so far, was 4. Generally speaking, B - chromosomes are found in highland races, with low number of knobs.

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6. Evidence for existence of a common prehistoric race in both North and South America.

A new cache of corn in an early Paracas stratum (circa 0-200 B.C.) was found by Dr. Dwight Wallace in Ica, on the southern Peruvian coast. This material, was found in an excellent state of preservation and permitted a careful morphological study. The ears were short, ranging fr 1.5 to 9.0 cms. in length, most of them with medium to strong fasciati with brown or red pericarp, and small yellow flinty (pop) kernels. Fo ears had cherry pericarp.

This corn is clearly related to a precursor of a large number of present-day Peruvian and Andean races, and the Mexican race chapalote seems to be similar to Huaca Prieta corn, as well as to corn from Tularosa Cave, which would mean, that this prehistoric race of corn might have been grown in both North and South America, more than 2500 years ago.

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1. A persistent nucleolus in maize.

A study of meiosis was made in 6 F_1 plants from a cross between a normal inbred line and a plant with the constitution abnormal 10 10^B $2B^{ab10}$. In all plants a persistent nucleolus was detected at both meiotic divisions in a large number of pollen mother cells. Parallel production of carmine stained nucleolar-like bodies was also observed many cells.

A large number of droplets of staining material were found in the nucleus, surrounding the chromosome threads at leptotene. At zygotene similar droplets were observed in close connection with the synizetic knot. Large, irregular, light staining spots were observed in the sur rounding nuclear sap. These spots are thought to be the products of the progressive dissolution of droplets previously formed and freed by the chromosome contraction into the synizetic knot.

The fact that in this stage droplets are found close to the chromosomal bulk seems to be a good reason to believe not only that these bodies are produced by the chromosomes but also that the chromosomes are still in an active metabolic stage. It has not been possible to ascribe the production of this substance to any particular region of the chromosomes.

At pachytene the droplets are less numerous and larger, lying completely free in the nuclear sap between the bivalents. They are generally 1/5 to 1/8 smaller than the nucleolus, in diameter. Later prophase stages are characterized by a gradual disappearance of these bodies, and at diakinesis none was observed. Instead, a granular, coalescent and light staining substance was seen spread over the nucleus. At prometaphase a persistent nucleolus was observed in a large number of cells. It soon becomes free from the nucleolar organizer attachment and orientates displaying an elliptical and finally a rod shape configuration.

At metaphase I the nucleolus is normally lying at one of the poles of the spindle. Very few cases were observed in which these nucleoli orient on the equatorial plate. They then form a long rod crossing the spindle plate with their ends close to the poles. Other times a spindle shaped configuration was observed, made up of two rods convergent at the ends and directed towards the poles. These nucleoli finally break into two pieces that move to the poles. Nucleoli were also seen lying outside the spindle. They seem to be motionless.

The division cycle of nucleoli always precedes the anaphase movement of chromosomes. It seems therefore that centrifugal forces are already operative in the spindle prior to the polar movement of the chromosomes. The directional stretching of nucleoli towards the poles is probably a function of the frame-like structure of the spindle that dictates the predominant direction of the movement. The persistent nucleoli normally disappear before anaphase. In a few cases, however, nucleoli were still found at final anaphase I lying beyond the poles, apart from the chromosomal group, seeming to be displaced by them from their previous site.

Telophase and interphase are characterized by a widespread occurrence of small, dark staining droplets in the cytoplasm. They are dissolved before metaphase II. Meanwhile amorphous nucleolar substance is produced inside the nucleus, and a persistent nucleolus is again present at metaphase II lying at one of the spindle poles. Nucleolar division has never been detected at this stage. Finally cytoplasmic droplets were again observed at telophase II, interphase and prophase of the microspore first division.

From the above description it seems logical to infer that the persistent nucleoli were due to an over-production of nucleolar substance by the chromosomes. Presence of nucleoli at the metaphase stage seems

in this case due to the saturation of the nuclear sap and cytoplasm by this additional product.

Pachytene analysis of the chromosomes in five plants disclosed their constitution as follows:

Plant 1 - 10 10^{B} $2B^{ab10}$

Plant 2 - 10 10^{B} $2B^{ab10}$

Plant 3 - 10 ab10

Plant 4 - 10 10^{B} B^{ab10}

Plant 5 - 10 10^{B} B^{ab10}

These plants carry a large number of knobbed chromosomes. A low degree of neocentric activity was detected at both meiotic divisions in all plants.

An attempt was made to evaluate the relative amount of the droplet forming substance in PMCs of these plants. Two morphological criteria were used: the evaluation of the mean number of droplets per cell at the pachytene stage and the counting of relative number of cells with persistent nucleoli at prometaphase-metaphase I. The results are given below:

	Average No. Per Cell of Nucleolar-like Bodies at Pachytene	Total No. of Cells	Relative No. of Cells With and Without Persistent Nucleoli at Promet.-Met. I	To No Ce
Plant 1	4.5	57	76:8	
Plant 2	4.3	65	121:4	1
Plant 3	2.1	50	63:92	1
Plant 4	1.96	51	53:73	1
Plant 5	2.3	54	57:88	1

These figures seem to confirm our idea of a direct relationship between nucleolar persistency and the amount of droplet forming substance in previous stages. However, the most important point is that the amount of this substance is considerably greater in plants 1 and 2 than in the others. Since these plants carry an extra abnormal 10 segment, it is reasonable to assume a dosage effect of this fragment on the production of nucleolar substance.

A closer comparison of the different cases presented in this table discloses that other heterochromatic portions of chromosomes seem not to affect the production of this substance. For instance the plant with no B chromosomes shows no difference in mean number of droplets per cell at pachytene and in the proportion of nucleolate cells in comparison to the plants carrying the two translocated parts of a B chromosome.

Pachytenes of plants 2 and 3 were studied in detail with regard to the knob constitution of the chromosomes. It is as follows:

		Plant 2	Plant 3
Chromosome 1	L	K/K	K/K
	S	K/O	O
Chromosome 2	L	K/K	K/O
	S	O	O
Chromosome 3	L	K/O	O
	S	O	K/O
Chromosome 4	L	K/O	K/O
	S	O	O
Chromosome 5	L	O	K/O
	S	O	O
Chromosome 6	L	K/O	K/O
	S	organ.	organ.
Chromosome 7	L	K/O	K/O
	S	O	O
Chromosome 8	L	O	O
	S	O	O
Chromosome 9	L	O	O
	S	K/K	K/K
Chromosome 10	L	B frag/O	ab10/O
	S	O	O

plus 2B ab10

K- Symbol for knob
O- Knobless
L- Long arm of the chromosome
S- Short arm of the chromosome

This table shows that knobs are relatively abundant in both plants and that differences are expected to occur in plants of the same family. Knob analysis of the remaining plants could not be undertaken. Most of the bivalents at pachytene stick together by their knobs making impossible their identification. However, this, in itself may be evidence of a heavily knobbed karyotype.

Production of nucleolar substance is frequently observed in association with heterochromatin. In maize the nucleolus is normally associated with a large heterochromatic piece, the nucleolar organizer. From the facts above described, the suggestion is made that other heterochromatic parts, as for instance knobs and B fragments, can also be activated under special genotypic conditions. This particular genotype is probably provided by the abnormal 10 segment. Influence of this segment on the neocentric activity of the other chromosomes, assumed to be localized on the knobs, is already known. We believe that detection of the persistent nucleoli and of the mechanism presumably causing them to arise was only possible due to the heterochromatin charged background in the PMCs of these plants that made possible the full expression of the abnormal nucleolar activity.

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1. The effects of teosinte chromosomes on mutation rate at specific loci.

In previous News Letters we have reported a general mutagenic effect of teosinte chromosomes which have been incorporated into A158. The present report concerns their effect on mutation rates at specific loci. A test of a homozygous chromosome-4 stock on mutation to sugary during pollen formation yielded 1 proven *su* mutation in 84,329. When this individual was grown out, it was found to be semi-sterile. In another test in which mutation rate was tested in the female rather than the male and in which the teosinte chromosomes were made heterozygous by outcrossing to a cytoplasmic male-sterile inbred (C106) no mutants were observed to either *sh* or *y* in 136,227 kernels involving about 68,113 gametes bearing teosinte chromosomes. A similar test for sh_2 in the female of teosinte derivati