nonsusceptible crops or kept in clean fallow, has been a question of much concern to investigators of this disease.

A partial solution of this problem was afforded when King and Loomis[2] announced the discovery of a sclerotial stage of the fungus in 1929. In the same year Dana[3] described the occurrence and infectious nature of smooth or "horse hair" strands following an 18-month clean fallow. Ratliffe[4] also reported upon a prolonged saprophytic stage of the fungus, which had hitherto been regarded by some as an obligate parasite.

During the years of 1931 and 1932 opportunity was afforded on the U. S. Cotton Breeding Field Station at Greenville, Tex., to further study the habits of the fungus in nature. Extensive searches in the soil for the source of carry-over infection was made in a number of infested plots which had been handled under different cropping and tillage conditions, and therefore permitted at least a minimum estimate as to the age and nature of the carry-over infection.

The colloidal nature of the Wilson and Houston clay soils, in which the examinations were made, presented an unusual opportunity for studying both the fungus and plant root development in their natural state of growth. An examination of a very large number of primary centers in continuous cotton plots in 1931 and 1932 revealed the fact that the carry-over infection was not due entirely to sclerotia and that the most of the infection over-wintered in the soil as strands rather than in the sclerotial stage. Examinations in a plot which was in clean fallow for the first year yielded numerous viable strands throughout the summer and fall of 1932. These strands were located, as a rule, along the old dead roots of the plants that they had destroyed the year before, or previously.

On a plot which had been in oats in 1930 and 1931, and kept in clean fallow after the crops were harvested, viable old strands were found throughout the summer of 1932, in and near primary centers of infection. These strands were found *in situ* upon the decayed remains of the old cotton roots which they had destroyed three years or more before. In some cases they were occupying the empty root channels of former plantings. When these strands were removed from the soil and placed in moist chambers, they readily put out new growth. Old strands found interlacing a colony of sclerotia in a plot which had been in clean fallow for 5 years were also viable. The age of the strands associated with colonies of sclerotia can not be determined accurately as they may have been the product of regenerated growth, from the original colony, subsequent to the fallow treatment.

The growth of the hyphae which usually took place from the ends of the old strands was characterized by radiating or parallel growth of elongated cells which freely anastomose during the early growth stages. As this growth developed, the conjugation of cells became less frequent and the more typical type of acicular hyphae with right-angled branches appeared. Histological studies showed that the older strands possessed an outer corticle ring of thick-walled, irregular shaped cells inside of which were large, elongated, thin-walled, septate cells. In younger strands the elongated cells may be smaller and the corticle layer very rudimentary or even absent.

The knowledge that strands of the root-rot fungus, in addition to the sclerotia, remain in a viable and infectious condition in the soil for several years, is worthy of note. In contrast to the more deeply seated infections of the far southwest, the strands at Greenville, Texas, were found most abundant in the surface foot of soil which render them more accessible to tillage operations or to soil disinfectants.

HOMER C. MCNAMARA
R. E. WESTER
K. C. GUNN

BUREAU OF PLANT INDUSTRY
U. S. DEPARTMENT OF AGRICULTURE
GREENVILLE, TEXAS

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THE MOST NORTHERN OCCURRENCE OF MESQUITE ON THE GREAT PLAINS

IN 1897, while collecting invertebrate fossils from the Comanche Cretaceous in southern Kiowa County, Kansas, I found a small shrub about five feet in height, which at that time was unknown to me. The next year, 1898, Dr. Lester F. Ward, the noted phytopaleontologist whom I was then assisting in collecting dicotyledonous leaf impressions from the Cheyenne sandstone, identified this shrub as mesquite (*Prosopis*). This was, I believe, the first and, so far as I am now aware, the only recorded occurrence of mesquite growing in Kansas.

The location is in the so-called "Black Hills," about four miles southeast of Belvidere, and ten miles west of Sun City. More specifically, it is in the southeast corner of Township 30 South, Range 16 West, at about 37° 20′ north latitude. Dr. Ward's interpretation of this mesquite growing so far from its natural

[2] C. J. King and H. F. Loomis, "Further Studies of Cotton Root-Rot in Arizona with a Description of a Sclerotium Stage of the Fungus," *Jour. Agr. Research*, 39: 9, p. 641–676, illus., 1929.

[3] B. F. Dana, "Recent Development in Root-Rot Investigations," *Farm and Ranch*, 48 (46): 22–23, 1929.

[4] G. T. Ratliffe, "A Prolonged Saprophytic Stage of the Cotton Root-Rot Fungus," U. S. Dept. Agr. Circ., 67, 8 pp., illus., 1929.

habitat was that seeds had been carried by cattle from Texas.

The mesquite tree, which reaches its maximum size along Rio Grande River in western Texas and northern Mexico, is quite abundant in southwestern Oklahoma, especially in the counties bordering Red River south of the Wichita Mountains, where it sometimes reaches the size of 10 inches in diameter and 20 feet in height. It occurs sparingly as far east as Coal and Atoka counties, Oklahoma, being found on the prairie between the eastern end of the Arbuckle and the western end of the Ouachita mountains. It also occurs in central Oklahoma as far north as southern McClain County. Both these locations are in the drainage of Washita River.

Queerly enough, mesquite is very rare, if indeed present at all, in the drainage of the two Canadian rivers in the western part of Oklahoma. But it is found in the valley of Cimarron River north of the Canadians in the northwestern part of the state. It is especially abundant in canyons and slopes of the Gypsum Hills and in the flat lands at the foot of these hills south of Cimarron River in Blaine, Major and Woodward counties, where thousands of acres are covered with dense growths of the shrub which here rarely becomes more than eight feet in height. So far as observed, it does not here occur among the sand hills.

Mr. R. C. Tate, a local naturalist of Kenton, Oklahoma, has reported numerous specimens of mesquite shrubs along Cimarron River and its tributaries in northwestern Cimarron County, which is the westernmost of the three counties which make up the Panhandle of Oklahoma, originally known as No Man's Land or the Neutral Strip.[1]

For some years Mr. Tate has been searching for the mesquite in southern Colorado, and under date of November 17, 1932, writes me that he has finally located a specimen about a quarter of a mile north of the Colorado line, in section 15, Township 35 South, Range 49 West. This is in Baca County, 49 miles west of the southeast corner of Colorado and in latitude 37° north.

Tate also reports clumps of mesquite along Carrizo Creek in northeastern New Mexico. The location is section 15, Township 30 North, Range 35 East, about 12 miles west of the Oklahoma line, and about the same distance south of the Colorado line.

It is altogether possible that the plant may occur along the Big Bend of the Cimarron River in Morton, Stevens, Grant or Seward Counties in southwestern Kansas. If in Grant County, the locality may be farther north than the lone shrub which Dr. Ward and I found near Belvidere, southern Kiowa County, 34 years ago.

It would appear that the greater number of observers are inclined to agree with Ward that the seeds of mesquite have been carried northward by cattle. However, it might not be amiss at this time to place on record an observation by the late Colonel Charles Goodnight, famous plainsman and rancher, one of the first men to successfully raise buffalo in captivity. In his opinion the seeds were carried by wild horses or mustangs, rather than by cattle or buffalo. Colonel Goodnight, who was an unusually close observer, is reported to have said that he had frequently noted small mesquite shrubs spring up near piles of horse manure at points far distant from the natural habitat of the plant.

However, the most vexing problem is, why is the mesquite so rare, if not entirely absent, in the valley of both North and South Canadian rivers in western Oklahoma, and so abundant along the tributaries of Cimarron River still farther north? Plant ecologists please answer.

CHAS. N. GOULD
UNIVERSITY OF OKLAHOMA

SPECIAL CORRESPONDENCE

THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

IN a review of the 1932 activities of the Academy of Natural Sciences of Philadelphia recently issued, Charles M. B. Cadwalader, managing director, depicts its 121st year as one of marked advances, and calls special attention to new exhibits, a large increase in museum attendance and continued scientific exploration in many parts of our own and other lands.

"We have shared the common decrease in income and contributions," says Mr. Cadwalader, "but have not lessened our efforts to give Philadelphia a free natural history museum of the first order, and to continue the laboratory research that has made the academy world known. During the year we kept the museum open every day, without any change in hours, and we had 113,300 visitors, a 9 per cent. increase over 103,700 in 1931, and nearly three times as many as in 1930. Among these were 2,900 in special classes from Philadelphia schools; 2,200 from private and public schools in New Jersey, Delaware and the metropolitan area, 1,000 Boy Scouts, who entered their names in the register provided for them, and 600

[1] "Some Observations on the Spread of Mesquite to the North in Cimarron County, Oklahoma," *Proceedings* of the Oklahoma Academy of Science, Vol. VIII, 1928, p. 58.