale which has never been ground down, and in these unchanged pieces we also frequently find large numbers of disks. These masses of shale, so far as we can ascertain, are identical with the shales of the upper Devonian formation. It will be seen that the disks are evidently not the product of their present location. They have been in some far-off age embedded in the shales; and subsequently these shales have been ground to clay, and, with other material constituting the bowlder-clays, have been redeposited beneath the lake and the adjacent shores. They are now undergoing another dispersion; for they are washed from their present position in the Chicago clays, and are mixed with the sands and alluvium, to be carried by the currents and winds to some new resting-place. Consequently our water-supply is now full of these products of probably some millions of years ago. They were perhaps water-cresses, and might have been of excellent flavor when fresh. They were fragant with gums or spices, as we know from their present composition. They are not now probably injurious to health, but they are especially valuable as a reminder, that in some widely different time, and amid very different surroundings, an abundant marine vegetation was being produced which has been preserved to our own day.

Vassar brothers' institute, Poughkeepsie, N.Y.

Jan. 2. — C. B. Warring, Ph.D., exhibited the gyroscope, and gave the explanation of its action the following form.

Dr. Warring, in giving his explanation of these phenomena, said it was important to clearly grasp these two principles: 1. A body set in motion will con tinue in motion until something stops it; 2. A body moving in any direction is not retarded by a force exerted at right angles to its direction.

We will suppose the ring to be laid aside, since it serves only for holding the disk, and that the disk or wheel is cut away until only a narrow strip is left, like two arms extending in opposite directions from the axle: its form will then resemble a T-square, which will now be used to illustrate the actions of the gyroscope.

Hold the stem of the square in the left hand, close to the end, and make the cross-piece vertical; hold the left hand still, and let the cross-piece move up or down: evidently it will describe part of a circle. If it is held so that the cross is just in front of a plumb-line, so that both can be viewed at once, it will be seen that the upper end of the cross moves away from the plumb to the right, while the lower moves away from it also, but to the left. If, while the left hand remained stationary, the cross had been allowed to drop freely, the top and bottom would evidently acquire a certain horizontal motion, one to the right, the other to the left. If, now, the T-square be quickly turned over, so that the top and bottom change places, this will not interfere with motion previously acquired: the bottom (which has now become the top) will continue to move to the left, while that which was the top will move to the right; and, as the motion continues (as in case of a pendulum), the ends of the cross are pushed back to where they were, and the instrument rises to its first position.

This explains why the gyroscope, in apparent defiance of the law of gravity, remains, when supported only at one end, in a horizontal position.

To understand why the instrument rotates around the central point, in a direction always the opposite of that of the top of the disk, the T-square is again brought into service. Hold it as before, and let it fall a few inches: as in the first experiment, the top, when the T goes down, gets a motion towards the right; but, before the instrument can be reversed, it must go half way, and point horizontally, instead of up and down. Evidently the motion which sends the upper end to the right will push the instrument (if the top was revolved towards the south) towards the north: hence the horizontal motion.

The horizontal motion is slow in proportion as that of the disk is rapid, because of the movement of the arms of the T. If the T turns slowly, it has more time to give motion to the ends of the arms, and consequently they push it around faster. If the T turns very quickly, it falls a very short distance (has so little time): hence the ends of the arms get very little motion, and, of course, can impart but little. A quick motion of the disk, therefore, makes a slow horizontal movement, and a slow motion of the disk makes a quick horizontal movement.

A careful consideration of the above will make it easy to see why the gyroscope ceases to maintain itself if the lateral (or horizontal) motion is stopped; for, in order to maintain itself, the motion imparted to the ends of the T-square, when vertical, must be expended in lifting: if spent in any other way, nothing is left to overcome gravity. Now if, as the square falls, and the T has become horizontal, some obstacle prevent its moving still farther to the right, its motion in this direction would cease; and, of course, when it arrived at the lowest point, nothing would be left to lift the instrument.

Another paradox is, that the instrument must fall somewhat, in order to produce any of its peculiar phenomena; but this, too, is easily explained. Every thing depends upon the two extremities of the T getting a motion, one to the right and the other to the left, when the T is vertical. If the T does not fall, or if it is not lifted up (for either movement will do equally well), there will be no such motion: only, if the first sends the instrument north, the other will send it south.

This directly or impliedly explains all the phenomena of the gyroscope.

NOTES AND NEWS.

THE death of Guyot has been soon followed by that of another of the notable scientific men, who, educated in Europe, took up their lot with us, and became, so to say, wholly our own. Dr. George Engelmann of St. Louis — our oldest botanist (excepting the venerable Lesquereux), as well as an eminent physician, for a time a fellow-student with Agassiz in Germany — died on the 11th inst., at the age of seventy-five. A biographical notice may be expected in an ensuing number.

— The *Journal of agricultural science* proposed from the North Carolina agricultural station recently, and to which we referred Dec. 28, has met with universal approval and most unexpected support.

Nearly one hundred shares of stock have been taken upon the plan proposed; and the Houghton farm proposes to assume all of the mechanical work of a monthly journal, and guarantee this part of its expense for one year. Without any special effort to secure them, about three hundred subscribers are reported.

In response to a cordial invitation of the commissioner of agriculture, a meeting will be held to organize this enterprise, at the Department of agriculture at Washington, at ten A.M., Wednesday, Feb. 27. All the friends of the scheme are urged to be present at this meeting, and participate in the inauguration of the journal. It is hoped that each agricultural college, experiment-station, etc., will send a representative.

— Commodore Samuel R. Franklin, U.S.N., has been detached from duty on the naval examining board, and ordered as superintendent of the naval observatory, to succeed Rear-Admiral R. W. Shufeldt, who was placed upon the retired list on Feb. 21.

— At a concert given by the Choral club of the University of Wisconsin on the evening of Feb. 8, two songs by Sir William Herschel were sung, — the first, a glee, 'Go, gentle breezes;' the second, a catch,