outcrossing to high-knob lowland races by both human and natural selective mechanisms, have retained the characteristics of both low knob numbers and relatively high frequencies of B-chromosomes.

Piricinco, one of the most widely distributed races in the Amazonian basin, although showing considerable tripsacoid influence is low in knob number. This situation is easily explained if it is accepted that the tripsacoid influence in Piricinco originates with knobless Tripsacum australe, whose southern, northern, and eastern distribution ranges overlap those of Piricinco.

Chuncho, another jungle lowland race, but with high knob number, can be shown to have originated in an area where high knob numbers are prevalent among the regional races.

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1. Identification of independent isolations of cytoplasmic male sterility.

A number of independent isolations of cytoplasmic male sterility have been checked for similarity to $[\underline{ms_2}]$ -type male sterility.

The following symbolism is being used for discussing genetic work with cytoplasmic male sterility.

$[\underline{ms}]$ - Cytoplasmic male sterile factor

$[\underline{ms_1}]$ - T or Texas type

$[\underline{ms_2}]$ - S or U. S. D. A. type

$[\underline{ms_x}]$ - other type (A letter is used until it has been definitely shown to be different from other known types; i. e., at present, $[\underline{ms_1}]$ and $[\underline{ms_2}]$.)

$\underline{Rf}^1$ - restorer for $[\underline{ms_1}]$

$\underline{Rf}^2$ - restorer for $[\underline{ms_2}]$

A genotype includes the residual chromotype. The superscript to the residual chromotype designates the number of backcrosses to that chromotype since the last "outcross."

Missing symbols in a genotype infer "wild" or "normal" for that "gene" (plasmagene or chromogene).

The sources checked were:

$[\underline{ms_A}]$ - A yellow flint dent from Turkey.

$[\underline{ms}_B]$ - Isolated by Brieger in Brazil.

$[\underline{ms}_C]$ - From a Vg stock. G. F. Sprague, Iowa.

$[\underline{ms}_D]$ - From a Vg stock. Galinat, Wisc.

$[\underline{ms}_E]$ - Isolated by James E. Wright, Pa.

$[\underline{ms}_F]$ - From Iojap stock. Marcus M. Rhoades, Ill.

$[\underline{ms}_G]$ - Isolated by C. Wernham, Pa.

$[\underline{ms}_H]$ - Ky. A. E. S., Ky27 sterile (from 33-16)

$[\underline{ms}_I]$ - From Hubbard flint. R. E. Bailey, Me.

Each of the above was pollinated by, and backcrossed to, the inbred A158 by D. F. Jones. The genotypes of the stocks received from him were: $[\underline{ms}_A]$ A158^6; $[\underline{ms}_B]$ A158^8; $[\underline{ms}_C]$ A158^5; $[\underline{ms}_D]$ A158^1; $[\underline{ms}_E]$ A158^4; $[\underline{ms}_F]$ A158^3; $[\underline{ms}_G]$ A158^o; $[\underline{ms}_H]$ A158^o; $[\underline{ms}_I]$ A158^o.

Each of these was again crossed by A158. Since none of the backcross progenies contained fertile plants it can be concluded that the A158 chromotype cannot restore any of the types of sterility.

Each was then crossed with plants of the genotype either $[\underline{ms}_2]$ $\underline{Rf}^2\,\underline{rf}^2\,\underline{Rf}^1\,\underline{rf}^1$ A158^5 or $[\underline{ms}_2]$ $\underline{Rf}^2\,\underline{rf}^2\,\underline{rf}^1\,\underline{rf}^1$ A158^5 (the male family may or may not have been segregating for $\underline{Rf}^1$). Because $\underline{Rf}^2$ is selected-for ($\underline{rf}^2$ pollen grains abort) when with $[\underline{ms}_2]$ (see M. N. L. 33: 17-19) all offspring would be expected to be fertile if $[\underline{ms}_x]$ were $[\underline{ms}_2]$. If $[\underline{ms}_x]$ were $[\underline{ms}_1]$ either one-half would be fertile or all would be sterile ($\underline{Rf}^2$ and $\underline{Rf}^1$ have shown no linkage).

The crosses gave the following results:

	X A158	X $[\underline{ms}_2]$ $\underline{Rf}^2\,\underline{rf}^2$ ___ $\underline{rf}^1$ A158^5	% Aborted Pollen
$[\underline{ms}_A]$ A158^6	all 14 sterile	all 12 fertile	55
$[\underline{ms}_B]$ A158^8	" 9 "	" 10 "	50
$[\underline{ms}_C]$ A158^5	" 14 "	" 13 "	55
$[\underline{ms}_D]$ A158^1	" 12 "	" 14 "	55
$[\underline{ms}_E]$ A158^4	" 14 "	" 9 "	55
$[\underline{ms}_F]$ A158^3	" 14 "	" 7 "	50
$[\underline{ms}_G]$ A158^o	" 14 "	" 8 "	50
$[\underline{ms}_H]$ A158^o	" 13 "	" 11 "	50
$[\underline{ms}_I]$ A158^o	" 15 "	" 15 "	50

Seeing that in each case all offspring of the cross $[\underline{ms}_x]A158^n$ X $[\underline{ms}_2]$ $\underline{Rf}^2\underline{rf}^2$ ___ $\underline{rf}^1$ were fertile we needn't concern ourselves about $\underline{Rf}^1$. It appears then that each sterile tested has behaved as $[\underline{ms}_2]$.

Before concluding that each $[\underline{ms}]$ was $[\underline{ms}_2]$, let us consider other alternatives. Since the genetic material from A158 did not bring about the fertility, the chromogene involved must have been either $\underline{Rf}^2$ or another gene so closely linked with $\underline{Rf}^2$ that out of ninety-nine progeny observed no cross-overs occurred.

A further check was made. It is known that the time of $\underline{Rf}^2$ gene action is shortly after the quartet is formed. This means that when it is with $[\underline{ms}_2]$, pollen grains carrying $\underline{rf}^2$ abort (see M. N. L. 33: 18-19). Therefore, if the fertile offspring of the cross $[\underline{ms}_x]A158^n$ X $[\underline{ms}_2]$ $\underline{Rf}^2\underline{rf}^2$ ___ $\underline{rf}^1$ $A158^5$ had the $[\underline{ms}_2]$ plasmatype and the restorer involved was $\underline{Rf}^2$, fifty percent of the pollen of these plants would be expected to abort. All of the plants were checked with a hand microscope (60X) and found to have about fifty percent aborted pollen. Differences (as shown in the above table) could have been due to environmental conditions, since the inbred A158 may vary somewhat from day to day. This means that if another gene, closely linked with $\underline{Rf}^2$, was responsible for the restoration its time of action would also have had to be shortly after quartet formation. Although this may seem unreasonable, more plants resulting from the same crosses will be grown this spring in an effort to observe any cross-overs.

Even if $\underline{Rf}^2$ is responsible for the restoration it cannot be absolutely concluded that all these plasmatypes are identical with $[\underline{ms}_2]$ (though they could justifiably be called $[\underline{ms}_2]$), for the plasmagenes can only be differentiated in terms of the restoring genes. It may be possible for one chromogene to compensate for more than one type of cytoplasmic "error." This should be borne in mind when considering that Khoo and Stinson (M. N. L. 33: 22) found chromatographic differences between these same types of cytoplasmic male sterility.

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1. Inhibition of geotropism in corn seedling shoots by gamma radiation.

US-13 yellow dent hybrid seedlings four days old (1-3 cm. high) were irradiated in the coleoptile stage or in other experiments were irradiated as dry seed. Fourteen doses from 20 to 640 Kr were administered at ca. 4 Kr per minute to seedlings within the relatively uniform flux center of a hollow cylinder type cobalt-60 irradiator. All plants were handled in individual one ounce square glass bottles containing vermiculite. One hour after irradiation they were "presented" to gravity by turning the bottles on their sides. Time lapse photographs were taken of the geotropic response of the shoots every twenty minutes for forty-eight hours. Geotropic bending and growth were measured on the projected film images. Radiation inhibited both geotropism and growth. Statistical analysis revealed that the primary component in the relation between dose and inhibition of geotropism was linear with significant higher order effects.

Irradiation of dry corn seed with subsequent germination and determination of geotropic response and growth gave a different picture. The inhibiting effect of radiation on geotropism increased to 120 Kr, then decreased, so that at 360 Kr the seedlings responded geotropically almost as well as unirradiated controls. A similar but much less pronounced effect on growth was obtained as had been reported