

6. Scanning electron microscopy of chlamydospores of teosinte smut
(*Ustilago maydis* (DC.) Corda).

In our earlier reports in MGCNL 44:42(1970) and 45:237(1971), we have described the microstructures of the chlamydospores of maize smut (*Ustilago maydis* (DC.) Corda). This species of fungus most commonly attacks maize plants (*Zea mays* L.). But in Mexico and Central America various races of teosinte (*Euchiaena mexicana* Schrad.) are also susceptible to the same fungus species. However, differences, if any, between the chlamydospores obtained from the two hosts have not been reported.

The following report presents our preliminary observations on the microstructures of mature chlamydospores of teosinte smut, obtained from different races of teosinte. The plants were grown at Waltham, Massachusetts, during the 1971 crop year. The mature chlamydospores from different smut galls from various locations in the host tissues were isolated and studied with the scanning electron microscope (SEM). The spore samples were prepared following the methods described by us previously in MGCNL 45:237(1971). The chlamydospores from smut galls were obtained from the following races of teosinte (1) Chalco, stem infection; (2) Guerrero (Wilkes, teosinte Coll. #47711), stem infection; (3) Michoacan (Wilkes, teosinte Coll. #47890), stem infection; (4) Guerrero (Galinat, teosinte Coll.), tassel (male flower) infection; (5) Chalco, tassel infection; and (6) Chalco teosinte and maize hybrid (Galinat Coll.), kernel infection.

The gross micro-morphology of the mature chlamydospores of teosinte smut under SEM shows a close similarity with corn smut. But the spore size, shape, spine distribution, and diameter of the spines at the base show slight differences from corn smut, depending on the type of infection and the race of the host species involved. The chlamydospores from stem infections exhibit mostly a globose (spherical) shape, and their spine numbers seem a little higher when compared with the spores from male flower or kernel infections. The spores of stem infection also show a characteristic folding, when they are placed under high vacuum conditions of the SEM. The spores derived from the male flower infections are mostly spherical, but the chlamydospores from Guerrero teosinte seem to have more spines as compared to the Chalco teosinte smut. The diameter of the spines at the base is slightly greater in the latter species than in the former.

Further, the chlamydospores from kernel infection in a hybrid of Chalco teosinte and maize show variation in spore shape, i.e., ovoid to spherical. Also their spines are slightly elongated and the diameter at the base is narrow compared to the spore spines of other teosinte smuts we have studied. The details of this investigation will be published elsewhere.

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7. The oldest convincing archaeo-palynological evidence for natural introgression between Tripsacum and Zea.

Mangelsdorf and Reeves (1931, 1939) were the first to demonstrate that Zea and Tripsacum can be hybridized artificially. They also postulated that teosinte (Euchlaena mexicana) originated as a result of such natural hybridization between these two genera. Mangelsdorf (1961) further suggested that the South American races of maize may have inherited their tripsacoid characteristics through direct introgression with Tripsacum. But natural introgression between Zea and Tripsacum has not yet been demonstrated conclusively. Our recent palynological investigation with various genetic stocks, which were artificially produced by crossing Zea and Tripsacum, has revealed that such introgression could be predicted precisely using the pollen grain ektexine patterns at the micro-morphological level (Galinat, Barghoorn, and Banerjee, unpublished data). Our palynological data also indicate that teosinte is not a hybrid of Zea and Tripsacum as suggested earlier; we feel perhaps this genus may have evolved parallel with Zea, possibly from a common ancestor. The phenotypic patterns of the pollen grain ektexine of the "pure races" of Zea and Euchlaena are very similar, and are represented by the evenly distributed spinules, although Zea pollen is significantly larger in size both in archaeological and in modern populations. On the other hand, the phenotypic pattern of Tripsacum ektexine in diploid and tetraploid species shows a very distinct "negatively-reticuloid" spinule clumping. When different races of Zea and Euchlaena are hybridized with each other artificially or in the wild, the pollen grains