the leaf (i.e., are axillary branches), yet in individual variations a branch may occur in this situation, and one or more ears be borne upon this branch, one ear being terminal.

The tassel may be transformed into groups of ears, the whole character of the tassel being occasionally changed to such an extent that the pistillate flowers replace the staminate. The bearing of a few grains upon the tassel is by no means an unfrequent occurrence. In the case of the tassel bearing many grains, there is a tendency in the upper leaf to curve upward and form a husk, and in cases a fair protection is thus secured.

On the other hand, the terminal portion of the normally situated ear may be extended so as to form a tassel which bears staminate flowers. In rare cases we have a normal appearance of ear for several inches, then a few inches of staminate flowers, and at the end a good ear again; the two perfectly formed ears being connected as if by a section of a tassel-stem, and forming a structure protected by a common husk. Staminate flowers are also occasionally produced on the rachis, along with the normal pistillate flowers; and I have even observed hermaphrodite flowers, — in one case on the cob, and in two cases on the tassel. In cases, also, the ears are branched; the branches starting from the base, or from the middle or terminal portion of the ear. In the tassel we quite frequently find ears crowded together through partial coalescing of the branches, so as to form a corolla, or cup, from which the main stem of the tassel emerges; and, in their normal situation, ears are occasionally so crowded, through branching, as to form a sort of bouquet. The tip of the ear may also divide into many smaller portions, forming the appearance of a tassel-like bunch of cobs terminating the grain-covered portion.

The rows of corn are always even-numbered, but may vary from 8 to 32 in varieties, and, in individual specimens, from 4 to 48. In two ears from the same stalk the number of rows may vary; the length of ear, from 2 to 12 inches in varieties, and in individual variations perfect ears may be found from 1 to 16 inches in length. The kernels are occasionally arranged upon the cob in a spiral. The size of the grain is also subject to great variation. In our collection, normal kernels of a variety called 'miniature' maize weighed one-half a grain, while normal kernels of a variety known as 'Benton dent' weighed 12 grains.

The shape of the grain is very varied. It may be longer than broad, or broader than long, varying from oval to shoe-peg form in flat and spherical variations; the upper surface rounded, or flattened, or pointed, or dented. The dent may be a central depression, as a notch, or a crease, or irregular. A cross-section is in some varieties square, in others rectangular, in others round, in others oval, in still others irregular. The structure may be all farinaceous, as in the Tuscarora; or semi-transparent and hardened, as in sweet-corns; or hard and horny, as in the pop-corns; or partly farinaceous and partly corneous, as in the common flints and dents. The chit also varies in length in the varieties, and in the form of the depression in which it lies; and the pedicle of the grain may appear strongly marked, as in the 'pod-corn.'

In germination, occasionally twin-embryos are formed, and in one case we have noted three. The roots may emerge from the base of, or may crowd off, the caulicle, and appear from the under side, or, in cases, may emerge from the caulicle at apparently any point. From the first node they almost invariably emerge. We thus seem to have a double system of roots, — the tap-root, emerging from the base; and the fibrous roots, which emerge from the sides of the caulicle. In exceptional cases the tap-root seems suppressed and the fibrous roots of the monocotyledon appear in its stead.

After the corn-kernel has germinated, it may be thoroughly dried, and will then start anew when planted. The plumule retains its life while new roots are formed, or exceptionally the descending axis retains its life, and renews its growth. This we have repeated to the fifth germination, with intervals of one week's drying between germinations. In one instance of variation a twin-embryo sent up two cotyledons, one of which afterwards developed into a leaf. This was the only case among many hundreds of observations.

E. LEWIS STURTEVANT, *Director.*

March 13, 1883.

University of Cincinnati.

Laboratory notes. — Several investigations, conducted under the direction of Prof. F. W. Clarke, are far enough along to warrant preliminary notices.

The phosphides of platinum have been prepared by O. T. Joslin. When phosphorus is thrown upon white-hot platinum, fusion takes place, and a brittle, silver-white button of Pt_3P_5 is obtained. This, treated with hot aqua regia for at least forty hours, only partly dissolves. The soluble portion agrees sharply with the formula Pt_2P_4, and PtP remains absolutely insoluble. By long roasting in a muffle, the original Pt_3P_5 is reduced to Pt_2P. The Pt_2P_4 is probably identical with the phosphide described by Schrötter as PtP_2.

The tartrates of antimony are being studied by Mr. C. S. Evans, and one set of results is complete. When alcohol is added to a solution of Sb_2O_3 in aqueous tartaric acid, a white precipitate is formed, concerning which earlier experimenters differ. We now find, that at least three distinct compounds may be thus produced, as follows: when there is a large excess of tartaric acid, the neutral salt $Sb_2(C_4H_4O_6)_3 . 6H_2O$ is thrown down. With a slight excess of acid, $Sb_2(C_4H_4O_6)_2 O . 6 H_2O$ is produced. The third compound should be $Sb_2(C_4H_4O_6)O_2$, and is said to have been described by Berzelius. We have obtained a compound approximating to this formula, but it was not absolutely pure. All three salts may be regarded as derived from Sb_2O_3 by successive replacements of one, two, and three atoms of oxygen by $C_4H_4O_6$.

The specific gravity of cadmium iodide is given, on Bödeker's authority, as 4.576. Mr. E. A. Kebler, assisted by Mr. E. Twitchell, has prepared the compound in a variety of ways; and we find that two distinct modifications exist. The normal CdI_2 has a specific gravity of 5.6 to 5.7, and is very stable: the other ranges from 4.6 to 4.7, is deliquescent, and decidedly unstable. The conditions governing the formation of the latter have yet to be made out. The normal salt represents union of cadmium and iodine without change of volume.

NOTES AND NEWS.

— The lecture season at the Lowell institute in Boston is drawing to a close. So far back as most of us can remember, the institute has annually tempted some distinguished scientific Englishman or other European to lecture to Boston audiences, and has done, perhaps, as much as any other establishment in the country to elevate the scientific standard. This year an unusual variety has been offered, and the au-

diences have been large and attentive. The courses were opened toward the end of October with six lectures by Dr. William B. Carpenter of London, on the Physical geography of the deep sea, in which he treated successively of the oceanic basin generally, thermal significance of oceanic water, action of prevalent winds on the ocean-surface producing horizontal circulation, physical conditions of inland seas, animal life of the deep sea, and land and sea in geological time. This was followed by a second course of six lectures by the same on Human automatism. The question was stated in the first lecture, and was followed by a discussion of congenital or primary automatism, secondary or acquired automatism, automatism in intellectual action, of the motive powers, and in morals.

On alternate evenings during the progress of these courses, Dr. George L. Goodale of Harvard university gave twelve lectures on Physiological and geographical botany: an outline sketch of some of the relations of plants to their surroundings. These series were followed by a course of six lectures on Motion and matter, by Professor Thomas C. Mendenhall of the Ohio state university, beginning Dec. 4; by twelve lectures on the Philippine Islands, with sketches of Panama, Japan, China, Singapore, Ceylon, the Red Sea, and the Mediterranean volcanoes, by Dr. Samuel Kneeland of New York, on Dec. 12 and following days. Three lectures on Storms were given by Mr. W. M. Davis of Harvard university, beginning Jan. 8; two on the Jelly-fishes, by Dr. J. Walter Fewkes of the Museum of comparative zoölogy, on Jan. 22 and 25. On Jan. 23, Professor Samuel P. Langley of the Allegheny observatory began a series of twelve lectures on the Sun and stars. Professor James T. Bixby of the Meadville theological school is about finishing a course of twelve lectures on the Inductive philosophy of religion; and Mr. F. W. Putnam of the Peabody museum began, March 13, his current course of six lectures — the last, we believe, for the season — on American archeology. The topics of the several lectures in this last course are, 1°. Ancient mounds, earthworks, and fortifications in the United States; 2°. Explorations of ancient towns; 3°. Stone graves of the Cumberland valley, and their contents; 4°. Ancient pottery; 5°. Altar-mounds and their contents; 6°. Burial customs, and the arts of the ancient Peruvians.

— The meeting of the International commission on the geological map of Europe was held at Foix last September. The commission consists of two committees, — one on the map, and one on nomenclature. The former is composed of Messrs. Beyrich and Hanchecorne (directors having but one vote), Daubrée, Giordano, De Moeller, Mojsisovics, and Topley. At the last meeting, Messrs. Daubrée, Mojsisovics, and Topley were absent. The Austrian and German geologists have agreed to form only one commission for the execution of the geological work of central Europe. A scale of the sedimentary formations, adopted by Austrian and German geologists, was accepted as a provisional basis for discussion. The commission voted unanimously to adopt the proposition of Mr. Neumayer to appoint a committee to compile a paleontological nomenclator. Much difficulty, however, seems to have arisen in coming to a general understanding about this nomenclature. The length of time required for the publication of the map will probably exceed the limit of six years. Some of the geographical sheets are already engraved, and a number of others are drawn. Assent to the subscriptions demanded had not yet been received from France, Spain, Scandinavia, Germany, and Denmark. The last meeting of the commission previous to the Berlin congress of 1884 will be held at Zurich, probably in August. The general price of the map will be 125 francs to the public, 100 francs to the subscribing governments.

— The Smithsonian institution, in co-operation with the Biological society of Washington, is making an effort to procure full statistics with regard to the trees, shrubs, and herbaceous plants growing in the public grounds of the city and suburbs. In order to trace the changes which have taken place in tree-planting in this district, it is desirable to learn what kinds were grown here soon after the permanent establishment of the government in Washington in 1800, and where specimens of these can now be examined. Information is wished for as to any rare or remarkable trees known to have stood in the public grounds, but removed during the extension of public buildings or other improvements, or of trees of great size or age, or remarkable for their connection with public events.

— Dr. J. C. Houzeau, director of the Royal observatory at Brussels, has returned to Belgium from his expedition to the United States to observe the transit of Venus, and, having obtained leave from his government, will spend the remainder of the winter season at Cannes. The king of Belgium is anxious to have the observatory transferred to Lacken, to an eligible site in the vicinity of his castle; but as yet the removal is not definitely decided upon. A temporary shed has been erected for the new meridian-circle made by the Repsolds.

— According to *Nature*, March 8, the mathematical papers and memoirs of the late Professor Henry J. S. Smith of Oxford are to be collected and published in two quarto volumes by the press of his own university. Miss Smith will contribute a biological introduction; and the general editorship of the work, which will include a considerable quantity of hitherto unpublished material, will be intrusted to Mr. J. W. L. Glaisher.

— Eugene G. Blackford issues a most attractive invitation to witness the 'display' of brook-trout he will make at his stalls in Fulton Market, New York,

April 2, at the 'opening of the trout-season, 1883,' when "examples of fish-culture from all the leading fish-culturists and fish-commissioners of the United States will be displayed." The folded card of invitation is printed in colors by Armstrong & Co. of Boston, and represents a trout-brook and fishing-paraphernalia on one page, while the opposite reproduces an admirable sketch of swimming trout by Beard. The whole is done in admirable taste.

— The fifth annual meeting of the Sanitary council of the Mississippi valley will be held at Jackson, Miss., April 3. Dr. John H. Rauch, secretary of the Illinois state board of health, is secretary of the executive committee.

— The finished portion of the new chemical laboratory for Phillips academy, Andover, Mass., was first occupied by the class in analytical chemistry March 5. For want of funds, only the east wing has as yet been built. The estimated cost of the whole is $20,000.

— A despatch from London, dated March 21, states that an eruption of Etna has occurred, accompanied by an earthquake, overthrowing several houses, and causing a panic in the vicinity. A despatch from Catania, two days later, reports eleven fissures in the mountain, and the central opening as active, but adds that there is no discharge of lava. Rome telegrams of the 25th, however, state that the eruption is unimportant and apparently subsiding.

— We are glad to aid in calling attention to the Association for the preservation of the scenery of Niagara Falls, formed in New York with the support of Messrs. G. W. Curtis, H. Potter, Ch. Lanier, J. H. Robb, and many others, for the purpose of securing state assistance in rescuing the neighborhood of the falls from unsightly surroundings. Through the efforts of this association, a bill has just passed the New-York Assembly, authorizing the appointment of commissioners to survey the lands about Niagara, and report to the next legislature. The bill has still to pass the senate, and receive the governor's approval. Membership in the association may be obtained by a subscription of ten dollars; and smaller contributions will be acceptable, as a considerable expense is incurred in keeping the matter before the public. The secretary is Rev. J. B. Harrison, P.O. box 105, New York; treasurer, Ch. Lanier, Esq., corner Nassau and Cedar Streets, New York. Dr. V. Y. Bowditch, 113 Boylston Street, Boston, will forward subscriptions from New England.

— The treasurer of the Balfour memorial fund acknowledges the following subscriptions: Joseph LeConte, University of California, $5; J. G. Scott, principal State normal school, Westfield, Mass., $5; Samuel Garman, Harvard University, $3; Walter Faxon, Harvard University, $5; A. H. Tuttle, State University, Columbus, O., $20; previously acknowledged, $385.

— Two correspondents of the *Scientific American*, March 17, give accounts of curious snowballs formed by the wind blowing over the surface of loose snow. The snow was formed into cylinders, with conical cavities at each end, nearly meeting in the centre, resembling rolls of cotton-batting. The fields are described as covered with rolls from the size of an egg up to twenty inches in diameter and forty in length.

— It is proposed to close the gap at the Delaware Breakwater with a concrete superstructure, resting upon a granite rip-rap foundation. This is necessitated by the deterioration of the harbor from a marked decrease in depth. At the meeting of the Philadelphia engineers' club, Feb. 17, Mr. J. M. Stewart described the plans for the improvement.

— Professor Thomas H. Huxley of London was elected a foreign honorary member of the American academy of arts and sciences at its last meeting, March 14, in place of the late Professor Bischoff; and Dr. Johann F. J. Schmidt of Athens, in the place of the late Professor Plantamour.

— John Burroughs writes charmingly and truthfully of 'Signs and seasons,' in the March *Century*.

— At the meeting of the Appalachian mountain club, March 14, Prof. E. C. Pickering read a paper on mountain observatories, and Mr. A. E. Scott one on the exploration of the Twin Mountain range.

— The forty-third regular meeting of the Biological society of Washington was held March 16. Mr. Orville A. Derby communicated some biological notes from Brazil. Mr. William T. Hornaday spoke on the mental capacity of the elephant, and Mr. Newton P. Scudder on the length of the hatching-period of the domestic fowl. Specimens illustrating giant clams of the Pacific were exhibited by Lieut. Francis Winslow, U.S.N.; accidents to animals, by Mr. F. A. Lucas; sections of hermaphroditic oysters, by Mr. J. A. Ryder; fossil ship-worms, by Dr. C. A. White; and microscopic sections of supposed coal, by Mr. George P. Merrill.

— At the meeting of the Boston society of natural history, March 21, Prof. S. P. Sharples gave an account of a visit to Turk's Island, and Mr. S. Garman made some remarks on fossil horses.

— The Field naturalists' club of Ottawa held their fifth *soirée* on Friday, March 16. Mr. W. P. Lett read a paper on the ducks resorting to the neighboring waters, and gave most interesting and valuable descriptions of their habits and food, — the result of many years' experience as a sportsman and observer of nature. Mounted specimens of the various ducks were exhibited. Dr. Small read the report of the botanical branch of the club on the work of the preceding season. It showed that twenty-five species of plants had been added to the lists already published, and gave many interesting facts concerning the occurrence of these and other rare species. Several exquisite paintings of rare plants were made for the

occasion by Mrs. Chamberlin. Mr. W. H. Harrington read the report of the entomological branch, indicating the work so far accomplished in the study of the Ottawa fauna, and the amount that would still be required to develop a knowledge of the various orders. The report referred to some rare species, and to others which had been unusually abundant or destructive. A case specially prepared showed many of the insects mentioned, with labels giving scientific and common names, and food-plants. Some discussion followed the lecture and reports; and a vote of thanks was tendered to the lecturer for his valuable paper.

— The electrical exhibition at Caen, France, will open May 15. The board in charge consists of Count du Moncel, honorary president; MM. Boreux, Boutard, Lecornu, Rabut, Professor Neyreneuf, M. Berjot, *père*, MM. Baumier and Veriene. Any applications for space should be addressed to the mayor of Caen, who is also a member of the board.

— A paper on Our coal interests, read by P. W. Sheafer at the annual meeting of the Mining institute of Pennsylvania, held at Shenandoah, Jan. 27, has been printed in full in the Mining herald of that place for Feb. 24.

— The *Scientific American supplement* for March 17 contains a long article by L. P. Gratacap, on the American museum of natural history in Central Park, New York.

— The second report on the Peter Redpath museum of McGill university, just issued, contains several papers by Principal Dawson, noticing important donations, and describing new and interesting specimens: one on a whale from the Saxicava gravel, near Smith's Falls, Ontario, 420 feet above the St. Lawrence; another on miscellaneous carboniferous fossils from the eastern provinces; and a third on graptolites of the Quebec group.

— Telegrams to the daily press announce that the scientific expedition sent out by the United-States government, under the charge of Prof. Edward S. Holden, to observe the coming eclipse of the sun at the Caroline Islands, reached Lima, Peru, in good health, and had just sailed thence in the U. S. sloop-of-war Hartford for their destination.

— Dr. Paul Topinard took occasion, at one of his last spring's course of lectures at the school of anthropology in Paris, to sum up the labors of Count George Louis LeClerc Buffon [1707–1788] as a student of the natural history of man, considering him "as the chief of the new school which produced Étienne Geoffroy Saint-Hilaire, and the precursor of Lamarck and Darwin." — "He was not only the precursor of Lamarck, but his inspirer."

— In our Summary, paragraph 372, for 'Rurichnites,' read 'Rusichnites,' and for 'Traena,' 'Fraena.'

RECENT BOOKS AND PAMPHLETS.

Adrews, L. W. I. Zur kenntniss einiger isomeren bromnitrobenzolsulfonsäuren. II. Ueber triphenylborat. Bonn, 1882. 45 p. 8°.

Barner, F. Krystallographische untersuchung einiger organischen verbindungen. Göttingen, 1882. 45 p., pl. 8°.

Bellardi, L. I molluschi dei terreni terziarii del Piemonte e della Liguria. III. Gasteropoda. Torino, *Loescher*, 1883. 253 p., 12 pl. 4°.

Bethke, A. Ueber die bastarde der veilchen-arten: inaug.-diss. Königsberg, *Beyer*, 1882. 20 p. 4°.

Beyda, H. F. T. Mathematische beschäftigungen aus früheren jahren. i., ii. heft. Stuttgart, *Metzler*, 1883. 48 p. 8°.

Boedeker, H. I. Ueber benzylanalin und phenylbenzylhydrazin. II. Diazobenzolcinid und jodaethyl: inaug.-diss. Göttingen, 1882. 36 p. 8°.

Brauer, F. Offenes schreiben als antwort auf Hrn. Baron Osten-Sackens 'critical review' menier arbeit über die notacanthen. Wien, *Hölder*, 1883. 11 p. 8°.

Caldarera, F. Introduzione allo studio della geometria superiore. Vol. i. Palermo, *Lauriel*, 1882. 626 p., 8 pl. 8°.

Charencey, H. de. Mélanges de philologie et de paléographie américaines. Paris, *Leroux*, 1883. 195 p. 8°.

Clevenger, S. V. Art institute lecture on artistic anatomy and the sciences useful to the artist. Chicago, *Newell, pr.*, 1883. 20 p. 8°.

Corrente, G. Sulla fillossera. Caltanissetta, 1882. 10 p. 4°.

Doormann, C. Anwendung der Lamé'schen functionen auf probleme der potentialtheorie bezüglich der dreiaxigen ellipsoids und der Fresnel'schen elasticitätsflache: inaug.-diss. Leipzig, 1882. 74 p. 8°.

Ebert, T. Die tertiären ablagerungen der umgegend von Cassel: inaug.-diss. Göttingen, 1882. 28 p. 8°.

Garbini, A. Apparecchio della digestione nel Palaemontes varians. Verona, *tip. Franchini*, 1882. 89 p., 3 pl. 8°.

Kraetzschmar, L. Ueber die verbreitung der lecithin im pflanzenreich: inaug.-diss. Göttingen, 1882. 30 p. 8°.

Landsberg, Max. Ueber imide zweibasischer säuren: inaug.-diss. Königsberg, *Beyer*, 1882. 58 p. 8°.

Loe, A. Ueber den glycerinäther: inaug.-diss. Göttingen, 1882. 37 p. 8°.

Luerssen, Chr. Die pflanzen der Pharmacopoea germanica botanisch erläutert. i lief. Leipzig, *Haessel*, 1883. 64 p., illustr. 8°. [To contain 6–7 lief.]

Manzoni, A. La struttura microscopica delle spugne silicee del miocene medio delle provincie di Bologna e Modena. Bologna, *Treves*, 1882. 24 p., 7 pl. 4°.

Mari, G. La storia naturale nelle sue applicazione, con riguardo speciale ai prodotti italiani. Milano, *Rivolta*, 1883. 11+904 p. 8°.

Matthews, F. E. I. Verbindungen der blausäure mit den halogenwasserstoffsäuren. II. Condensation einiger aldehyde mit acetessigäther, etc.: inaug.-diss. Bonn, 1882. 42 p. 8°.

Merrick, C. S. Ueber die einwirkung von jodallyl auf anhydrobenzolyldiamidobenzol: inaug.-diss. Göttingen, 1882. 34 p. 8°.

New York — State survey. Report for the year 1881. James T. Gardiner, director. Albany, *Weed, Parsons, & Co., pr.*, 1882. 81 p., 1 pl. 8°. 5 maps.

Olleck, H. von. Analytische untersuchungen über das verhalten von phosphaten zu citronensäure-lösungen: inaug.-diss. Göttingen, 1882. 29 p. 8°.

Oschatz, F. Experimentalle untersuchungen über die physiologische wirkung der chinolins: inaug.-diss. Göttingen, 1882. 50 p. 8°.

Pieper, R. Ueber einige metamere hydroxylaminderivate: inaug.-diss. Königsberg, *Beyer*, 1882. 38 p. 8°.

Schirmacher, E. Die diluvialen wirbelthierreste der provinzen Ost.- und Westpreussen: inaug.-diss. Königsberg, *Bayer*, 1882. 52. p., 5 pl. 8°.

Schutzkwer, Nachum. Das coffein und seine verhaltung im thierkörper: inaug.-diss. Königsberg, *Bayer*, 1882. 25 p. 8°.

Steffen, M. Die landwirthschaft bei den altamerikanischen kulturvölkern. Leipzig, 1883. 139 p. 8°.

Wandtafeln (Vier) zur erklärung der elektrodynamischen maschinen. München, *Buchholz*, 1883. imp. f°. Mit text, 10 p. 8°.

Wiesinger, F. Ueber die einwirkung von eisenchlorid auf orthophenylendiamin: inaug.-diss. Göttingen, 1882. 31 p. 8°.