Table 1. Metrical data for measurable elements from the Rodgers dog skeleton. Crown and alveolar lengths are measured from the exterior. Distances are measured along alveolus from front of M^1 or P_1 to back of tooth shown below. Heights and widths are taken at the center of the tooth indicated.

Measured element	Right (mm)	Left (mm)
Crown length P^4		19.4
Alveolar length P^4		18.5
Distance M^1–M^2		20.4
Crown length P_4	11.6	11.7
Alveolar length P_4	10.1	10.5
Maximum width P_4	6.0	6.1
Crown length M_1	20.7	21.1
Alveolar length M_1	19.8	20.0
Maximum width M_1	8.6	8.6
Width of mandible at P_4	11.0	
Height of mandible at M_1	11.5	
Width of mandible at M_1	26.2	
Distance P_1–P_2	13.7	
Distance P_1–P_3	24.6	
Distance P_1–P_4	37.3	
Distance P_1–M_1	56.3	

mined by radiocarbon dating on carbonized wood from the same level as the feature; the sample came from a burned area 0.9 m east of the burial. The date was 5540 ± 170 B.C. (GAK-1172). Wood charcoal that was 10 cm higher dated at 5060 ± 160 B.C. (GAK-1171). Cultural materials from this horizon will be reported elsewhere (*4*).

The dog's skeleton was crushed; most of the breaks were undoubtedly caused by the weight of the capstones and the pressure of the overburden (Fig. 1). Also, only parts of the animal were present; these parts included portions of both ulnae, the radii, a humerus, a femur, portions of the skull, and the lower jaw. There were also a few fragments of the vertebrae, the ribs, and the feet. The disappearance of some elements can probably be attributed to disturbance by small rodents in the tumulus during the years following the burial. A few dental measurements were recorded (Table 1), but, because of the fragmentary condition of the skeleton, the size of the skull and postcranial bones had to be estimated.

Fig. 1. Dog burial subsequent to excavation. Notice the many breaks in the bones due to pressure from covering rocks and overburden.

Some of the leg bones were complete enough so that their lengths could be extrapolated by comparison with complete specimens in the faunal collections at the Illinois State Museum. On this basis the stature of the Rodgers dog was estimated to be about that of a fox terrier; that is, at the shoulders its height was between 40 and 50 cm. For a dog of its size, its muzzle was unusually massive, as demonstrated by the height and thickness of the mandible. The height at the center of the right carnassial (alveolus rim to ventral margin) averaged 4 to 5 mm more than the same measurement taken on six modern dogs of comparable size; a transverse section of the mandible at the right carnassial measured 1 to 2 mm more than any in the modern dogs. Extensive wear on all the teeth indicates the animal was a mature adult, although dental attrition may have been accelerated in some aboriginal dogs owing to their dietary habits.

Additional descriptions of this mode of interment are absent in the literature; dog burials at this time are rare, if not unknown, in the eastern United States. Perhaps as much as 1500 to 2000 years later, dog burial was commonly practiced by Archaic peoples in the southeastern United States (*5*) and as far to the northeast as New York State (*6*). In Kentucky, pits containing dog burials are a very common feature of the later Archaic peoples. These burials were sometimes covered, usually with freshwater mollusk shells (*7*).

The Rodgers dog was an animal with about the stature of a fox terrier but with a more robust muzzle than is present in modern dogs of comparable size. The burial may mark an early expression of a cultural pattern that was later practiced throughout much of eastern United States. This pattern apparently became the rule among some of the later, more sedentary, Archaic groups such as those who occupied the shell mound sites of Kentucky, Tennessee, and Alabama.

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Chromosome Pairing within Genomes in Maize-Tripsacum Hybrids

Abstract. *When the ten chromosomes of maize were inserted into a polyploid* (2n = *72*) Tripsacum dactyloides *background they formed up to five pairs at meiosis. Two plants that each contained 36* Tripsacum *and 14 maize chromosomes were deprived from the* F_1 *of maize* × Tripsacum. *Chromosomes of these plants frequently formed 25 bivalents, 18 between* Tripsacum *chromosomes and seven between maize chromosomes. Maize chromosomes could be distinguished from* Tripsacum *chromosomes on the basis of size. The within-genome pairing is probably induced by the genetic background.*

Maize chromosomes normally form ten pairs at meiosis. In haploid cells, one or two pairs may be formed by what is generally considered nonhomologous pairing (*1*). It is also common in the haploid for chromosomes to fold back on themselves so that pairing takes place between arms of the same chromosome. In hybrids of maize and diploid ($2n = 36$) *Tripsacum floridanum*, the maize chromosomes show some affinity to *Tripsacum* chromosomes, and a small amount of pairing occurs between them (*2*). Within the haploid maize complement in similar materials one or two maize pairs may be formed.

Nevertheless, we found that, in some hybrids between maize and polyploid ($2n = 72$) *Tripsacum dactyloides*, the maize chromosomes frequently associated into five pairs. There is a considerable difference between F_1 plants

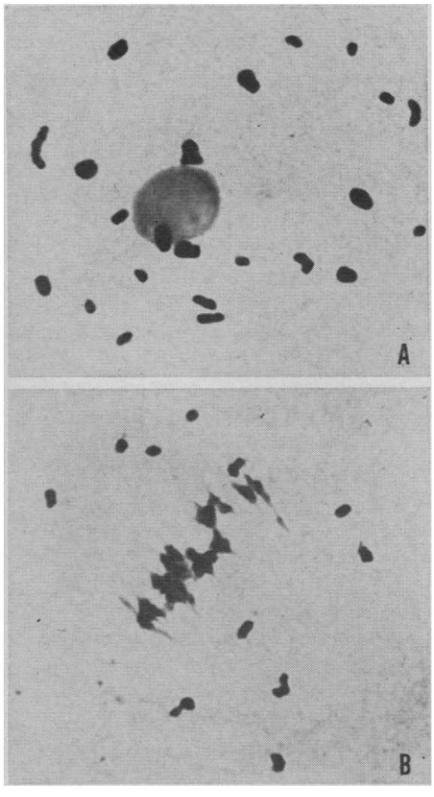

Fig. 1. (A) Diakinesis showing 23 pairs (5 maize and 18 *Tripsacum*) of chromosomes. (B) Metaphase showing *Tripsacum* chromosomes at plates and early dissociation of ten maize chromosomes.

in this respect depending on the specific maize and *Tripsacum* stocks used (*3*). This report concerns hybrids which contains 36 *Tripsacum* and 10 maize chromosomes. The *Tripsacum* chromosomes regularly form 18 bivalents, while the maize chromosomes form 0 to 5 pairs. Maize chromosomes can be distinguished from *Tripsacum* chromosomes by their larger size (Fig. 1A). The maize pairs are not synchronized with the *Tripsacum* chromosomes and separate early. By the time the *Tripsacum* chromosomes line up on the metaphase plate, the maize chromosomes appear to be in a sort of suspended anaphase (Fig. 1B). The maize chromosomes may be included at random or more often excluded altogether in meiosis.

The 46-chromosome hybrids are male sterile, but when backcrossed to maize, the offspring are usually 46-chromosome plants resembling the F_1 morphologically. This is not due to apomixis because purple plants resembling the F_1 are recovered when the backcross is made to a maize genetic stock carrying the genes for purple plant color (*B*, *Pl*). Evidently, the functional female gametes of the F_1 are primarily those with no maize chromosomes and the unreduced number (36) of *Tripsacum* chromosomes. The F_1 is reconstituted in each backcross generation. A few percent of the individuals in backcross populations have more than 46 chromosomes due to the inclusion of some maize chromosomes at meiosis. We have recovered plants with 50, 52, 54, and 56 chromosomes in backcross progenies.

The 56-chromosome plants are evidently derived from unreduced eggs of the hybrid and normal maize pollen. They contain 36 *Tripsacum* chromosomes that form 18 bivalents and 20 maize chromosomes that form 10 bivalents. Meiosis is almost completely regular in these plants, as expected. However, the 50-chromosome plants frequently form 25 bivalents. These are derived from 18 pairs of *Tripsacum* and seven pairs of maize. Of the seven maize pairs, four bivalents are to be expected as being those which would occur between the four extra maize chromosomes from the egg and their homologs within the set of ten chromosomes from the male parent. However, the remaining three maize pairs resulted from nonhomologous pairing among the remaining six chromosomes from the male parent. In these plants, the maize and *Tripsacum* chromosomes are well synchronized, and meiosis is regular. The seven pairs of maize chromosomes can be easily identified by size.

It is now apparent that in the right genetic environment (background), the ten chromosomes of maize will frequently form five pairs. Some might interpret this as evidence for a residual homoeology on the ground that the basic number in Maydeae and Andropogoneae is $X = 5$ rather than $X = 10$. Rhoades (*4*) has shown that maize chromosomes do contain duplicated regions, but whether or not these represent vestiges of an ancient polyploidy has not yet been established. We are more inclined to interpret the pairing as nonhomologous and nonhomoeologous induced by the genetic background. We feel that all organisms that carry out meiosis have coded genetic information that orders the chromosomes to pair during meiosis. Asynaptic and desynaptic aberrations are mutations of such genetic information. The polyploid *T. dactyloides* ($2n = 72$) presumably carries a double dose of pairing orders, and, although autoploid in nature, the chromosomes associate regularly into bivalents. In this background chromosomes of the haploid maize genome pair with each other, and the 36 *Tripsacum* chromosomes associate into bivalents, but synchronization is off. In the 50-chromosome plants (36 *Tripsacum* chromosomes and 14 *Zea* chromosomes), the additional maize chromosomes probably carry additional genetic information specifically for the behavior of maize chromosomes, and a better balance of the chromosomal environment is achieved.

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Neuroglia: Biophysical Properties and Physiologic Function

Abstract. *The membrane time constant of neocortical glial cells is about 385 microseconds, less than one-twentieth the known value for the Betz cell. Glial membrane specific resistance is low (approximately 200 to 500 ohm centimeters squared). Neuroglial cells are ideally suited to buffer the immediate extraneuronal space at areas of synaptic contact against the increases in external potassium ion concentration that accompany postsynaptic and spike activity and to minimize the spread of potassium ions to other pre- and postsynaptic regions.*

The protoplasmic astrocyte is the principal neuroglial cell within the gray matter of the normal brain (*1*). These cells possess an irregular cell body from which numerous slender processes radiate to form differing relationships with capillaries, other astrocytes, and the receptive surfaces of neurons (*2*).