as if to alight again. When it seems that they must inevitably terminate their flight and settle down upon the herbage, another flash renews and quickens the flight impulse and they arise precipitately, as if suddenly propelled upward by some energizing stimulus attending the flash.

This striking behavior may be observed almost any calm evening throughout the summer. It is particularly noticeable when the insects are arising from the herbage, and are just preparing to get fairly on the wing. What is the actual significance of this luminosity to the insects? In what manner does the flash stimulate momentarily the powers of upward flight? It would sometimes seem as if the energy-transformation attending the flash, actually aided them to get fairly on the wing, possibly also sustaining their flight in some manner.

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## SPECIAL ARTICLES

### FUNGICIDAL DUSTS FOR CONTROL OF SMUT

For more than a century efforts have been made to secure a perfect method of treating cereal seeds to destroy smut spores carried on their surfaces. Many fungicides have been tested and a number of standard formulas have been put forth as efficient. More recent investigations have demonstrated that none of the formulas involving dipping seed in solutions, fumigating with powerful gases or dissolving spores by various solvents, has proven completely successful. Reagents of sufficient strength to destroy the smut spores have proven to be injurious to the germination of the seed.

It has been demonstrated recently by the writers and by many other investigators, that the commonly accepted standard smut fungical formulas involving the use of bluestone and of formaldehyde, are frequently extremely injurious to the germination of the seed and the development of the seedlings. In arid and semi-arid wheat areas, formaldehyde frequently causes serious losses in seed planted in dry soil. Bluestone, the preferred fungicide in such regions, causes serious losses in germination and delayed growth of seedlings. Threshing operations in semi-arid regions cause greater rupture to seed coats than occur in more humid regions, further increasing seed injury. To avoid these losses, it has been recommended that the bluestoned seed be dipped, after a short drain, in a lime solution to react with the copper and thus check the penetration of the copper sulphate in the seed germ as soon as it has destroyed the bunt spores adhering to the surface of seed. Unless the seed coats have been badly ruptured this formula is very effective but it has been found that the seed does not pass so freely through the drill and, in cold damp weather, the seed dries slowly due to the coating of lime and hence may cause fermentation or heating. To avoid these troubles experiments with bluestone used as a dust were undertaken. The partial success of flowers of sulphur in preventing bunt in California and the reported success with copper carbonate by the Department of Agriculture of New South Wales, gave encouragement for attempting dust treatments.

Little Club wheat dusted with spores of bunt (*Tilletia tritici*) at the rate of 1 part of spores to 750 parts of seed by weight and treated according to standard formulas, gave the following results:

| Fungicide | Treatment | | Smutted Plants % | Smutted Heads % |
|---|---|---|---|---|
| | Strength | Germination % | | |
| Check | — | 99.0 | 12.8 | 6.2 |
| Formaldehyde | 1-40 | 98.0 | 0. | 0. |
| Copper sulphate | 1-4 | 12.5 | 0. | 0. |
| Copper sulphate + lime solution | 1-4 1-8 | 80.0 | 1.7 | .4 |
| Copper carbonate | dust | 95.3 | 0. | 0. |
| Copper sulphate | dust | 54.1 | 0. | 0. |
| Copper sulphate dust mixed with calcium carbonate dust (1-1) | dust | 98.3 | 0. | 0. |
| Copper sulphate and lime dusted separately | dust | 96.5 | 0. | 0. |

Rod row plantings were made March 8, 1920, and later, which accounts for the rather

light smut attack. The seed was harvester thrashed and showed considerable injury to the seed coats permitting maximum bluestone injury. The tests were replicated from 2 to 9 times and the average tabulated.

The results compiled from repeated tests demonstrate the effectiveness of copper sulphate dust when mixed with equal parts of calcium carbonate dust in the control of bunt attack due to seed-borne spores. No damage to seed germination occurred. Copper carbonate dust was equally effective. These dusts, especially the copper sulphate adhered tightly and completely covered all parts of the seed wheat. The process of shaking the wheat in dusting removed a large portion of the bunt spores. Two ounces of the dusts per bushel are considered ample. Copper sulphate and lime are available everywhere at low cost. Further experimentation in representative areas in the wheat belt of the United States is desirable before the dust methods are put into practise among farmers.

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## THE AMERICAN ASTRONOMICAL SOCIETY

THE twenty-fourth meeting of the society was held on September 1 to 4, 1920, at Smith College, Northampton and Mt. Holyoke College, South Hadley, Massachusetts. The members lived at the Gillett House, one of the residence halls at Northampton. This was the first occasion on which the society had met regularly at a woman's college, and it was a double pleasure to visit two such institutions, and especially to find in what flourishing condition are their observatories and astronomical departments.

There were five sessions for papers at Smith, and two at Mt. Holyoke, where the society went on the second day. A special feature of the meeting was the conversazione at which various exhibits were shown, including the latest work of the 100-inch telescope at Mt. Wilson.

Sir F. W. Dyson, Astronomer Royal, Greenwich, was elected as an honorary member of the society.

The officers for the ensuing year are:

*President*—Frank Schlesinger.

*Vice-presidents*—Walter S. Adams, Otto Klotz.

*Secretary*—Joel Stebbins.

*Treasurer*—Benjamin Boss.

*Councilors*—S. I. Bailey, W. J. Hussey, H. N. Russell, V. M. Slipher, Caroline E. Furness and John A. Miller.

The representatives of the society on the National Research Council will hereafter be elected in the same manner as the officers of the society. The present members on the Division of Physical Sciences are: W. W. Campbell, H. N. Russell and Joel Stebbins; and these three together with the president of the society, Frank Schlesinger, and W. S. Eichelberger form the executive committee of the American Section of the International Astronomical Union. The committee will organize the American preparation for the triennial meeting of the union in 1922.

About seventy members of the society were in attendance at the meeting, and fifteen new members were elected. The list of papers, abstracts of which are printed in *Popular Astronomy*, was as follows:

*The spectra of some variable stars:* W. S. ADAMS and A. H. JOY.

*Note on the spectrum of T Pyxidis:* W. S. ADAMS and A. H. JOY.

*Personality in the estimation of tenths:* SEBASTIAN ALBRECHT.

*Observations of variable stars at the McCormick Observatory:* HAROLD L. ALDEN.

*Parallax determinations of bright stars:* HAROLD L. ALDEN and S. A. MITCHELL.

*Variable stars in Messier 22:* S. I. BAILEY.

*Concerning results of observed gravitational light deflections:* LOUIS A. BAUER.

*Ghosts and oculars:* LOUIS BELL.

*On telegraphing the position of a celestial object:* ERNEST CLARE BOWER.

*Notes on the classification of long period variables:* LEON CAMPBELL.