My interpretation of the cupule in maize as a vestige of the cupulate fruit case of teosinte and tripsacum does not invalidate my earlier views on the homologies of the cupule within the framework of the phytomer, as previously described (Galinat, 1963).

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7. The role of the cupule in the modern maize cob.

While the cupule has a functional role in the relatives of maize, at first glance it does not appear to have a function in the maize cob. Yet, cupules are always present in the cobs of modern maize. Despite this, selection for smaller cupules is possible and the ultimate non-cupulate rachis may be controlled by as few as two recessive genes.

If the cupule is now vestigial in maize and yet genetically controlled, why does it persist in the cobs of all the modern races? Some observations presented here suggest an answer.

In studying the cupules of the various races of maize, I have observed that the flour corns tend to have the widest cupules while the flints, the popcorns, the dents and some of the dent-related sweet corn varieties have progressively smaller cupules in the order listed. Derivatives from crosses between these variants, in which kernels of different sizes and endosperm types are combined with a cupule smaller than that of the original parental stock, tend to have two types of difficulties. (1) The kernels may develop mold in the field which usually results from a splitting of the pericarp and an accompanying release of sugar from endosperm tissue. Sudden changes in the moisture level of both cob and kernels may cause this pericarp splitting through unequal stresses. (2) The second difficulty is shattering which occurs later during drying of the mature ears. The kernels shrink to a fixed minimal size before the cob shrinks. If the cob subsequently contracts more than that attained by the kernels, some of the kernels are mechanically pushed out and off from the cob. In the case of the flour corns, which have excessively large kernels that do not shrink appreciably on drying, selection is strong for a wide and indurated cupule which provides the necessary dimensional stability (hardness) to the drying cob.

While the original protective function of the cupule has been lost, it has acquired a new secondary function in giving structural stability and strength to the modern maize cob. The checkered arrangement of wide lignified cupules is a mechanically strong design which in effect increases the thickness of the rind.

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8. Cytological map of *Tripsacum dactyloides* (2n = 36).

Since the "Bussey clone" of *T. dactyloides* (2n = 36) of Manhattan, Kansas is the source of most of the extracted chromosomes from tripsacum which we are comparing cytogenetically to their homeologs in the maize genome, the preparation of an idiogram for its chromosome complement is basic to our approach in analyzing the evolution of the American Maydeae. Furthermore, the genome of this collection of tripsacum is part of a permanent bridge over which we will continue to extract the desired chromosomes of tripsacum for many years in the future. Its complement is maintained in a perennial amphidiploid hybrid with Mangelsdorf's multiple tester, the origin and use of which have been previously described (Galinat: MNL 34, 1960).

The spread of chromosomes at pachytene is extremely poor; there is considerable fusion of many of the terminal knobs and extensive nonhomologous association of the centromeres. Occasionally, however, some of the chromosomes lie free of the rest, either individually or in groups of about 4 or 5 chromosomes, in each of the nuclei. Correlatable data obtained from 238 observations selected from over 500, on individual chromosomes 1 to 18, are presented in the following table.