Angelli, holding it to be distinct from *Viola palmata,* the differences showing in the character of the flowers and of the summer leaves. Miss Angell, who was present, told of her studies of this species and called attention to the extraordinary size of the summer leaves. Dr. Rusby in the course of his remarks mentioned a very early form which is apparently the variety *cordata* of *Viola cucullata* of Gray. This form has been studied extensively by Miss Sanial, one of the club members.

Dr. Rydberg spoke of the violets of the Rocky Mountain region, passing in review the various species from that section and calling attention to the occurrence of the common European *Viola biflora* which reappears in Colorado.

Dr. Shull spoke of the difficulty he had experienced in germinating violet seeds, and in the discussion it was brought out that violet seeds are apt to lose their vitality upon drying.

Dr. MacDougal spoke of the difficulties attendant upon mutation experiments with the violets, and advocated experiments to test any possible theories as to hybrids.

After some further discussion by Dr. Britton and others this most interesting meeting was brought to a close.

Edward W. Berry,
Secretary.

THE UNIVERSITY OF COLORADO SCIENTIFIC SOCIETY.

During the academic year 1904–5 the society met every Monday evening from October to May, holding in all thirty meetings. In nearly all cases a single topic was discussed at each session, but a few times there were two papers given. The speakers avoided technicalites as far as possible and presented their topics in such form as to be interesting to men of science generally. Papers were given, for the most part, by members of the faculty representing the various departments of pure and applied science. At the last meeting of the year, held on May 15, the following officers were elected:

President—Henry B. Dates.
Vice-President—Ira M. DeLong.
Secretary—Francis Ramaley.
Treasurer—Martin E. Miles.

Francis Ramaley,
Secretary.

Boulder, Colo.,
June 7, 1905.

SPECIAL ARTICLES.

NEW WORK UPON WHEAT RUST.

For a number of years it has been the belief of the writer that the efficiency of the uredospores (summer spores) of wheat rust to perpetuate the disease is possibly much greater than thought to be. It has been assumed by most botanists that these spores are quick to germinate and short of life. As there are formed definite resting spores, and also the cluster cup stage on the barberry bush, it has been apparently taken for granted that the summer spores have no other effect than to rapidly spread the disease from plant to plant during the summer season.

It will be interesting news to mycologists to know that we have at last definitely established the fact of the wintering of the red spores (uredospores) of a number of the important rusts in viable form, including the important species *Puccinia graminis.*

During the winter of 1888 and 1889 the writer, while working at the Indiana Station, first demonstrated the fact that the mycelium of the uredo stage (red spore stage) of the species known as *Puccinia rubigo-vera* could pass the winter in the tissues of the wheat plant uninjured (see *Agricultural Science,* Vol. 3, page 105). During the summer of 1890 (see *Agricultural Science,* Vol. 5, Nos. 11 and 12) it was further proved that the red spores of this last-named species could survive exposure to the drying air and sunshine of July and August for over a month. This indicated that it was possible for such spores to be borne many miles by the wind, and aided to an understanding of the rapidity with which general rust infection may take place over large areas of country.

Aided by the persistent and painstaking efforts of assistant plant pathologist Mr. F. J. Pritchard, I have at last been able to make numerous trial studies upon methods of stor-

ing and keeping wheat and other types of grass straw, which is infected by red rust, so as to carry out various studies upon the most successful methods of testing the vitality of the spores from week to week and from month to month. We are now able to announce definitely that the vitality of the red spores (*uredospores*) of *Puccinia graminis,* in certain cases, may remain unimpaired by the action of the drying winds of autumn and the intense cold of a North Dakota winter. In some cases we have been able to germinate as high as eighty to ninety per cent. of all the spores under test. We have found these spores successfully surviving upon dead leaves, dead straw and upon the partially dead or green leaves of living grain or grasses. This applies also to a number of other important rusts which attack wheat and allied grasses.

In the case of *Puccinia rubigo-vera,* the smaller wheat rust, it has been found by the writer to be wintering freely in Mississippi, Texas, Illinois, Minnesota and North Dakota both upon living leaves of wheat or winter rye and upon the matured leaves and straw of the same. This fact will of necessity have great weight upon the future investigations of wheat rust. The matter of the barberry stage and other æcidial rusts may yet be proved to be of physiological necessity for the perpetuation of the species, but it would seem that these need no longer be believed to be a direct yearly necessity to the perpetuation of the rusts concerned.

HENRY L. BOLLEY.
NORTH DAKOTA AGRICULTURAL COLLEGE.

CONCERNING THE IDENTITY OF THE FUNGI CAUSING AN ANTHRACNOSE OF THE SWEET-PEA AND THE BITTER-ROT OF THE APPLE.

ABOUT a year ago I received some sweet-pea stems from Inwood, W. Va., with a request as to the cause of the plants dying. These stems had dead, shrunken areas on them with masses of pink spores scattered about over the dead areas. There were also a few spore masses on some of the leaves. An examination showed that the dead areas were probably caused by some species of *Glœosporium,* but no such fungus has been found as occurring on the sweet-pea in the literature that I have had access to. I have called the disease an anthracnose on account of its resemblance to the anthracnoses of some other plants.

More material was secured at different times during the autumn, and it was my intention to make a personal investigation of the disease until after Mr. A. Lee Post became officially connected with the experiment station and a student in the university, when the problem was assigned to him under my direction. He began a study of the life history of the fungus by means of artificial cultures and inoculations. The results of the investigation, up to date, have been presented in the form of a thesis, and will probably be published later with slight alteration and the addition of new data.

While examining some of the agar cultures with Mr. Post, I noticed that there was an occasional cell of the mycelium that contained spores, the number of spores in the cells varying. To all appearances the endospores were the same as those borne externally on the hyphæ. This was the first time that I had seen endospores in the mycelium of a fungus other than those found in bacteria, and correspondence with some of the leading mycologists has failed to give me any definite light on the subject of endospore formation in the higher fungi.

The manner of growth of the mycelium and the way the conidia were produced were so characteristic of the bitter-rot fungus of the apple and the one causing the mummy disease of the guava, that Mr. Post made some inoculations in apple-agar and in apples. The result of the inoculations on apples was so similar to the bitter-rot of the apple that a number of mycologists have pronounced it genuine bitter-rot.

Through correspondence with the person who sent me the diseased sweet-pea stems, I learned that the sweet-peas grew near an apple tree, the fruit of which rotted. Just what kind of a rot it was will be determined this fall if possible. This rotting of the apples on the tree near the sweet-peas, suggested the possible identity of the anthracnose of the sweet-pea and bitter-rot of the apple. To prove