and costly expenditure on entertainments and excursions.

UNIVERSITY AND EDUCATIONAL NEWS

ANNOUNCEMENT of a gift of $250,000 for a library for Amherst College was made at the annual banquet of the Amherst Alumni Association of New York. The library is to be a memorial to a graduate of the class of 1867 from a brother whose name is withheld.

A GIFT of $150,000 from a graduate of Wellesley College toward the fund for a new administration building is announced. The donor does not wish her name made known at this time.

PRELIMINARY plans for the chemistry building at Throop College of Technology, in Pasadena, have been completed, and the architects, Mr. Elmer Grey, of Los Angeles, and Mr. Bertram G. Goodhue, of New York City, are at work on the complete detailed plans and specifications of the building. The building is to cost $60,000 and construction will be begun probably within thirty days. The building is to be ready for occupancy next September, and Dr. Arthur A. Noyes will inaugurate his research work in the new laboratory about December, 1916. He has just returned to Boston after a few weeks' stay in Pasadena, which time was spent in working out plans for the building, and for the development of the department of chemistry, and the special research laboratories.

IT is announced that a group of prominent dentists of New York City some months ago submitted to Columbia University a detailed proposal to create a dental school. The proposal has the approval of the faculty of the college of physicians and surgeons. Candidates for admission would be required to possess the same academic training as students entering the study of medicine at Columbia, namely, the completion of two years of work in an undergraduate college.

DR. J. T. KINGSBURY, president of the University of Utah, has presented his resignation to take effect at the end of the present academic year. It will be remembered that the administration of the University of Utah, which led to the resignation of seventeen members of the faculty last spring, has been reviewed and criticized in a report of a committee of enquiry of the American Association of University Professors.

DR. KATE GORDON, head of the department of education, Bryn Mawr College, goes next September to the Carnegie Institute of Technology, Pittsburgh, where she will have charge of the Bureau of Mental Tests and give instruction in psychology in the woman's department of the School of Applied Design.

AT Yale University, Henry Laurens, Ph.D., has been promoted to an assistant professorship of biology in Yale College.

DR. V. E. EMMEL, of the Washington University Medical School, St. Louis, Mo., has been appointed assistant professor of anatomy in the University of Illinois college of medicine, Chicago, Ill.

DISCUSSION AND CORRESPONDENCE

INSECTS IN THEIR RELATION TO THE CHESTNUT BARK DISEASE

A RECENT bulletin[1] of the Department of Forestry of the commonwealth of Pennsylvania discusses the relation of insects to the bark disease. This paper bears the title, "Insects as Carriers of the Chestnut Blight Fungus," and as such tabulates a number of insects collected and found carrying spores of this parasite. Tests were made on some seventy-five insects representing about twenty-five species. Of these, fifty-two were collected while on chestnut blight cankers. From these experiments it was found that thirty per cent. of these insects carried numbers of the pycnospores of this fungus on their bodies and that the highest counts by far were obtained from the spore-feeding longicorn beetle *Leptostylus macula* Say.

The citation of these results as proof merely that insects are carriers of the chestnut blight spores is entirely justifiable, but in drawing

[1] Studhalter and Ruggles, Bull. 12, Dept. Forestry, Commonwealth of Pennsylvania, 1915.

their conclusions the authors make the statement (p. 28) that

> they (*i. e.*, some insects) are important agents in the local dissemination of this disease. This is especially true of the beetle, *Leptostylus macula.*

They also dispute the conclusion reached by the writer[2] that *Leptostylus macula* is a more important factor in destroying the spores of this disease, and state (p. 20) that

> the large number of spores carried by this beetle certainly indicate that it may be an important agent in the dissemination of the blight fungus.

In the writer's opinion these statements lack proof. From the fact that the insects have spores on their bodies the conclusion can not be drawn that they disseminate the disease. It is shown that the spores may be brushed off from the bodies of the insects even though with difficulty, but the question is, Where are they brushed off? If the life histories and activities of many of these insects had been more carefully observed an opposite conclusion to that reached by the authors would appear to have been a more natural one. To disseminate this disease it would be necessary for the insect to migrate from infested to healthy trees. With most of the Coleoptera discussed in this publication this is not the normal habit.

In the case of *Leptostylus macula* it can be positively stated that under normal conditions this insect never frequents healthy trees. It must be admitted that in crawling from one canker to another for the purpose of eating pustules, this insect possibly would spread the spores to start a new infection on the same tree, but this would be insignificant in contrast to the fact that the rain, as stated (p. 23), washes these spores down the tree in large numbers.

The extent to which this, as well as certain other species, feeds on these fruiting bodies is illustrated by trees, examined by the writer, on which from 50 to 75 per cent. of the cankerous area was eaten clean of pustules. From such habits it would be natural to expect a far greater percentage of spores on this species than on others.

[2] Science, N. S., XXXVI., p. 825, 1912.

Of the three other species of beetles listed by the authors as carrying spores, all are known to feed on dead wood and therefore are not likely to frequent living trees. Of the thirteen ants collected under natural conditions and tested for spores, only three were found to carry those of *Endothia parasitica.* Ants frequent living trees, especially those infested by aphides, and in case they carry spores conditions would be favorable for infection of the wounds made by the aphides. But it is shown that only a small number of ants in nature were found to carry spores. Most of the other insects discussed may be considered as occasional visitors, such as those which rest on the trees between flights; of these, few are recorded as carrying spores. The only other insects discussed that might possibly be responsible for direct transmission of the disease are tree-hoppers, which might infect the wounds they make while ovipositing.

In discussing the dissemination of other fungous and bacterial diseases by insects (pages 7–11) the authors cite cases in which a direct relation between host and insect can be established, as fire blight of pear, spread from blossom to blossom by pollen-bearing insects, and by aphides which puncture the living tissue; and ergot of rye, where the insects are attracted by a saccharin solution oozing from the conidia-bearing surface. In discussing the chestnut insects the authors establish no such relation; in fact, the most important insects, in the writer's estimation, in which some such relation might be proven are not mentioned in their experiments. The first of these insects in importance is the longhorned beetle *Leptura nitens,* which bores in the bark of 90 to 95 per cent. of the living trees over 10 inches in diameter throughout the chestnut range and in addition has adapted itself for breeding in great numbers in chestnut blight cankers. The interrelation thus established by the beetle between the living, healthy trees and the cankers on diseased and dead trees would provide favorable conditions for the transmission of the disease. The adaptation of this beetle to life in chestnut blight cankers has become so marked in old infected tracts that it

has often been difficult to find the larvæ in healthy trees, although they were present in greatly increased numbers in the cankers. Thus this insect, which is undoubtedly of importance as a carrier of spores to healthy trees, would, as the infections grew old, become less so owing to its increasing tendency to breed in and frequent diseased trees to the exclusion of healthy ones. Other insects which come in this category are several species of moths of the genus *Sesia,* although, in the case of these, observations indicate that adaptation to a life in cankerous tissue has not developed to so great an extent.

Of more importance in providing for the spread of the chestnut bark disease are the fresh wounds made by certain insects through the outer bark of the tree to the cambium whereby spores disseminated in various ways can gain entrance. Of first rank among insects which work in this way are *Leptura nitens,* which, as stated, is found in 90 to 95 per cent. of the trees over 10 inches in diameter throughout the chestnut range, and the chestnut bast-miner *Ectoedemia phleophaga* Busck, which is found abundantly in 95 per cent. of the saplings and younger trees throughout the natural range of the chestnut. Less abundant, though also widely distributed, are three species of *Sesia—S. castanea* Busck, *S. scitula* Harris, and *S. pictipes* G. & R. All these insects attack perfectly healthy trees and make wounds at various situations over the entire bark surface of trees from those of sapling size to those which are matured. Furthermore, most of them are abundant and widely distributed. These wounds are all holes made by the larvæ either for the extrusion of frass—in which case they are present and used throughout the entire larval life—or for exit when the larvæ are preparing to leave the open to the cambium and surrounded by the moist dead tissue necessary[3] for the growth of the spores. Thus practically all chestnut trees in their natural range have numerous open wounds whereby wind-blown and rain-washed spores can gain entrance. Young cankers have been found starting in wounds of both types mentioned.

Wound makers of another class are the cicadas, tree crickets, tree-hoppers and aphides. These puncture the bark in ovipositing or feeding. In numerous cases the blight has been found starting in cicada and tree-hopper wounds. A possibility exists that these insects both carry the spores and directly inoculate the wound; but such a chance is slight from the fact that insects of this kind normally frequent healthy trees.

In conclusion it may be said that in view of the facts established, namely, that ascospores are carried about by the wind in great numbers and that the pycnospores are washed down the trunks by the rain, the rôle played by insects in the transmission of this disease in merely transporting the spores is insignificant. On the other hand, owing to these same characteristics of the disease, the part played by insects in making wounds in the living cambium where such spores can gain entrance is far more important, and such wounds have been commonly found infected. Again, the fact that certain insects frequent diseased trees and eat the pustules, thereby preventing the dissemination of the spores, can certainly not be considered other than a benefit.

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[3] Rankin, W. H., "Phytopathology," Vol. 4, p. 242, 1914.

CANCER AND HEREDITY

IN final reply to Dr. Little, of Harvard, there are three things to be said:

I

My results in cancer transmission are these:

1. The establishment of strains of mice which both in inbreeding and in hybridization transmit spontaneous cancer through as many generations as I please to carry it, and in a percentage which can be predicted with a surprising nicety. For example, certain strains of mice have been producing a fairly steady percentage of spontaneous cancer in this laboratory for five years without a break.