

that the present center of diversity of the genus *Tripsacum* is in southwestern Mexico and adjoining areas as previously suggested by Randolph and Hernandez (*Genetics* 35:668, 1950).

L. F. Randolph

2. Cytogenetics of speciation in *Tripsacum*.

There are many well known examples of species with the tetraploid number of chromosomes that apparently have arisen by hybridization of distantly related diploid species followed by chromosome doubling. Such allopolyploid species are essentially true-breeding because of the synaptic incompatibility of the chromosome sets of the parental species and lack of gene exchange between them at both the diploid and tetraploid levels. But the possibility that a series of tetraploid species might arise by chromosome doubling following the hybridization of two closely related but phenotypically very unlike diploid species having chromosomes sufficiently compatible to pair regularly and exchange genes freely seems not to have been generally recognized as a potentially significant evolutionary process. It is just these conditions, however, that appear to explain most satisfactorily the occurrence of extremely variable tetraploid populations of *Tripsacum* widely dispersed in Mexico and Central America, of which four types have been described as species (*T. lanceolatum*, *laxum*, *pilosum* and *latifolium*) and others appear to be equally deserving of specific or sub-specific status as they complete the process of acquiring adequate discontinuity and other essential attributes of definitive taxa.

There are only two diploid species of this region that combine most of the characteristics found among the tetraploid populations of this and neighboring areas: *T. zopilotense* and *T. maizar*. The former is a small, grass-like essentially glabrous plant with slender, sparsely branched culms usually less than a meter in height and with a single or rarely two terminal spikes, narrow flaccid leaves less than a cm. in width; staminate spikelets in pairs, one sessile. The latter is a robust very pubescent plant, corn-like in general appearance with thick culms branched at upper nodes, up to 4.5 meters in height; leaves 7-10 cm. wide; tassels with as many as 45-50 branches of which the staminate portion is much longer than the pistillate; staminate spikelets in pairs of which one is sessile the other pedicellate; a plant of rich moist soils, in sharp contrast to the habitat preference of *T. zopilotense* for the poorer soils of rocky, arid slopes. The pachytene chromosomes of *T. maizar* have few if any conspicuous knobs; those of *T. zopilotense* have numerous terminal and intercalary knobs. Although differing phenotypically in many traits these two species are cross-compatible and their chromosomes pair fairly regularly in the diploid F_1 hybrid (Prywer, Bolet. Bot Soc Mexico 28:11-18, 1960). Among the

natural tetraploids there is a low frequency of quadrivalent synapsis indicative of an auto-allopolyploid origin. Experimental verification of the hypothesis that the tetraploids did in fact originate as doubled hybrids of T. maizar and T. zopilotense or similar diploid species (Randolph and Hernandez, Genetics 35:686, 1950) has been undertaken by making the appropriate crosses to be followed by induced chromosome doubling of the diploid hybrids.

L. F. Randolph

3. Cytotaxonomic studies of Tripsacum in Mexico and Guatemala.

In 1963 field studies of *Tripsacum* populations were undertaken in Mexico and Guatemala and continued in 1965 to learn more about the interrelationships of the diploid and tetraploid species and to evaluate their taxonomic status. Included in these studies were populations from the state of Durango in northern Mexico and southward through Sinaloa, Nayarit, Jalisco and Guerrero on the west coast, eastward to Vera Cruz and southward into the states of Oaxaca and Chiapas. In Guatemala populations were studied from the rain forests of the Coban area, the San Antonio Huixta area of southwestern Guatemala, and the neighborhood of Jalapa in southeastern Guatemala. The type localities of the six species of *Tripsacum* described from these countries were visited. Utilizing appropriate techniques of cytogenetics and numerical taxonomy, measurements and other data were obtained for statistical analysis from 5 to 15 or more individuals selected as representative of more than 40 reproductively isolated populations. The size of the populations studied varied from a small number of clones in recently disturbed habitats to many hectares in undisturbed habitats of various kinds. The measurements included morphological characteristics of the culm, leaves, inflorescences, spikelets and the amount, kind and distribution of pubescence; also the percentage of good pollen, chromosome number and other features of taxonomic significance that were recorded totaled more than 20 items for each plant. Voucher herbarium specimens were preserved and live-plant collections were made for garden culture of individuals from which the measurements and other data had been recorded.

Preliminary evaluation of these data and the accompanying field observations indicated it is only at the diploid level that there are in the region studied good species as ordinarily defined. Among the tetraploid populations there is a unique array of phenotypes varying widely in combinations of morphological traits from extremes much like the assumed parental species, T. zopilotense and T. maizar, to intermediates including a wide range in combinations of the various contrasting traits of those two species or others