era adopted in the index, with synonyms and sectional divisions. This follows in the main the treatment in *Die natürlichen Pflanzenfamilien,* departing from it where recent monographic work seems to render it necessary, and changing generic names where priority requires. In this connection, it will be a rude shock to some of our conservative fern students to see the names *Dryopteris, Dennstædtia, Phanerophlebia, Phyllitis, Pteridium, Matteuccia, Cyclophorus* and *Ceropteris* accepted in place of names long cherished, but progress is inevitable and these names will stand because they are *right.*

To those people who still name ferns as new which are 'not described in *Synopsis Filicum,*' to whom it makes no difference whether the type locality of the name given to a West Indian fern is New Zealand, Mauritius or Jamaica, or to whom the mere priority of publication is of no concern, Mr. Christensen's book will be only a thorn in the flesh. To those whose ambition is to place fern delimitation and our knowledge of fern distribution on a stable and scientific foundation for accurate study, his work will be worth its weight in gold as a time saver, and a datum line for departure into new fields. Conceived in the same spirit as *Index Kewensis* for flowering plants, Mr. Christensen's work will far outrank it in accuracy, completeness and rational point of view.

The novice might well ask: Are the ferns all described in these 5,940 accepted species? Unhesitatingly we would say, No! Not all these names will stand, for there has been much avoidable and some unavoidable redescription in the absence of such an index as we now have before us. On the other hand, countries supposed to have been exhaustively studied are yielding frequent novelties. A single capital illustration is fresh from the antipodes. The island of Java has been classic ground for fern study since the time of Blume (1828). Raciborski has recently (1898) given us a fresh manual of the ferns of the vicinity of Buitenzorg. This last work includes only a single terrestrial *Ophioglossum.* An American morphologist visits Buitenzorg specially in quest of material bearing on this primitive type and what does he find? No less than four well-marked terrestrial species of *Ophioglossum* snatched from under the eyes of the slower European botanists who have exploited rather than exhausted the fern flora of the old world.

LUCIEN M. UNDERWOOD.
COLUMBIA UNIVERSITY,
November 10, 1906.

SCIENTIFIC JOURNALS AND ARTICLES.

The Botanical Gazette for November contains the following papers: 'The Ovule and Female Gametophyte of Dioon,' by C. J. Chamberlain. This genus is endemic in Mexico and it is probable that plants often reach the age of more than 1,000 years. The structures studied were the ovulate strobilus, the megasporophyll, the integument, the vascular system of the ovule, the megaspore membrane, the archegonium and the egg, the general conclusions being reached that Dioon resembles Cycas more than does any other living genus. 'Temperature and Toxic Action,' by Charles Brooks, the purpose of the experiments recorded being to determine what might be the modifying effect of temperature on the toxic properties of certain chemicals as shown by the effect of these substances on germination and growth in certain fungi. 'The Embryogeny of some Cuban Nymphæaceæ,' by Mel. T. Cook, giving an account of the development of the embryo sac, the endosperm and the embryo.

SOCIETIES AND ACADEMIES.

THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE.

THE eighteenth meeting of the Society for Experimental Biology and Medicine was held at the Cornell Medical School, in New York City, on Wednesday evening, October 17. The president, Simon Flexner, was in the chair.

Members present.—Atkinson, Auer, Beebe, Buxton, Crile,[1] Dunham, Elser, Emerson, Ewing, Field, Flexner, Flournoy, Foster, Gibson, Gies, Hatcher, Lee, Levene, Levin, Loeb (L.),[1] Lusk, Mandel (A. R.), Meltzer, Meyer,

[1] Non-resident.

Murlin, Norris, Park, Richards, Salant, Schwyzer, Shaffer, Torrey, Wallace, Wolf, Wood, Yerkes.[1]

Abstracts of Original Communications.[2]

The Formation of Glycogen from Sugars by Muscle, with a demonstration of a perfusion apparatus: R. A. Hatcher and C. G. L. Wolf.

Contrary to the findings of Külz, saccharose does not yield glycogen in muscle. Glucose is a direct glycogen-former in muscle. No glycogen is formed from either glucose or saccharose in the glycogen-free muscles of animals which have been starved and treated with strychnin.

A perfusion apparatus was shown which permits the simultaneous and separate perfusion of the hind limbs of an animal and the arterialization of the blood by the lungs of two animals, each pair of lungs being used for an individual limb.

Bile Media in Typhoid Diagnosis: B. H. Buxton.

In the author's work 10 c.c. of blood, drawn directly from a vein, were distributed into three flasks containing 20 c.c. each of sterilized ox bile. This medium was used with great success in typhoid diagnosis.

The Inconstant Action of Muscles: Warren P. Lombard and F. M. Abbott.

The movements of the hind leg of the frog, which are generally ascribed to finely adjusted nervous coordination, are in fact largely the result of the mechanical conditions under which the muscles act. These conditions differ with each new position of the bones entering into the joints of the limb, and consequently alter the effect of the contraction of the muscles as the positions of the bones change during the course of any given movement. Thus a muscle which in one position of a bone acts as a flexor, in another position acts as an extensor, and a muscle which in one position of a bone may carry it dorsally, in another position may carry it ventrally. Manifestly it is absurd to try to class muscles as flexors and extensors, for example, or to try to name them according to the movements which they are supposed to produce. A study of central coordination must be postponed until the effects of peripheral coordination based on joint and muscle mechanics has been ascertained.

The Senses and Intelligence of the Chinese Dancing Mouse: Robert M. Yerkes.

For a few days during the first month of post-natal life dancing mice respond definitely to sounds, but neither direct nor indirect methods of testing auditory sensitiveness furnish any evidence of it in the adult. Brightness vision is fairly acute; color vision is poorly developed. In visual discrimination the mice apparently depend upon brightness differences. The behavior of the dancing mouse is readily modifiable. Modifications of behavior occur more rapidly in the male than in the female. Individual differences in plasticity and in the permanency of modification are marked. There is little evidence of any form of imitative tendency in behavior.

On the Motor Activities of the Alimentary Canal after Splanchnic and Vagus Section. W. B. Cannon. (Presented by S. J. Meltzer.)

Movements of the Esophagus.—Splanchnic section resulted in no deviation from the normal. Bilateral vagus section resulted in the well-known paralysis of the thoracic esophagus. A distinction must be drawn between the immediate paralyzing effect on the esophagus of cutting the vagi, and the later partial or almost complete recovery of efficiency by a local mechanism in the esophageal wall.

Movements of the Stomach.—Splanchnic section caused no alteration from the normal movements. The immediate effect of vagus section was tardiness in the starting of gastric peristalsis after food was introduced into the stomach. Again a distinction must be drawn between the first and the later effects of vagus section.

[2] The abstracts presented in this account of the proceedings have been greatly condensed from abstracts prepared by the authors themselves. The latter abstracts of the communications may be found in number one of volume four of the society's proceedings.

When all the extrinsic nerves were cut the gastric waves passed at the usual rhythm, but were unlike those seen when the vagi alone were cut in being, from the first, deep and powerful contractions. After death in these cases the stomach was usually found to be strongly contracted.

Passage of Carbohydrate and Protein Food from the Stomach.—After total suppression of impulses through the splanchnics both carbohydrate and protein foods are discharged through the pylorus at practically the normal rate. In the absence of impulses through the vagi and in the presence of impulses through the splanchnics the discharge of both carbohydrate and protein is notably retarded. But this retardation, especially when protein is fed, is much more marked soon after the operation than it is later. Again a distinction must be drawn between the immediate depressing effect of vagus section and the later considerable recovery of normal functioning.

When all extrinsic nerves have been cut, there is, as in the cases of vagus section alone, a difference between the immediate defect and the later partial recovery of normal function.

Passage of Food through the Small Intestine.—After splanchnic section the rate of transit from pylorus to ileocolic sphincter, when protein was fed, was much accelerated, and after vagus section it was much slower than normal. The rate was slower also when all nerves were cut. The variation from the normal was in all cases less with carbohydrate food than with protein.

Rhythmic segmentation of the food in the small intestine was observed in every condition of nerve section.

The persistence of characteristically different rates of discharge of protein and of carbohydrate food through the pylorus, after splanchnic section, after vagus section, and after severing both sets of nerves in the same animal, definitely proves that the control of this differential discharge is local and not mediated through the central nervous system.

Experimental and Clinical Observations upon Direct Transfusion of Blood: G. W. CRILE.

By means of end to end anastomosis by suture, blood was transfused in 74 dogs. Blood was transfused, retransfused and reversely transfused over a period of a month in the same dogs. There were no agglutins or hemolysins produced, no hemoglobinuria and no nephritis. Blood was found physiologically interchangeable. Every degree of hemorrhage, even to cessation of the arterial stream, was successfully treated.

In six clinical cases of hemorrhage treated by transfusion of blood the results were the same as in the laboratory. The hemorrhage factor was eliminated.

On the Normal Peristaltic Movements of the Ureter: D. R. LUCAS (by invitation).

In dogs narcotized with morphin the peristaltic *contractions* of the middle part of the ureter occur at intervals varying between 6 and 15 seconds. The curves representing these contractions were of variable but generally of fairly good size. These peristaltic contractions are apparently the same as those which Engelmann and other writers observed. The author found, however, *that the renal pelvis as well as the uppermost part of the ureter exhibits peristaltic contractions of another kind;* they are small, of short duration and occur every three or two seconds.

In some animals, in which the contractions from the middle part of the ureter presented fairly large curves, it frequently happened that these curves were superimposed by finer undulations. From the lower end of the ureter only a few tracings were obtained. It seems that in the lower end, also, the small and more frequent contractions predominate.

Anesthetics, *e. g.,* chloroform or ether, exercise pronounced inhibitory effects on ureteral peristalsis. The relatively slight and more frequent contractions appear to be less affected than the others by anesthetics.

Gastric Peristalsis under Normal and Certain Experimental Conditions: JOHN AUER.

The author has devised a very simple and satisfactory means of studying gastric peristalsis. He finds that if a well-fed rabbit is stretched out on its back and the hair of the epigastrium clipped, any observer may see

active gastric peristalsis under a closer approximation to physiological conditions than the saline bath affords. Mere inspection of the abdomen of a rabbit in this position shows that the stomach is far from inert. A short time after preparing the animal, peristaltic waves are seen coursing over the stomach from left to right, increasing in strength as the pyloric third is approached. These waves are easily registered by placing a tambour over the stomach region to be studied and connecting it with a writing tambour or manometer. The writing tambour registers not only the change in volume of the stomach part it overlies, but also the respiration of the animal; in many cases, with delicate adjustment of the writing pen, the heart beats are also marked.

A study of gastric peristalsis by this method has shown that as a rule the stomach is motionless for awhile after the animal is placed upon its back and its limbs are extended, but that active peristalsis is reestablished a few minutes afterward. Cessation of gastric peristalsis is also caused by the operation of opening the abdominal cavity, by section of both vagi in the neck and by subcutaneous injection of morphin. Inhibitory effects are also caused by ordinary inhalation of ether and by fasting. Intravenous injection of curare does not abolish gastric peristalsis so long as artificial respiration is maintained. Feeding reestablishes peristalsis after its discontinuance from fasting.

Reflex Inhibition of the Cardia in Rabbits by Stimulation of the Central End of the Vagus: S. J. Meltzer and John Auer.

At the last meeting the authors reported that by stimulation of the central end of the vagus a tetanic contraction of the entire esophagus can be produced in dogs and cats, but not in rabbits. In continuation of their studies the authors have found that *stimulation of the central end of the vagus causes a distinct inhibition of the cardia in rabbits.* The cardia of the rabbit is normally contracted in a moderate degree. Furthermore, at each deglutition the peristaltic movements of the esophagus terminate in a characteristic contraction of the cardia—it sinks into the stomach. Finally, after a stimulation of the peripheral end of the vagus the cardia contracts in the same characteristic way. The authors found that these three states of contraction can be definitely inhibited by a stimulation of the central end of the vagus. In the first place the cardia relaxes—bulges up during such stimulation. In the second place, if deglutition occurs, the cardia fails to contract so long as the central end of the vagus is being stimulated. Finally, the interruption of the stimulation of the *peripheral* end of the vagus does not bring on a contraction of the cardia while the central end is being stimulated.

Continuous Anesthesia by Subcutaneous Injection of Magnesium Sulfate in Nephrectomized Animals: D. R. Lucas and S. J. Meltzer.

Nephrectomy prevents rapid excretion of magnesium sulfate after its subcutaneous introduction. Consequently half the dose of this salt that is required per kilo to anesthetize a normal rabbit suffices for a nephrectomized rabbit. Furthermore, the anesthesia caused in nephrectomized rabbits by half the usual dose is deeper and lasts longer, because most of the magnesium compound is unable to leave the body. The anesthetic results with magnesium sulfate, in normal and nephrectomized rabbits, are in sharp contrast to the toxic effects of strychnin under analogous circumstances.

Remarks on and Exhibition of Specimens of a Metastasising Sarcoma of the Rat: Simon Flexner and J. W. Jobling.

The exhibited specimens consisted of a mixed-cell sarcoma, of the seminal vesicle of a white rat, which had been transplanted successfully into a series of white rats. The original tumor, which was found in a rat dying spontaneously in the laboratory, was as large as a walnut. Its surface was covered with peritoneum and its consistence was firm. Thus far it has been transplanted to full-grown and young rats both by subcutaneous and by intraperitoneal inoculation. The features of the tumor which the authors especially emphasized were the large and numerous

metastases which have appeared in the inoculated rats. The rat containing the original tumor did not show visible metastases. But in the animals which have succumbed after successful inoculation, the metastases have been numerous and of large size. They have appeared in the lungs and kidneys, and in one instance, following intraperitoneal injection, in the ribs and intercostal muscles. As the specimens showed, the nodules in the lungs and kidneys reached large dimensions, taking in a segment of a kidney or an entire lobe of the lung. The animal in which metastases existed in the intercostal muscles showed large nodules in the lung; in this animal a growth from the lung into the pericardium, and from the pericardium into the heart wall, took place. The secondary tumors had the same structure as the primary tumors. They were made up of spindle-shaped and polygonal cells; the latter were often of large size, with lobed or regular nuclei. Intercellular substance was present, and in places was fibrillated.

The epicardium in the rat, in which growth occurred in the myocardium, showed invasion of the serosa by the sarcomatous cells, having spread doubtless from the nodule mentioned and caused sarcomatosis of the serous membrane. This tumor is being further transplanted and studied in its biological relationships.

The Influence of Water on Gastric Secretion and the Combining Affinity of Mucus for HCl in the Stomach: N. B. FOSTER and A. V. S. LAMBERT.

Pawlow called attention to water as a stimulant of gastric secretion, but the degrees and limitations of stimulation produced by water in food Pawlow has not recorded. Using dogs with Pawlow fistulas, it was observed that with definite amounts of cracker meal as food the amount and rate of gastric secretion depend to some extent on the amount of water given the dog with his meal, *i. e.*, when small amounts of water are given, the secretion is slow and scanty. If larger quantities of water are mixed in the food the secretion is more abundant.

The degree of acidity of gastric juice depends upon the amount of secretion. When this is considerable it is much more acid than when the secretion is scanty. Pawlow is of the opinion that the degree of acidity of the gastric juice is constant; this can hardly be correct, however, for the total acidity changes from hour to hour. Pawlow evidently determined free HCl only, but the amount of free acid is dependent on the amount of mucus secreted, since mucus like other protein products combines with HCl. Mucus in the presence of pepsin combines with HCl to a very considerable extent and undergoes digestion with formation of proteoses.

The Action of the Electric Current on Toxin and Antitoxin: CYRUS W. FIELD and OSCAR TEAGUE.

The authors alluded to the unsuccessful attempts of various observers to ascertain definitely the nature of the electric charges carried by particles of toxins or antitoxins. Believing that such failures were due to the disturbing influences of products of electrolysis, the authors successfully eliminated the latter in their experiments. They found that both toxin and antitoxin particles travel toward the cathode and must therefore carry positive charges. This holds true when the tested fluid is made either acid or alkaline in reaction.

Since a true chemical reaction can take place only between ions carrying charges of opposite sign, the fact that toxin and antitoxin are both electro-positive would indicate that the combination of these two substances represents not a chemical union, but rather the adsorption of one colloid by another.

Nuclein Metabolism in a Dog with an Eck Fistula: J. E. SWEET and P. A. LEVENE.

A dog with an Eck fistula was maintained in nitrogenous equilibrium on a diet consisting of cracker meal, plasmon and lard. In this dog the output of uric acid was greater than from the normal animal. During fasting, after administration of nuclein, nucleic acid or of adenin, and during a period of feeding with a diet containing a small proportion of protein but of high caloric value, the excretion of uric acid was also increased. Ingested

thymin was recovered in large proportion from the urine. It was impossible to detect thymin in the urine after feeding nuclein or nucleic acid.

On the Fractioning of Agglutinins and Antitoxin: R. B. Gibson and K. R. Collins.

The results of the work thus far accomplished have demonstrated the untrustworthiness of a differentiation of the antibodies into those contained in euglobulin and those in pseudoglobulin, a finding in accord with the recent criticisms of salt fractionation by Haslam, and by Osborne and Harris.

No evidence has been found in these experiments to show that the agglutinins developed in rabbit, goat or horse serum can be either euglobulin or pseudoglobulin, or that these antibodies can be separated from one another by ammonium sulfate fractionation.

Further Observations of the Effects of Ions on the Activity of Enzymes: William N. Berg and William J. Gies.

The authors have found that the sequence of zymolysis in both velocity and extent in given groups of equivalent (percentage, molecular, normal, dissociated) acid or basic solutions varies considerably with the nature of the protein. This fact makes it impossible accurately to formulate statements regarding various phases of peptolysis or tryptolysis without specifying the particular protein involved in the process; it also renders doubtful various general conclusions of common acceptance pertaining to digestion that have been derived, in one research or another, from the use of a single protein. A study of the peptolysis of *many proteins* in a given series of acid solutions has therefore been undertaken, and an effort will be made to extend the observations to the tryptolysis of the same proteins in a similar series of basic solutions.

The speed and degree of both peptolysis and tryptolysis are resultants of conflicting influences. In the case of peptolysis, for example, the hydrogen ions in a given acid solution are always essential and positive factors, whereas, the accompanying anions or molecules (perhaps both) appear to be, *as a rule,* non-essential and inhibitory factors. That acid *molecules* are *not necessarily* inhibitory in peptolysis, however, was shown in a number of experiments with acetic acid, which neither favored nor interfered with peptic digestion materially when present in different amounts in solutions containing constant proportions of hydrochloric acid.

William J. Gies,
Secretary.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

The 620th meeting was held on October 13, 1906, President Abbe in the chair.

The evening was devoted to the subject of earthquakes.

Mr. C. F. Marvin, of the Weather Bureau, said the present year has been noteworthy because already 58 shocks have been recorded, while there were only 23 in the previous three years. He exhibited the Washington record of the San Francisco shock, showing a duration of about four hours, for the horizontal motion, while near the seat of the disturbance the duration was only a few minutes. The general nature and peculiarities of such records and the formulæ based on them by Japanese seismologists were presented briefly.

Mr. F. B. Littell spoke on 'Spirit-level Disturbances at the Naval Observatory due to the Chilean Earthquake.' While observing with the alt-azimuth instrument, which has two levels in the north and south plane, sensitive to 0.1″ or 0.2″, he observed oscillations amounting to 2″ and having a period of 18 seconds; these were reduced to 1″ after five minutes and to ½″ after about twenty minutes. The time was 7:49.

A large number of lantern views taken in and near San Francisco by Mr. G. K. Gilbert were then exhibited and briefly explained by Mr. Nutting.

Informally Mr. Press spoke of some experiments made with large hailstones; some on cracking appeared to have a bubble of air, but when stones of similar appearance were dissolved in water no bubbles rose. The president stated that this was the general experience except for one observer who wrote many years ago.

The 621st meeting was held on October 27,

1906, Vice-president Hayford in the chair.

R. A. Harris presented a paper entitled 'Elementary Notions relating to Integrals in General Function Theory' which treated of integration around a pole of a function, and of Cauchy's theorem.

It was pointed out that any element Zdz, where $Z=1/z-c$ and dz is an elementary arc of a small circle about c, is simply a vector in the y-direction, $2\pi/n$ in length, n denoting the number of parts into which the circumference is divided. Consequently,

$$\int Zdz=\frac{2\pi i}{n}\times n=2\pi i.$$

This established, it readily follows that

$$\int Zdz=2\pi if(c) \text{ where } Z=\frac{f(z)}{z-c},$$

f having no zero in the neighborhood of c.

Cauchy's theorem was demonstrated for circular paths, for paths enclosing slender areas, and for any path.

In the first case the truth is obvious if Z denote a power-series. For, the argument of $Z_\nu dz$ varies $\nu+1$ times as fast as does the argument of dz, and as dz takes all directions uniformly on account of the path being circular, so does $Z_\nu dz$. (ν refers to any particular term of the power-series.) The aggregate of the dz's being zero, so must be the aggregate of the $Z_\nu dz$'s or of the Zdz's.

For slender strips the theorem is obvious because the variation in the value of the function for an infinitesimal z-rectangle or square can be ignored in such products as Xdx, etc., if only ∞^1 of these rectangles go to make up the given strip.

Finally, by taking into account the variation of the function when z describes an infinitesimal square, so that instead of X, say, we have for the X-coordinates of the middles of the sides of the transformed square

$$X-\tfrac{1}{2}\frac{\partial X}{\partial y}dy, \quad X+\tfrac{1}{2}\frac{\partial X}{\partial x}dx, \text{ etc.}$$

With these values for X and similar ones for Y, the value of Zdz for the four sides of the elementary square is readily obtained. This sum will vanish, including infinitesimals of the second order, if the conditions for a monogenic function are satisfied. A given area comprises ∞^2 elementary squares, and so the neglected infinitesimals of the third order are of no consequence in the result.

Mr. A. Press presented 'Studies in Soil Capillarity.'

There seems to have been considerable misconception of what constitutes the capillary height of soils. A mere presence of moisture can not be an index of how much water will rise in a soil by virtue of capillary action. If one will drive home the analogy of capillary movement in fine bore tubes the 'capillary height' can be defined as that height to which moisture will rise in a soil where there is complete filling of the pore-space of the soil. This maximum height will be definite just in proportion as the soil-particles are homogeneous in size. However, if an equilibrium-condition is established in a soil, the indefiniteness of the capillary height is not so marked. This is proved by the experiments of Professor King when ten-foot cylinders of soil were employed, and after being first surcharged with moisture draining was continued for a period of about two years. Moisture above the capillary height can only be adsorption moisture and the pore-space need not necessarily be entirely filled. There are two types of adhesion-water: the one dry, the other wet; the first is hygroscopic water and is explained on Laplace's theory of molecular (surface) attraction; the second is of the same nature but differs in degree, because in the one the water-vapor has first to be condensed to water before strict adhesion can take place, and in the other no extra amount of energy is called for, because by wetting the soil (above the capillary height) the bonds of attraction of soil for moisture are more easily satisfied. Mulching, to be beneficial, depends upon whether the capillary height is exceeded or not. A so-called 'natural mulch' would be where the capillary height is below the surface of the soil.

Dr. Parks's experiments, in the *Philosophical Magazine*, show that the attraction of powders for moisture practically follows the law:

$$\frac{d\omega}{dt}=A(W-\omega),$$

where ω is the water content and W is the maximum moisture of (wet) adhesion, and where also A is a constant. If this law of attraction is used, we can determine the general equation of water-flow in one direction in soils by considering the attraction at two points removed by the distance dx of length, and taking into account the resistance of flow due to viscosity. The equation is, by employing the generalized Ohm's law,

$$\left(\frac{d\omega}{dt}\right)^2 + a^2\frac{d\omega}{dx} = 0.$$

If the boundary conditions can be satisfied the flow of moisture can be determined from one part of a soil to another with regard to time.

The 622d meeting was held on November 10, 1906, Vice-president Bauer in the chair.

Mr. A. L. Day presented some results of investigations on 'Lime-Silica Mixtures' made at the Geophysical Laboratory. Considering first the materials separately: silica is melted with great difficulty and becomes very viscous; the first traces of melting appear about 1,600° C.; powdered quartz heated in the electric furnace and cooled shows traces of crystallization as tridymite about 1,000°; lime melts to a thin liquid in the arc and when recrystallized is very insoluble in water. Mixtures of the two were studied pyrometrically, chemically and microscopically. As the percentage of silica increased the melting point generally rose, the graph showing two maximum points, corresponding nearly to definite chemical combinations, separated by sharp minima not much lower in temperature.

Mr. J. F. Hayford gave an account of the 'Meeting at Budapest of the International Geodetic Association' in September, 1906. (See Science, December 7.)

Charles K. Wead,
Secretary.

THE TORREY BOTANICAL CLUB.

The second stated fall meeting of the club was held at the museum building of the New York Botanical Garden on October 31, 1906, at 3:30 P.M. In the absence of the president, Professor H. M. Richards presided. Twenty-three persons were in attendance.

Dr. Britton presented the matter of the club's action in connection with the meeting of the American Association for the Advancement of Science, to be held in New York City, December 27–31. The program of meetings for the association week was read and motion was made that a committee of five, including the chairman of the meeting, be appointed by the chair, with power, to arrange for a reception to visiting botanists in Schermerhorn Hall, Columbia University, on the evening of December 26. The motion was carried. The personnel of the committee is as follows: Professor H. M. Richards, Professor L. M. Underwood, Dr. H. H. Rusby, Mrs. E. G. Britton, Dr. C. Stuart Gager.

The following papers were presented:

Remarks on the Formation of Aerial Tubers in Solanum tuberosum: Dr. C. Stuart Gager.

A brief outline was first given of the steps in the germination of the potato seed, up to and including the growth of the primary rhizomes, and the formation at their distal ends of the first tubers. Reference was then made to two recent publications in *Torreya* (6: 181 and 211, 1906), describing an anomalous formation of a tuber of *Solanum tuberosum,* on a sprout from a seed tuber, in daylight, and briefly summarizing the pertinent literature.

The specimen in question, with photograph, was then exhibited, and possible causes of the anomaly discussed. Prunet's researches (*Rev. gen. d. Bot.* 5: 49. 1893) led him to the conclusion that, at maturity, the apical and basal ends of the mature tuber are physiologically different, due to a redistribution, after the cessation of growth, of the reserve materials stored in the tuber while it was forming. The validity of this conclusion has never been tested by other investigators, and it was thought improbable that such a condition, even if it existed in the seed tuber which bore the anomaly, would enter as a causative factor.

The specimen exhibited, and numerous other recorded cases of the formation of tubers on aerial branches, render very improbable the

suggestion of Noël Bernard (*Rev. gen. d. Bot.* 14: 139, 269. 1902), and of Jumelle (*Rev. gen. d. Bot.* 17: 49. 1905), that potato tubers are caused by a fungus, a species of *Fusarium*, endotrophic with *S. tuberosum*.

In the normal formation of tubers two kinds of factors are doubtless involved: the first organic, consisting of specific peculiarities in the protoplasts; the second environmental, comprising external conditions, especially of light and moisture, and the stimulus of the various metabolic products within the stem. The ability to induce tuberization in aerial stems by depriving them of light and reducing their transpiration, as Vöchting did, and the sport described by Vilmorin (*Torreya, l. c.*), suggest that the specific cellular peculiarities obtain throughout the entire shoot system, and need only the stimulus of definite environmental conditions, either external or internal, to make them operative.

In this connection it would be desirable to know whether the presence, in any portion of the potato stem, of a superabundance of food materials would operate as a stimulus, causing the excessive formation of parenchymatous cells, which, gorged with the reserve food, make up the greater part of the bulk of the tubers. It is well known, through the researches of Knight and others, that, if the flow of food materials is diverted from incipient underground tubers by removing them as fast as they begin to form, this material will accumulate in portions of the aerial stem, causing tubers there. In the specimen in question, translocation of digested food became established toward and into the developing 'sprouts,' but elongation of the latter was not favored because of the very slight water-supply from without. It does not seem improbable that a combination of these two conditions alone would be sufficient to produce the tuber, even in daylight.

Two New Coralline Algæ from Culebra, Porto Rico: Dr. MARSHALL A. HOWE.

Dr. Howe exhibited and discussed briefly specimens representing two rather large and conspicuous kinds of non-articulated corallines which were secured during a visit made last March to the island of Culebra. These have been studied in collaboration with Dr. M. Foslie, of Trondhjem, Norway, and a joint paper, in which the two new species are to be described and illustrated, is soon to be published. One of the species is a *Goniolithon* which seems to have its closest affinity among the forms already described in a species originally found on the island of Funafuti, of the Ellice Islands group, in the South Pacific. The second species, a *Lithophyllum* which forms columnar flat-topped masses sometimes a foot in height, is evidently a reef-builder at Culebra, and, like the other, curiously enough, finds its nearest relative in a species originally described from Funafuti and since reported from the Maldives in the Indian Ocean. The speaker remarked upon some of the general characteristics of the non-articulated corallines, and showed microtome sections and photomicrographs illustrating the structure of the two species that were under discussion. In reply to a question as to the ecological relationships of the coralline algæ and the true corals, it was stated that though certain species of both groups are reef-builders and inhabit similar places, each of the groups seems to be somewhat inimical to the other. A place in which corals are flourishing is not a good place in which to look for coralline algæ, and *vice versa*. It is a common thing to find corallines attached to dead or moribund corals, but comparatively rare to find the corals growing on calcareous algæ. In one case a crustaceous coralline was noticed to be encroaching upon and covering a living coral.

Remarks on the Flora of Nova Scotia: Dr. C. B. ROBINSON.

The province of Nova Scotia consists of a peninsula connected with New Brunswick by an isthmus of very slight elevation, and the island of Cape Breton separated from the rest of the province by the Strait of Canso, which at the narrowest place is less than a mile broad. The northern part of the island is composed of hills between 800 and 1,400 feet high, except narrow strips along the coast and in the river valleys.

In general the flora of the peninsula and island is composed of plants which have mi-

grated from the west or southwest through New Brunswick, many species having their northeastern limit in the province. A second source lies in the introduction, chiefly from Europe, of weeds in ballast, etc., and many species thus added to the flora are very conspicuous and troublesome. But the main purpose of the paper was to call attention to the presence in northern Cape Breton of a third element, namely, species that are believed not to occur anywhere upon the peninsular portion of the province, and in some cases not in New Brunswick. Such cases are always open to the suspicion of incomplete collection, but this can hardly be held to explain the gap in the distribution of the male fern, *Dryopteris filix-mas* (L.) Schott., known from about twenty localities in this region, although nowhere abundant there, and not found otherwise east of Vermont. Another conspicuous fern reported from two rather widely separated districts in northern Cape Breton is the holly fern, *Polystichum Lonchitis* (L.) Roth., and no other stations are recorded east of Ontario. A similar statement may be made about many flowering plants, those referred to being *Carex abacta* Bailey, *Blephariglottis blephariglottis* (Willd.) Rydb., *Sanguisorba canadensis* L., *Aster nemoralis* Ait., not known from peninsular Nova Scotia, *Drosera intermedia* Hayne and *Solidago macrophylla* Pursh, only so far found there immediately east of the Strait of Canso.

It was attempted to correlate this with the observations of Canadian geologists to the effect that the region in question had escaped glaciation, the limit of the ice-sheet being not far from Pictou.

Specimens were also shown of several species not hitherto recorded from the province, among them *Tetragonanthus deflexus* (J. E. Smith) Kuntze, *Sparganium fluctuans* (Morong) Robinson, *Meibomia canadensis* (L.) Kuntze, *Vicia hirsuta* (L.) Koch, *Falcata comosa* (L.) Kuntze, *Chœnorrhinum minus* (L.) Lange, and *Triglochin palustris* L.

Account of a Collecting Trip to the Sierra Mæstra of Cuba: Mr. Norman Taylor.

Before giving an account of the various trips made during the expedition, a description was given of the Sevilla Estate, which is a local name for the area visited. This is a tract about forty miles long, having for its southern limit the Caribbean Sea. Its northern boundary is the ridge of the Sierra Mæstra range. At its eastern and lower end this range is about 3,500 feet high, but rises in altitude, and gradually approaches the coast as it goes to the westward, reaching its culminating point near El Turquino, a mountain credited with an elevation of 8,400 feet. There is no gradual descent from the ridge of the Mæstra to the sea, but numerous other mountains intervene. This feature, together with the river valleys, makes the country very rugged and precipitous.

The chief rivers, the Sevilla, Guama, Bayamita and Peladeros, rise in the Mæstra itself, while numerous others of uncertain local names rise in the front ranges. All the rivers, at this time of the year, flow under the ground for the last two miles, so that it is easily possible to get across near the coast, but in the rainy season they flow in the surface bed and are quite impassable.

The prevailing wind is the moisture-laden northeast trade. On this account the rainfall is abundant on the windward side of the Mæstra while the leeward side of the range is dry and arid. The increasing altitude of the mountains from east to west and the decrease in the width of the strip of land lying between them and the sea make the effect of this great wind-shield still more marked as one travels westward. Here at least two species of *Cereus,* and an *Agave,* together with many other sub-xerophytic plants, were found.

Among the interesting plants collected were specimens of *Pinus occidentalis.* This pine occurred on the mountains at elevations between 1,000 and 2,300 feet, and was plentiful in many places. The great size and inaccessibility of the trees of *Ceiba pentandra* that were found in the mountains was cited as a factor that must have some bearing on the probable new world origin of the species.

Discussion followed by Dr. Britton and Dr. Howe, the former giving recent evidence collected by him in Jamaica, pointing toward the

conclusion that the *Ceiba* may very probably be considered as a native of the new world.

C. STUART GAGER,
Secretary.

THE ELISHA MITCHELL SCIENTIFIC SOCIETY OF THE UNIVERSITY OF NORTH CAROLINA.

THE 168th meeting of the society was held in the main lecture hall of the new chemical laboratory on Tuesday evening, November 20, at 7:30 P.M., with the following program:

PROFESSOR A. S. WHEELER: 'Denatured Alcohol.'

PROFESSOR J. E. MILLS: 'The Mutual Absorption of Attraction by the Attracting Particles.'

A. S. WHEELER,
Recording Secretary.

THE ST. LOUIS CHEMICAL SOCIETY.

AT the meeting of the St. Louis Chemical Society on November 12, Dr. H. M. Whelpley presented a paper, entitled 'The United States Pharmacopœia and National Formulary, the Standard Authority of the Food and Drugs Act of June 30, 1906.' The paper was due to the interest in the pharmacopœia developed by the new law. The speaker gave a brief history of pharmacopœias in general and of the United States Pharmacopœia in particular, dwelling especially on the methods pursued by the Pharmacopœial Convention, in the decennial revisions of the national standard.

C. J. BORGMEYER,
Corresponding Secretary.

DISCUSSION AND CORRESPONDENCE.

THE 'ELIMINATION' AND 'FIRST SPECIES' METHODS OF FIXING THE TYPES OF GENERA.

IN a recent number of SCIENCE Mr. Witmer Stone has very ably presented the evidence in favor of the adoption of the 'first species' method of fixing types of composite genera.[1] As a strenuous advocate for many years of the 'elimination' method, I beg space for a few comments on Mr. Stone's paper.

[1] "The Relative Merits of the 'Elimination' and 'First Species' Method in Fixing the Types of Genera—with Special Reference to Ornithology," SCIENCE, N. S., Vol. XXIV., No. 618, pp. 560–565, November 2, 1906.

It must be admitted that he has made a pretty favorable showing for the 'first species' principle. I have always conceded that this would be the ideal method if we were at the threshold of our work, and my opposition to it has always been due to the fact that we did not begin in this way, and that to adopt it now would introduce serious confusion in nomenclature. Mr. Stone's researches in the matter seem to have convinced him that the rigid and uniform enforcement of either principle would result in practically the same number of changes in generic names; while the alleged ease and simplicity in application seems to render the 'first species' method preferable to the 'elimination' process. I regret, however, that in his enthusiasm for his view of the case he has been (doubtless unconsciously) led into a few misleading statements with regard to the ease of its application and to various other matters, only a few of which, owing to the vastness of the subject, can be here noticed. First, he makes the astounding statement that "Elimination has never been practised in Europe and does not seem to be understood by foreign writers, and in the vast majority of cases the first species is taken by them as the type." The implication is that the 'first species' principle not only now prevails abroad, but ever has been the guiding rule in selecting types of composite genera when no type was specified. The truth of the matter is just the reverse! The B. A. Code of 1842 expressly provided that when no type was clearly indicated the author who first subdivided a composite genus might restrict the original name to such part of it as he might deem advisable, and that such assignment should not be subject to subsequent modification. This ruling has been one of the corner-stones of all subsequent codes, down even to the latest, 'The International Code' of 1905. The elimination principle followed as a necessary corollary, and has been used, consciously or unconsciously, with a few individual exceptions, by all subsequent naturalists, in dealing with the question of types, unlimited evidence of which could be cited did space permit. The B. A. Committee suggested, however, that 'in many cases' it might