Uredo Arachidis, although a single collection from Paraguay would indicate that it should be called *Puccinia Arachidis.* It has been known to mycologists since 1884, but only very recently has it attracted attention of the cultivator. Specimens received by the writer from W. Robson, of Montserrat, British West Indies, show every leaf covered with the abundant brownish-yellow powder of the fungus. This was in September, 1916. Mr. Robson reports that some seasons it is a serious menace to the peanut crop in that island. Experiments for its control with Bordeaux mixture did not prove promising.

The life cycle of the rust has not been worked out, but as in the case of the chrysanthemum rust the cultivator will meet only with the uredinial stage, for only one kind of spore is produced on cultivated plants. The rust appears to be working its way northward, having been reported from Porto Rico in 1913, and from Cuba in 1915. It has not yet been reported from any part of the United States proper.

The second rust, to which attention should be called, is one on potatoes and tomatoes (*Puccinia Pittieriana*). Little is yet known about it. It was collected by H. Pittier on the wild potato in 1903 and again in 1904 on the slopes of the volcano Irazú in Costa Rica, at an altitude of about 10,000 feet, and was found again in the same region by E. W. D. Holway in 1916. It is mentioned in Pittier's "Plantas Usuales de Costa Rica" under the name *Uredo Pittieri.* More recently specimens have been examined by the writer sent by A. Pachano from Ambato, Ecuador, where it was found in 1918 in the gardens of the Quinta Normal on both potatoes and tomatoes.

For this rust only one kind of spore, the teliospore, is produced in the life-cycle, and these spores germinate at once upon reaching maturity, requiring no period of rest. The habit of the fungus and its mode of distribution are essentially those of the hollyhock rust. In gross appearance, as well as in other characters, it is very similar to the common rust on cocklebur.

The two rusts, to which attention is particularly called, have not yet demonstrated their full capacity for harm, but from their appearance, and from what we know of the introduction and behavior of similar rusts that are highly destructive, there seems little doubt that if once established in a region where suitable crops are extensively grown, they will prove most unwelcome to the cultivator.

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THE FIXATION OF FREE NITROGEN BY GREEN PLANTS

IN spite of a considerable amount of negative evidence, the question of the ability of chlorophyll-containing plants to utilize the uncombined nitrogen of the air is still an open one. A large number of experiments with lower forms, especially the grass-green algæ, tend to disclaim any such ability and it has come to be very generally accepted that members of the Chlorophyceæ are not able to use free nitrogen. However, the number of species which have been investigated is small and the culture methods employed have not always been those which are most favorable for the best growth of these organisms. Accordingly experiments were begun in this laboratory a few years ago for the purpose of extending our knowledge over a larger number of species, under culture conditions which would insure a rapid and vigorous growth. Some of the results of these experiments are presented in this brief preliminary note and a more detailed account will appear elsewhere within a few months.

Seven species of grass-green algæ (Chlorophyceæ) were used in the experiments. With the exception of one (*Protococcus* sp.), all were isolated from soil and all species were used in pure culture, understanding by this term a single species free from all other organisms. The cultures were grown in 500 c.c. Kjeldahl flasks on approximately 150 gr. of accurately weighed mineral nutrient agar. Since previous experiments have shown that these forms will not grow in the complete

absence of combined nitrogen, a definite amount of combined nitrogen was supplied in the medium. The full nutrient solution employed contained 0.5 gr. NH_4NO_3 per liter and in the various series this source of nitrogen was replaced by $(NH_4)_2SO_4$, $Ca(NO_3)_2$, asparagine, glycocoll, and urea, the other constituents of the solution remaining unchanged. In all the culture media nitrogen as such was present in approximately equal quantities and each nitrogen source was set up in duplicate series, with and without 1 per cent. glucose. NH_4NO_3, $Ca(NO_3)_2$, and $(NH_4)_2SO_4$ were also used in the presence of mannite. The culture flasks were arranged in series according to the medium and connected by glass and rubber tubing for aeration with ammonia-free air. Three flasks of each series remained uninoculated as checks and two or three flasks in each series were inoculated with the same organism.

At the end of a growing period of from five to seven months the cultures were analyzed for total nitrogen. The Gunning-Kjeldahl method was used for media free from nitrates and where nitrates were present the Förster modification was employed. The average of the determinations of the three checks of a series was taken as the nitrogen content of that medium per unit weight, and any increase in total nitrogen in the culture flasks of that series was regarded as "free nitrogen fixation." In the urea, glycocoll, asparagine, and $(NH_4)_2SO_4$ series no marked increase or decrease occurred either in the presence or absence of glucose or mannite. Marked increases were found, however, in both NH_4NO_3 and $Ca(NO_3)_2$ media in the presence of glucose, the amount of fixation ranging from 6 to 10 mg. per culture in the 1917–18 experiments and from 4 to 13 mg. in the 1919 experiments. Since the initial nitrogen content of the medium was but 22 or 23 mg. per culture, as shown by the checks, this fixation represents an increase in total nitrogen ranging from 17 to 55 per cent. Where mannite replaced glucose in the nitrate media, there was no indication of fixation; and in the absence of both glucose and mannite, there were only slight increases over the checks. Fixation was not confined to any one species, apparently all seven species showing ability to use free nitrogen. The amount of fixation, however, varied somewhat with the different species and seemed to be related to the intensity of growth.

One species of the 1919 experiment exhibited what is apparently a "denitrification" when grown on nitrate media in the presence of mannite. The total nitrogen content of these flasks was from 2 to 9 mg. below that of the checks. However, the same species in the presence of glucose increased the total nitrogen content of the culture. There was also a slight indication of denitrification with this species on nitrate media in the absence of both glucose and mannite.

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AMERICAN PHYSIOLOGICAL SOCIETY

REPORT OF THE THIRTY-SECOND ANNUAL MEETING

The American Physiological Society held its thirty-second annual session during the holidays at Cincinnati, Ohio. The scientific and business sessions were called at the school of medicine of the University of Cincinnati. Six half-day sessions were held on December 29, 30 and 31, 1919, for the reading and discussion of scientific papers. In the two business sessions a number of important measures were considered and voted, the most notable of which was the establishment of a new journal for the publication of periodical reviews of physiological progress in subjects of dominant scientific interest.

The important business acts of the council and of the society at the several sessions during the meeting are here enumerated:

1. The annual assessment was fixed at $1.00 for the year 1920.

2. A grant of $125 was made in aid of the publication of the journal, *Physiological Abstracts*, edited by the English Physiological Society in which the American Physiological Society is a collaborator.

3. Professor Donald R. Hooker, of Johns Hopkins University, was appointed managing editor of