tion; the example might then be worked out in this manner:

35..... 42—
12..... 126
4..... 378+
1.....1134+
378+1134—42=1470;

but the possibility of constructing similar processes throws no light on the origin of such a method among the Russian peasants.

C. A. SCOTT.

CAMPHOR SECRETED BY AN ANIMAL.

TO THE EDITOR OF SCIENCE: Mr. O. F. Cook's article in a recent number of SCIENCE recalls some observations by the late E. D. Cope. Cope wrote (*Trans. Amer. Entom. Soc.*, Vol. 3, May, 1870, pp. 66–67), as follows: "The species of *Spirobolus* and *Julus* discharge a yellowish juice having much the smell of aqua regia and a very acrid taste. The *Spirostrephon lactarius* exudes from a series of lateral pores a fluid which has in its odor a close resemblance to creasote. The *Polydesmus virginiensis* is defended by a fluid which has almost exactly the smell of hydrocyanic acid and is fatal to small animals. *Petaserpes rosalbus* secretes a considerable quantity of a milky substance, which has the perfume of gum camphor."

Quite possibly there are other references to the subject, but I have not examined the literature of the Myriapoda very carefully.

NATHAN BANKS.

EAST END, VA.

A CORRECTION.

TO THE EDITOR OF SCIENCE: In the issue of SCIENCE for October 19th I notice your statement under 'University and Educational News' of my appointment as acting president of Wells College. Permit me to say that a misspelling of my name completely changes it into that of another person. Instead of *Feeley*, it should be *Freley*.

J. W. FRELEY.

BOTANICAL NOTES.

PROLIXITY IN BOTANICAL PAPERS.

WHAT botanist has not groaned in spirit in these recent years over the increasing prolixity of American botanical writers? There was a time when it was the exception for a botanist to write a paper of great length, and some of us were a little ashamed of what appeared to be the inability of botanical writers to prepare papers whose length, at least, would suggest profundity. Doubtless at that time there were fewer men who could write anything better than short notes, and perhaps there was some need of a change. But now, alas, we have learned the lesson only too well. One takes up journal after journal and finds that many of the papers are drawn out through pages and pages until in very weariness he turns to the 'conclusions,' hoping to obtain a summary of the author's results, often to find that here, too, there is such prolixity as to suggest the need of a 'summary' of the 'conclusions.'

Is it not time that botanical teachers gave some instruction in conciseness of statement, while they are making investigators out of the raw material which they find in their classes? Paper and ink do not cost much, and the long-suffering editors of botanical journals have not made, as yet, any audible protest, but we speak for the readers of these long-drawn out papers whose time is too valuable to be given to the absorption and assimilation of the vast mass of excellent but uncondensed matter which now-a-days finds publication. Many a good paper would be much more readable if condensed to half its length, while at the same time it would lose nothing in clearness of statement of all essential facts.

THE STUDY OF PLANT DISEASES.

AN instructive paper by Mr. Galloway, in the 'Yearbook of the Department of Agriculture' for 1899, gives a brief history of the development of the study of plant pathology in the United States. Little has been done by American botanists previous to 1875, and practically nothing at all by the Government. With the establishment of the agricultural experiment stations, an impetus was given to the beginnings made by Professors Farlow, Burrill and Arthur, and about the same time in the Department of Agriculture a beginning was made of what eventually developed into the Division of Vegetable Physiology and Pathology. This was done by the appointment of Professor

Lamson Scribner to be assistant botanist, with instructions to devote himself to the study of plant diseases. For a minor and secondary place in the Division of Botany, this work, thus begun, has grown into a separate division with a large force of trained physiologists and pathologists. With this development in Washington, there has been a corresponding growth in the work in the experiment stations, while in many of the agricultural colleges and larger universities courses of study in plant physiology and pathology have been introduced into the botanical departments. Where but a few years ago so little was done in the study of plant diseases that the term 'plant pathology' was almost unknown, good introductory courses in physiology and pathology are now offered, and increasing numbers of young men are familiarizing themselves with the scientific and practical aspects of the problems involved.

THE ANNUAL SHEDDING OF COTTONWOOD TWIGS.

JUST now (the middle of October) the Cottonwood trees (*Populus deltoides* Marsh.) are shedding their twigs, the ground beneath the large trees being well littered over with fallen twigs of all sizes. This curious phenomenon has been noticed repeatedly, but still it appears not to be generally known, even by botanists. As the autumn advances the cortical tissues of the bases of many of the twigs become so much swollen as to produce bulbous enlargements. At the same time there is a loosening of the woody tissues in the same region, the result being that the woody cylinder is larger in diameter at the base of each affected twig, and the wood-wedges are separated from one another by thicker medullary rays. There appears to be a good deal of longitudinal tension exerted by the swollen cortical tissues, the result being that the woody tissues are pulled asunder, showing a complete transverse fracture of the whole of the woody cylinder. A breeze now easily fractures the cortical tissues and the twig drops to the ground.

There is much apparent waste in this shedding of these twigs, since they invariably have large, well-formed terminal buds and generally a good many lateral buds also. Among the latter one often finds well-grown flower buds. These facts show that the twigs which are shed are not the feeble and dying ones, but are among the most vigorous and active on the trees. It is an interesting fact that the Tamarisks (*Tamarix* sp.), which are held by some botanists to be closely related to the Poplars, shed their twigs by exactly the same device as that described above. In the Tamarisks the shedding of the twigs is a part of the annual process of defoliation, their leaves being so small that it appears to be less trouble and expense to drop twig and all than to separate every individual leaf. Possibly in the Cottonwoods, with their large leaves, we have a survival of the Tamarisk twig-shedding habit long after its original significance has disappeared.

THE IMMEDIATE EFFECT OF POLLEN.

FOR a long time it has been known that in the crossing of some plants the pollen seems to produce an effect upon more than the embryo, in other words, that not only the embryo but other structures, also, show evidences of hybridity. Focke named this phenomenon *xenia* in a paper published nearly twenty years ago, and this is the term now used by writers of papers on this subject. The latest paper is an exceedingly interesting one by H. J. Webber: 'Xenia, or the Immediate Effect of Pollen, in Maize,' published as a bulletin (No. 22) of the Division of Vegetable Physiology and Pathology of the United States Department of Agriculture. In it an attempt is made to throw light upon the real nature and meaning of the phenomenon. Many experiments were made by him to determine whether xenia actually takes place in maize, with the result that its occurrence is no longer to be doubted. It is shown, moreover, that this immediate effect of the pollen is limited to the endosperm of the maize kernel. Thus where a change of color occurs in the hybrid, this color is in the endosperm cells, and furthermore, where the color is in the pericarp (as in the variety known as Red Dent) no change in color takes place.

The explanation suggested by DeVries and Correns in papers published almost simultaneously in December, 1899, that xenia is the result of double fecundation is adopted by Mr. Webber without modification. In fact the same

explanation had suggested itself to him early enough in 1899 to enable him to make a number of experiments that year, with a view to obtaining evidence in regard to it. This theoretical explanation, in short, is as follows: As is now admitted, in the process of fecundation (in some plants, at least) not only is there a union of one of the generative nuclei of the pollen tube with the egg nucleus, but also, there is a union of the second generative nucleus with the embryo-sac nucleus. As the endosperm develops from this nucleus thus fecundated, it is clearly a hybrid organism also. In other words, in the fecundation of the egg a hybrid sporophyte is produced, but at the same time the supporting gametophyte (the endosperm) is itself developed as a hybrid. This is possible because of the tardy development of the gametophyte tissue, which is so delayed that actually it is formed simultaneously with that of the sporophyte which it bears, and which it should precede.

CHARLES E. BESSEY.
THE UNIVERSITY OF NEBRASKA.

NEW YORK BOTANICAL GARDEN.

IMPROVEMENTS in the New York Botanical Garden are going steadily forward. A contract amounting to $22,000 for grading and roadways near the Museum is approaching completion, and a series of working greenhouses is now under construction in the eastern part of the Garden in a locality little frequented by visitors. These houses comprise two main ranges 20 by 60 feet, storage rooms, potting sheds and an independent heating plant, in which the open hot water system will be used.

The New York Central and Hudson River Railroad is building a new passenger station at the Bedford Park entrance to the Garden. The new station will be of stone and brick costing about $40,000. The offices will be located on the western side of the tracks, connected by a tunnel with the extensive passenger shelters and waiting rooms on the eastern side which open directly into the plaza. The name of the station will be changed to Bronx Park (Botanical Garden) upon completion of the new building which will save much confusion to visitors.

Professor L. M. Underwood spent the summer in investigations upon American ferns in the British Museum, Kew Gardens and the Cosson Herbarium in Paris. The Cosson Herbarium contains the Feé collection, formerly owned by Emperor Dom Pedro of Brazil. The Feé collection has the largest and best set of West Indian ferns in existence.

Other exploration work was carried out in connection with the Garden is as follows: Dr. Rydberg accompanied by Mr. F. K. Vreeland made extensive collections in the Sierra Blanca in southeastern Colorado; Dr. D. T. MacDougal explored the Priest River Forest Reserve, also carrying out investigations under a grant from the American Association; Dr. C. C. Curtis made a series of collections in western Wyoming, Professor F. E. Lloyd in cooperation with Professor Tracy visited the islands in the Mississippi delta; Messrs R. M. Harper and Percy-Wilson made collections in Georgia, and Dr. M. A. Howe investigated the marine and land flora of Bermuda and the coast of Maine, also carrying out the terms of a grant from the Peabody fund; Dr. and Mrs. N. L. Britton made a brief tour in the Adirondacks, securing many living specimens of alpine plants for the grounds.

Dr. N. L. Britton is now in Europe for the purpose of securing exhibits from the Paris Exposition and negotiating for the purchase of several herbaria.

Contributions for the conservatories have been received from many sources, the most valuable of which are those given by Miss Helen Gould, Mrs. F. L. Ames and Siebrecht and Son.

The fall lecture course now in progress has been announced as follows:

October 13th. 'Autumn Flowers,' by Mr. Cornelius VanBrunt.

October 20th. 'Evergreen Trees,' by Professor F. E. Lloyd.

October 37th. 'Freezing of Plants,' by Dr. D. T. MacDougal.

November 3d. 'Evolution of Sex in Plants,' by Professor L. M. Underwood.

November 10th. 'Poisonous Plants which Live in our Bodies, and how we contend against them,' by Professor H. H. Rusby.

November 17th. 'The Sedges,' by Professor N. L. Britton.