that bees and other insects, chiefly pollinating and nectar-seeking ones, obtain infectious material from "holdover" blight and spread it to the newly developed bloom. In accordance with this assumption the removal of blighted limbs from infected trees has been the main recommendation, often the only one, for controlling this disease.

Beginning with the observations of Stevens and his associates[4] in 1918 on the dissemination of the blight-producing pathogen by wind, there have been a number of investigators who have questioned the rôle of insects either in disseminating the blight producer after the disease started[5] or as agents of initial dissemination,[6] and some excellent evidence has been presented to show that rain falling over exuding cankers may readily act as a disseminating agent. But so far as the writer knows no concerted effort has been made by these investigators to explain the fact that, with relatively few exceptions, the first signs of blight in bearing orchards are to be found usually in the blossom clusters. Inasmuch as several investigators have presented rather conclusive evidence showing that young pear and apple leaves may readily be infected through natural openings by means of water suspensions of the pathogen, why then are the foliar shoots relatively free from disease in an orchard where they develop simultaneously with the bloom and where the latter may show a high percentage of infection?

It is this question plus one other consideration which has made it appear worth while to investigate the source of inoculum which may be involved in the first spring infections. The other consideration arose from the fact that no infectious exudate from overwintered cankers has been found to occur in the Ozarks of Arkansas prior to the first signs of blight, as reported in a previous publication.[7]

Aside from the overwintering of fire blight bacteria within twigs and limbs which were diseased the previous year, there are several other possible sources of overwintered inoculum. Among these are, first, bacterial masses freed as exudate during the previous growing season and remaining alive over winter, or bacteria freed by the disintegration of formerly diseased material, including leaves, succulent and woody shoots, flowers and fruits; second, the carrying over winter of the germ within the living quarters of insects which had previously come in contact with diseased material, or the adherence of the bacteria directly on the insect bodies. Indicative of the first possibility, evidence has been obtained which suggests that this may be true but which at this time is considered to be inconclusive. For the present it may suffice to note that certain strains of bacteria of proved pathogenicity have been isolated in the early spring from diseased material, strains which morphologically and physiologically are markedly different from the ordinary ones of *Bacillus amylovorus*.

Considering the second possibility, the writer has successfully isolated the fire blight pathogen from beehive material gathered throughout the summer, winter and early spring and from the bees themselves obtained from the hives in the early spring prior to the development of blight. The details of this work will be reported elsewhere. It may be stated that technique of isolation is extremely important in this instance. There remains to be determined, however, whether these findings are applicable to various sections of the country, and under diverse climatic conditions.

In the meantime it appears likely that we now have an explanation for the common occurrence of blossom blight in the absence of twig blight and in the absence of early spring oozing from blighted twigs and limbs. It is also probable that an explanation is at hand for the failures to control blight in orchards where painstaking, current remedial methods have been used, including the removal of blighted wood.

As a matter of caution it should be noted that even if the present findings will be duplicated in different parts of the country this does not mean that bees can be dispensed with. As long as self-sterile pears and apples are grown, these insects seem essential for proper pollination. The problem of control involves, among other things, the maintenance of uninfested beehives, and the failure to recognize this must at least in part account for the gradual extinction of the pear industry in America.

H. R. ROSEN

UNIVERSITY OF ARKANSAS,
AGRICULTURAL EXPERIMENT STATION

[4] SCIENCE, 48: 449–450, 1918.
[5] *Ohio Agr. Exp. Sta. Bul.*, 357: 83–126, 1922; *Mich. Agr. Exp. Sta. Tech. Bul.*, 97, 32 pp., 1929.
[6] *Jour. Agr. Res.*, 39: 579–621, 1929.
[7] *Ark. Agr. Exp. Sta. Bul.*, 244, 96 pp., 1929.

BOOKS RECEIVED

Archivos do Museu Nacional, Rio de Janeiro. Volume XXX. Pp. 331. Illustrated. Published by the museum.

BRIGGS, DENNIS B. *A First Year Practical Chemistry.* Pp. v + 77. 14 figures. J. M. Dent & Sons, Toronto.

GOODRICH, EDWIN S. *Studies on the Structure and Development of Vertebrates.* Pp. xxx + 837. 754 figures. Macmillan. $10.00.

SAIDLA, LEO E., and WARREN E. GIBBS. *Science and the Scientific Mind.* Pp. xiv + 506. McGraw-Hill. $3.00.

TAYLOR, C. V., and WILLIAM H. DAVIS, Editors. *Contributions to Marine Biology:* Lectures and Symposia Given at the Hopkins Marine Station December 20–21, 1929, at the Meeting of the Western Society of Naturalists. Pp. viii + 277. Stanford University Press. $7.50.

TURNER, CLAIR E. *Personal and Community Health.* Third edition. Pp. 443. C. V. Mosby. $2.75.