ten weeks. It was found difficult to carry definite specific larvæ under observation in Petri dishes through the entire period, but the time was established by noting the appearance of new groups of moths in the larger stock of fur. Just what there was in the Petri-dish method of culture to hinder the larval development could not be determined. Some larvæ grew to large size, approximating maturity, others died in a few weeks, but none were certainly carried from the egg to the cocoon. Ten weeks appeared to be the shortest period in which larval growth was completed, but this is necessarily partly an estimate.

The cocoon stage lasted at the shortest two weeks. This was definitely established by observing the time at which larvæ ceased feeding, and closed their cases, and then putting such cases away for observation.

It is probable that all stages of the life history may under some circumstances be more or less indefinitely lengthened. Certainly the larval stage may. Its conclusion probably depends entirely on the obtaining of a sufficient amount of food, and may probably last several months, as over winter for example. Winter stops the activities of this moth only when the temperature of the surroundings is too much lowered. In the present investigation moths were observed emerging from cocoons and larvæ were seen feeding during all months of the year. Breeding experiments were not attempted during the winter but there seems no reason to suppose they would not have been successful and that egg-laying would also have occurred.

Remedies for Moths.—A summary of results along this line may be interesting.

Remedies intended for the flying-moth stage are worse than useless. So-called repellants such as tobacco, cedar, did not repel or harm the moth in any stage. The imago stage is the most delicate of all, but it could be placed in a small closed tumbler with burning tobacco with no apparent injury. Cloth soaked in odoriferous substances for the purpose of repelling them was made the recipient of eggs as readily as untreated cloth. As already noted, the moth laid eggs as readily on cotton and silk as on wool although neither of these was used as food by the larvæ.

Any method of attack must be directed toward the larval stage to be effective. Camphor and napthalene in closed places kill all stages. The egg and larvæ turn from whitish to a yellowish brown in color; the larvæ cease activity almost immediately. No gaseous poisons were tried but undoubtedly the common ones would be effective. Kerosene and gasoline fumes were not effective.

The main method of attack in this case was directed toward poisoning the larvæ through their food. The problem was to find some poison which could be placed on cloth and serve to kill larvæ feeding on it before they could do material damage. At the same time it must not be harmful to human beings, or if harmful in posse, must be insoluble. If baby wants to chew mother's dress or its woolen blanket, it must be able to do so with impunity. After about four years of nearly continuous investigation, during which several chemists were cooperating, the problem was finally dropped. Numerous compounds were used in tests but the larvæ proved singularly immune. Larvæ placed in Petri dishes with a piece of cloth soaked in corrosive sublimate as well as other common poisons, ate of the cloth as shown by the color of their alimentary canal and the fæces, but lived on for weeks apparently uninjured. Some few substances were found which did appear to have some result but not enough to justify adopting them as the basis of a moth-proofing process.

The problem still seems to be possible, but the solution is not apparent. After the substance is found, there still remains the overcoming of the objections of the tailors and clothing manufacturers, some of whom consider clothes moths among their best friends.

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A CHROMOSOME DIFFERENCE CORRELATED WITH SEX DIFFERENCES IN SPHÆROCARPOS

The chromosome group found in the cells of the female gametophyte of *Sphærocarpos Donnellii* contains one large element which

considerably exceeds both in length and in thickness any of the older chromosomes. The chromosome group of the male gametophyte contains no element similarly distinguished by its size; on the other hand, the male possesses a very small chromosome which seems not to correspond in size to any element in the female.

The other chromosomes in the cells of either sex have the form of slender rods; there are noticeable differences in length between those of each group. The bending and not infrequent overlapping of the ends of the chromosomes place difficulties in the way of an exact determination of their number; but, subject to modification by further study, it may be said with reasonable assurance that the chromosome number for each sex is eight. As to seven of the eight, the chromosomes of the male seem to resemble those of the female; but the eighth chromosome of the female is probably corresponding to it in the male is the the large one already referred to, and the one very small chromosome.

Of the two spindles formed in each spore mother cell at the time of the homœotypic division, one shows a large body which is sometimes plainly two-parted; no element appears on the other spindle that approximates in size this large chromosome. It has been reported that in at least one species of *Sphærocarpos* two of the spores of each tetrad develop into male plants and the other two into females. Observations which I have made, although as yet in limited number, indicate that the same rule holds for *S. Donnellii.* The cytological results here reported seem to show that in consequence of the chromosome distribution in the reduction divisions two of the four spores derived from a single mother cell receive each a large chromosome (and seven of smaller size), and these spores develop into female plants; and that each of the other two spores receives a small chromosome instead of the large one, and, on germination, gives rise to a male plant.

The resemblance between this history and that of the chromosomes of certain insects, such as *Lygæus* and *Euschistus,* which possess a large X- and a small Y-chromosome, is obvious. It is too early to conclude that the particular chromosomes with respect to which the male and female gametophytes of *Sphærocarpos* differ are the bearers of definite sex-determining factors; but it seems not unlikely at least that the greater size and vigor of growth of the female gametophyte are associated with the greater amount of chromatin that its cells contain.

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THE AMERICAN ASTRONOMICAL SOCIETY

THE twenty-first meeting of the society was held August 29 to 31 at the Dudley Observatory, Albany, N. Y., about ninety members and visitors being present. The arrangements for the meeting were admirably carried out by the host, Professor Benjamin Boss, acting also for the trustees of the Dudley Observatory and the department of meridian astrometry of the Carnegie Institution of Washington. The activities included an excursion to Saratoga Lake and a visit, at the close of the meeting, to Vassar College and its observatory.

Various committee reports and items of business were considered by the society, among others the question of the daylight saving movement, and when an informal expression of opinion was called for, the vote stood

In favor of daylight saving.....	18
Opposed to the plan	22
Neutral	6
	46

Another matter in the same connection, which would affect only astronomers, was a proposal coming from England that the astronomical day begin at midnight instead of at noon as at present. A test vote showed that a large majority of the members present were opposed to the change, but after some parliamentary procedure it was agreed to refer the matter to a committee to make a report back to the society.

Officers were elected for the ensuing year as follows:

President—Edward C. Pickering.
First Vice-president—Frank Schlesinger.
Second Vice-president—W. W. Campbell.
Secretary—Philip Fox.
Treasurer—Annie J. Cannon.