

5. The membrane structure of spore-galls of corn smut (*Ustilago maydis* (DC.) Corda).

Investigators working with maize and teosinte plants are well aware of the formation of smut galls (*Ustilago maydis* (DC.) Corda). The fungus may occur in any part of the host and produces tumor-like swellings. However, the infection is always localized; the shape and size of the swellings (galls) varies according to the plant parts involved. The smut galls when young appear to be covered with a glistening silvery membrane, which, as it matures, becomes dry and papery. Finally, the membrane ruptures and exposes large masses of powdery dark spores.

The structure of this gall membrane is still inadequately known. It is interesting to establish whether the membrane is formed by the host tissues or by the fungus itself. According to Clinton (1905, p. 20), the membrane is composed largely of semigelatinized fungus threads. Duggar (1909) has also reported that the membrane is made up of modified fungus threads mingled together with dried host cells.

In the present investigation, we have closely observed the development of the smut galls in kernels while still attached to the cobs. At initial stages, the gall tissues are entirely composed of large masses of abnormally active host tissues. Later, with the exception of a few outer cell layers, most of the internal tissues of the galls were invaded and consumed by the fungal hyphae. Finally, large masses of dark spores are formed. The gall membrane, which is normally more than one layer thick, becomes desiccated and papery. Eventually, the gall membrane ruptures due to internal pressure exerted by the large masses of chlamydo-spores. We have further studied the structure of the mature gall membranes at the ruptured points using scanning electron microscopy (SEM). SEM observations show that the mature gall membrane is composed of at least 1 to 3 layers of hypertrophied parenchyma cells of host tissue. From the outside this membrane is very smooth and shows a clear cellular organization, while the inner surface of the membrane is entirely covered with loose chlamydo-spores. We were unable to observe any indications of attachment of the spores to the membrane.

Umesh C. Banerjee
Elsó S. Barghoorn