Jacksonville. He says that within five miles of Jacksonville is a remarkable spring, known as the Moncrief spring, the waters of which seem to be identical with those of the excavation at the city water-works and of many of the springs of this portion of the state. They differ from those of the southern and western portions in being more decidedly chalybeate. In temperature they are decidedly similar. All those near Jacksonville have temperatures of 72° F., and are said to be almost invariable, summer and winter. The extreme range is two degrees; that is, from 72° to 74°. The deep wells, the shallow ones, and also several lake-like springs, all register 72° F. Some are in superficial strata, reaching a depth of only fifteen or twenty feet; others are from thirty to forty feet deep in clay and rock; and some artesian wells penetrate to two hundred feet.

Chemical division. — During January and February Prof. F. W. Clarke and Dr. T. H. Chatard have been busy in the analyses of mineral waters. Among them, Professor Clarke has examined water from the Helena hot-springs of Helena, Montana Territory, which is an alkaline saline water, and water from the warm springs of Livingston, Montana, which is a calcic sulphur-water. Both are thermal, and these are probably the first analyses ever made of them. Dr. Thomas Chatard has also finished some analyses of Damourite from the well-known topaz locality at Stoneham, Me.

At New Haven, Messrs. Barus and Hallock, during January, were engaged in experiments to determine the exact boiling-point of zinc.

The north wind of California. — Mr. Gilbert Thompson, while engaged in topographical researches in the Cascade-range section of California, has been incidentally collecting information concerning what is generally observed as the 'north wind of California,' as it was first observed in that state, and supposed to be local. The name, however, should not be so restricted, as it should be extended to the Pacific slope of the United States and possibly of North America. The characteristics of this wind have been more particularly described by Dr. J. H. C. Bonté, of the University of California, than by any one else. To describe them briefly, they are included under the head of excessive drying-qualities. These are marked both in summer and in winter. In the former, vegetation sometimes appears as though it were burnt, and the effect upon both animals and men is striking. Men who have recently arrived in the country, and are robust, are not so sensitive to the wind as residents; and it has therefore been said that the imagination has a great deal to do with it, but this is a mistake. It matters not whether the wind is hot or cold, it produces a feeling of great depression and nervous irritability, lassitude, and restlessness. Some call it the 'poison wind,' and others the 'crazy wind.' The effects produced are similar to those of the 'Puna wind' of Peru, and the 'Hammattan' of Africa. It blows at no regular interval, nor for any known definite periods. There is some local authority, however, for the opinion that some multiple of three has been observed by some of its recurrences. The wind is really vicious only once in eight or ten years; and it undoubtedly has a powerful and favorable effect in drying up the wet soil, and neutralizing the effects of the rank vegetation, in the Sacramento valley after the rainy seasons. Mr. Thompson has, so far, traced its course and width to latitude 42°; and such information as he possesses to date seems to indicate that the wind moves down along the east base of the Cascade range, and thence through the Sacramento and San Joaquin valleys of California. There are numerous theories as to its origin, and the reasons why it produces such marked and peculiar effects.

RECENT PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Academy of natural sciences, Philadelphia.

Feb. 12. — Dr. N. Roe Bradner exhibited an inscribed stone found inside a skull taken from one of the ancient mounds at Newark, O., in 1865. An exploration of the region had been undertaken in consequence of the finding of stones bearing markings somewhat resembling Hebrew letters, in the hope of finding other specimens of a like character. The exploration was supposed to have been entirely unproductive of such objects, until Dr. Bradner had found the engraved stone now exhibited in a skull which had been given to him. The specimen is of a dark reddish material, of a rounded wedge shape, and bears on its surface a number of characters, the significance of which had not been determined, but which resemble the markings on the specimens before discovered. —— Rev. H. C. McCook described the nests of a new species of spider recently received from Mr. W. G. Wright of San Bernardino, Cal., for which he proposed the name Segestria canites. The cocoons hang in strings from the limbs of trees extending over a pathway. They are placed one above the other to the number of eight, and are united by a netting of white silk, covered with the leaves of the neighboring plants. They are kept in place over the path by lines which extend to either side, sometimes to a distance of five feet. Along one side of the suspended nests is a tube, which is inhabited by the mature spiders. As the weaving of nests over pathways leads to their being frequently torn away by passing animals, it had been suggested that the case was an illustration of a weakening of the instinct of preservation. It may, however, be rather a means adopted for the distribution of the species; the spiderlings being doubtless carried to remote points by the animals which tear away the nests. —— Mr. Edward Potts reported that he had examined the fore-bay at Fairmount water-works, from

which the water had been temporarily withdrawn, with a view to discover the winter condition of the fresh-water sponges and other inhabitants of that locality. Where the surface could be reached, it was found to be covered with a mud-colored incrustation of considerable thickness, which proved to be composed almost wholly of the statoblasts and spicules of the sponge Meyenia Leidyi. Some few fragments of Meyenia fluviatilis and Spongilla fragilis were seen, but the first named was clearly the prevailing species. A disused sluice-way was covered with a dry incrustation of the same material. While considering the effect of the presence of so large a sponge-growth at the inlet to the supply-pumps, Mr. Potts stated that Meyenia Leidyi was conspicuous among the known North-American sponges by its great relative density, and the small proportion of its sarcode or flesh. Its decay, therefore, at the termination of its period of summer growth, would be a slighter cause of pollution to the water-supply than that of any other species. He was, moreover, inclined to believe that decay was not the normal or necessary result of the close of each season's growth. The fragile branches of some species inhabiting exposed situations may, of course, be broken off and destroyed while the sarcode still covers them; but in the sessile portions, and in all when sufficiently protected, the cells of the sarcode at the period of full maturity, forsaking their places along the line of the skeleton framework, gather together by simultaneous amoeboid movement into dense groups, where they are soon covered by a tough chitinous coat, which, in turn, generally becomes surrounded by a crust of minute granular cells, and armor-plated by a series of protective spicules. These groups are now recognized as the statoblasts, gemmules, or winter eggs of the sponge. They are eggs only in appearance, being in reality the resting-spores or protected germs which conserve the life of the individual through the cold of winter. This life-history indicates rather a condensation than a decay of substance as winter approaches, and leaves little or no reason to regard such organisms as a source of water-pollution.

Feb. 19. — Mr. Thomas Meehan exhibited twigs of the plant used by the Piutes and other western tribes of Indians for making baskets. They proved, on examination, to belong to Apocynum cannabinum, the species used by the eastern Indians for a like purpose. —— Mr. Meehan called attention to sections of trees from Schuylkill county, Penn., illustrating remarkably slow growth. A black oak, Quercus tinctoria, in a little over two inches from the centre, had an average of thirty-six circles to an inch; one of hen lock spruce, fifty-one circles to an inch; and one of the common chestnut, twenty-four circles to an inch. Though only four inches in diameter, the oak stem was seventy-six years old; the hemlock, four inches in diameter, was one hundred and four years old; and the chestnut had grown only four and a half inches in diameter in sixty years. He believed two hundred years to be the full average duration of most of the trees of the eastern United States. —— The same speaker, referring to the supposed parasitic nature of the snow-plant Sarcodes sanguinea, of the Rocky Mountains, stated that he had carefully examined a specimen growing at an elevation in the Yosemite Valley, and found it to be existing independently, no connection being traceable with either living or dead roots. No trace of vegetation was found in the soil which was carefully washed away, but a huge mass of coralline fleshy matter, out of which the inflorescence arose. The origin of this fleshy mass was yet an unsolved mystery. From analogy with the behavior of other plants, he was inclined to believe that there was some parasitic attachment in the early life of the plant, and that it stored up in this coralline mass enough nutrition in one season to support the inflorescence, after which the connection was severed. —— Mr. Meehan also exhibited the dried leaves and fruit of Halesia diptera, H. tetraptera, and of a remarkable departure raised from the last-named species some years ago. This appeared in a bed of seedlings, all raised from seed gathered from one tree growing in a garden in Germantown. It attracted attention, when one year old, by the leaves bearing a resemblance to those of an apple-tree. The original tree had leaves narrowly lanceolate and acuminate, rather thin, pale green on the upper surface, and with no particularly prominent veins. The plant in question had broadly ovate leaves, scarcely pointed, very dark green, rugose on the upper surface, and strongly veined and hirsute below. The flowers, when they appeared, were open cup-shaped, instead of being drawn into a narrow tube at the base, as in the parent plant; and the pistil was wholly enclosed, and not exserted. For several years the plant was sterile; and many good botanists, whose attention was called to it, regarded the plant as a hybrid, and the sterility as a proof thereof. It was of no avail to point out that there was no other species from which the parent could have obtained pollen within many miles, nor to show that hybrids were not necessarily sterile. This season, however, the plant produced fruit. It is very small, not much over a quarter of an inch in diameter, and the four equal wings are comparatively large and of a strongly coriaceous character. The fruit which had been cut open was found to have perfect seeds. If the plant, with these leaves, flowers, and fruit, had been found in a state of nature, the botanists would surely have considered it the representative of a distinct species, if not of a new genus. While the suggestion of hybridity might be reasonably excluded, change of surroundings could not be advanced as the cause of the variation, for the environment was precisely the same for the sport, the seedlings which grew without change, and the parent stock. —— Professor Angelo Heilprin stated that among a small number of carboniferous fossils obtained from the border of Wise county, Tex., and submitted to him for examination by Mr. G. Howard Parker, a form occurs which can unhesitatingly be referred to the genus Ammonites. Only a fragment of a single individual is to be found; and this, unfortunately, has lost the shell, so that no external ornamentation, if any such existed, can now be discerned. This is the first Ammonites that has been detected in any Amer-

ican formation below the mesozoic series. The association with it of characteristic paleozoic forms of life, such as Zaphrentis, Phillipsia, Bellerophon, Conularia, Chonetes, and Productus, leaves no doubt as to its position; and hence we must conclude that here, as well as in India, where Waagen first announced the occurrence of true carboniferous ammonitic forms, the distribution of this highly characteristic group of organisms was not so rigidly defined by the mesozoic line as geologists had been led to conclude. That pre-mesozoic Ammonites will be discovered elsewhere besides in India and Texas, there is no reason to doubt; indeed, no assumption could be more illogical than the contrary: and therefore the present discovery is in no way specially surprising, and only interesting rather than important. Special interest, however, attaches to this form; as through it, and the individuals or fragments that have been found in the Tejon (tertiary) rocks of California, we have established in this country the extreme range of the group which it represents. The name Ammonites Parkeri was proposed for the species.

Philosophical society, Washington.

Feb. 2. — Prof. C. V. Riley presented a review of recent progress in economic entomology; describing especially the development of insecticide methods and apparatus, and closing his remarks with a plea for applied science. —— Dr. Swan M. Burnett discussed the question, why the eyes of animals shine in the dark, giving a short digest of the subject, and describing experiments of his own. He concluded that the phenomenon was caused by reflection from the retina of the eye. It is seen best when the observer is on the line connecting the shining eye with a source of light, and ceases when his station departs from that line by a certain amount. The limiting angle (measured at the reflecting eye) is relatively great in the case of eyes which are hypermetropic. Professor William Harkness pointed out that the limiting angle is likewise affected by the magnitude of the bright image on the retina. —— Mr. A. B. Johnson spoke on eccentricities of ocean-currents as illustrated by the voyages of lost buoys. At various times buoys have been torn from their moorings in the waters of the United States, and carried to sea; and eleven of these have been afterward found at distant points, and identified by means of letters cast in their constituent plates. One was found on the west coast of Ireland; a second, at Pendeen Cove, England; two others, just east of Teneriffe; a fifth, near Turk's Island; and a sixth and seventh, near Bermuda. The remainder were found in the open Atlantic, in the following positions: latitude 42° 22′, longitude 26° 38′; latitude 29° 46′, longitude 77° 38′; latitude 30° 30′, longitude 28° 40′; latitude 24° 11′, longitude 32° 43′. Admiral Jenkins cited another instance of a U. S. buoy stranding on the coast of Ireland. In the discussion which ensued, the opinion was expressed by Dr. William H. Dall and others, that the buoys found near Teneriffe had made a northward *détour*, and that those picked up near Bermuda and Turk's Island might have continued on the same course, and afterwards turned west, completing the circuit of the Sargossa Sea; but it was thought more probable that the latter had followed the southward coastwise current inside the Gulf Stream.

Feb. 16. — Prof. F. W. Clarke spoke on the periodic law of chemical elements, giving the history of the discovery of the law and of its verification by the subsequent discovery of elements indicated by it, and even specifically predicted. He exhibited an enlarged copy of Meyer's atomic-volume curve drawn with the latest values for atomic weights and specific gravities, and presented a similar curve illustrating the connection between atomic weight and melting-point. Each curve presents a series of maxima and minima, the maxima of one corresponding to the minima of the other. The regularities of these curves indicate that the elements originated by some method of evolution, and that a feature of transmutation of one element into another is not impossible. —— Mr. Henry A. Hazen read a paper on the sunglows, which has since been printed in the March number of the *American journal of science*. The first appearance of the phenomenon was at Mauritius, Aug. 28, 1883; and it was next seen at Maranham, Brazil, Aug. 30. It then appeared at irregular intervals on either side of the equator, until Nov. 26 and 27, when it seemed to burst out over the whole world. After describing the nature of the phenomena, and stating the principal theories which had been advanced to account for them, he proceeded to advocate the vapor theory as follows: *a.* The glows are precisely like the ordinary sunset phenomena, which are known to be caused by the presence of aqueous vapor; *b.* The abundance of the material so uniformly distributed accords with the universality of the glows; *c.* The fact that faint stars and clusters could be easily seen indicates that nothing more opaque than water-vapor or frost-particles could be in suspension; *d.* Frost-particles might be repelled to a great height above the earth, and might be kept there by some form of electrical action; *e.* The fact of the spectroscope giving no indication of an abundance of moisture does not militate against this theory, because it has been shown that ice-crystals or frost-particles do not affect the spectrum in a rainband spectroscope. To the volcanic-ash theory he opposed the following objections: 1°. On this theory there must have been sufficient material ejected from Krakatoa, on Aug. 26 and 27, to cover more than a hundred and thirty-five million square miles of the earth's surface; 2°. There must have been currents of nearly equal force, moving *in opposite directions* from the volcano; 3°. The upper currents must have had a sufficient velocity to carry the ashes twelve thousand miles in a hundred and fifty hours (about eighty miles per hour) toward the west, while meteorology indicates no such velocities, and in general shows the upper current to be always toward the east; 4°. The ashes must have been mechanically distributed over the whole earth by air-currents; 5°. The phenomenon has been markedly intermittent; 6°. Volcanic ashes

are more or less opaque, while the phenomena attendant upon the glows indicate no such opacity. The cosmic-dust theory incurs many of the same objections, besides being inherently improbable. In the ensuing discussion Prof. E. B. Elliott argued that the phenomena were electrical; and Prof. H. M. Paul sustained the volcanic-ash theory, pointing out that Mr. Hazen's conclusion as to the simultaneousness of the first appearance of the phenomenon at remote points depended on a special interpretation of imperfections of the record, depending on cloudiness, and claiming the equal privilege of interpreting them in another way.

Ottawa field-naturalists' club, Canada.

Feb. 28. — Dr. George M. Dawson read a paper on the occurrence of phosphate deposits. After showing that phosphatic materials were essential to the life both of plants and animals, he pointed out that the natural cycle of the rotation of these substances was interrupted by the action of man, and that large quantities of matter which should return to the soil were withdrawn from it and taken elsewhere. The cropping of the soil impoverishes it, and prevents it from yielding as abundantly as formerly, unless the loss is compensated by the application of phosphatic fertilizers. The grain exported from the port of Montreal in a single year has been estimated to contain 2,574 tons of phosphoric acid, which implies the total exhaustion, in as far as phosphates are concerned, of 75,000 acres of good land, to renew which would necessitate the application of some 6,000 tons of apatite. It is easily seen that there must always be, under the present condition of affairs, an extensive demand for phosphatic materials; and it becomes necessary to inquire where specially concentrated natural sources of supply may be found. The occurrence of such deposits was traced from the guano, which accumulates in exceptionally dry climates, on islands frequented by immense numbers of sea-birds, and such recent deposits as the 'mussel muds' of Prince Edward Island, through the so-called coprolite beds of England, Carolina, and elsewhere, to the more concentrated and metamorphosed deposits found in the older rocks of Canada and Norway. The main facts in regard to the mode of occurrence of apatite deposits in the Laurentian rocks of Canada were explained, and the great economic importance of such accumulations was considered. —— Mr. Fraser Torrance who, as a mining-engineer, has had large experience with the deposits found in the vicinity of Ottawa, gave a very interesting description of the character of some of the deposits, and of the difficulties met with in working them, owing to the irregular manner of the deposition of the mineral; which cannot be considered as occurring either in veins or in beds, but as passing from one to the other without any regularity of transition. The methods in which the present surface-workings are conducted are such as to throw most serious difficulties in the way of any future mining of the lower deposits. The imperfect manner in which apatite has hitherto been manufactured in Canada was described; and it was stated that it was highly probable that much of the mineral which was mined in Canada and exported to Great Britain returned, either in the raw or manufactured condition, to the United States. —— Mr. F. D. Adams reported the detection by him, in minerals received from Arnprior, of a specimen of rock identical with that in which apatite occurs in Norway, and which had previously been known only from Norway and Finland.

Boston society of natural history.

March 5. — Prof. A. Hyatt read a paper on the larval theory of the origin of cellular tissue. He reviewed the history of investigation among sponges; concluding, that, though true metazoa, they possessed characteristics which showed them to be derived from protozoa. The parallel between the development of the cell and egg in the tissue is strictly parallel with the evolution of nucleated from unnucleated forms in protozoa. Recent investigations have removed all objections to the homology of the egg or any cell with the adult of the nucleated protozoon; and the principal mode of reproduction by division is the same in all these forms. The egg builds up tissue by division after being fertilized by the male or spermatozoon, just as the protozoon builds up colonies after fertilization. Spontaneous division of a cell which undergoes encystment takes place, and the spermatozoa which result from this are true larval monads. These resemble the monads derived from division of the encysted bodies of protozoa in their forms and in their activity. They differ in being able to fertilize the female or ovum at once, instead of being obliged to grow up to maturity before arriving at this stage. Thus all cells may be regarded as larval protozoa, and eggs and spermatocysts as encysted larval forms, the spermatozoa being equivalent also to larval forms which have inherited the tendencies of the mature forms in the protozoa at the earliest stages. Thus the origin of the tissues in the metazoa is in exact accord with the law of concentration and acceleration in heredity. The cells are larval, which, in accordance with this law, have inherited the characteristics and tendencies of their adult ancestors in their earliest stages. The three layers can be accounted for as larval characteristics inherited from colonies of Infusoria flagellata, which had two forms (protective and feeding zoons), and then three (protective, feeding, and supporting), these corresponding to ectoderm, endoderm, and mesoderm. —— Dr. M. E. Wadsworth read a paper on the structure of the earth's interior, which he held to be a molten or semi-fluid mass, which will gradually cool and solidify.

NOTES AND NEWS.

THE National academy of sciences will hold its next annual session at the National museum, Washington, commencing April 15, at eleven A.M. An election of five new members will be held. This will not make good the vacancies of the past year; for, of the ninety-eight members on the roll a year ago, six have since died, — Professors Alexander and Guyot