

14. The inhibitor of tunicate.

The inhibitor of tu^h reported in last year's News Letter also affects the expression of the Tu gene as it was assumed that it would. The genotype Tu tu in the presence of the inhibitor is similar to the genotype $tu^h tu$ without the inhibitor.

The inhibitor is apparently linked with Y on chromosome 6 as the following data from the progeny of a selfed ear heterozygous for both genes indicate:

| | Weak tu^h | Intermediate tu^h | Strong tu^h |
|--------------|-------------|---------------------|---------------|
| Yellow seeds | 20 | 35 | 12 |
| White seeds | 3 | 14 | 7 |

A second test involving backcrosses instead of selfs produced the following results:

| Rows | Yellow seeds | | White seeds | | Total | Cross-overs |
|-----------|--------------|---------------|-------------|---------------|-----------|-------------|
| | Weak tu^h | Strong tu^h | Weak tu^h | Strong tu^h | | |
| 57-553-54 | 33 | 16 | 24 | 28 | 101 | 40 |
| 57-555-56 | <u>25</u> | <u>23</u> | <u>18</u> | <u>30</u> | <u>96</u> | <u>41</u> |
| Total | 58 | 39 | 42 | 58 | 197 | 81 |

Although not one of the three tests shows highly significant deviations from independent inheritance, they are consistent in showing some association between the inhibitor and Y which came into the cross with it. Further tests are needed to verify this indication of linkage and to determine more precisely the amount of crossing over involved.

The interaction of the Tu gene with the inhibitor follows expectations quite closely. A population segregating for both genes would be expected to have one-fourth of its plants homozygous tunicate and three-fourths of these or three-sixteenths of the total to be an inhibited form of tunicate. In a population of 118 plants, 27 plants were Tu Tu and 20 of these were inhibited. Theoretical numbers are 30 and 22 respectively.

The fact that the inhibitor acts upon the expression of the Tu gene has made it possible to obtain fertile homozygous Tu Tu plants in

a great variety of stocks. These in turn are exhibiting a number of characteristics which may be regarded as primitive and which may provide clues as to the nature of wild corn and to some of the changes which must have occurred in the course of corn's evolution under domestication. For example, practically all Tu Tu plants bear their ears high on the stalk, the uppermost ear sometimes occurring at the node below the tassel. Since the upper part of the stalk is slender, this means that only small ears can be borne in this region. If wild corn was of this nature, then one of the most important changes occurring during domestication has been a shift in the position of the ear to a lower, thicker region of the stalk which is capable of bearing larger ears.

Since the number of husks surrounding an ear is directly correlated with the number of internodes between the tassel and the ear these small ears borne on the uppermost nodes of Tu Tu plants have only a few husks and these sometimes open up at maturity. This explains a previously puzzling situation: why an ear of pod corn should be twice protected, once with glumes surrounding the seeds and a second time with husks surrounding the ear. It is now possible to imagine the husks as a protective device primarily for the tender young female inflorescence and the glumes a protective device for the ripening kernel.

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15. The widespread distribution of Chapalote maize in prehistoric times.

The present-day Mexican race of maize called "Chapalote" was one of the basic races in North America in prehistoric times. A re-examination of the actual cobs, photographs or descriptive literature covering 14 sites in northwestern Mexico and southwestern United States suggests that the archaeological maize from this area was either pre-Chapalote, Chapalote or a more evolved and more tripsacoid derivative called "Basket-maker" corn. The Mexican states with prehistoric Chapalote are Michoacan (lava impressions), Sonora (Dark Cave) and Chihuahua (Swallow Cave, Slab Cave, Tau Cave, Olla Cave). In the region now the U.S., Chapalote occurred in Arizona (Richards Cave, Tonto Cave, Painted Cave), Colorado (Cottonwood Cave, Lo Dais Ka Cave) and New Mexico (Bat Cave, Tularosa Cave, Gebollita Cave).

16. Archaeological evidence of the effect of teosinte introgression on maize evolution.

A large stratified collection of archaeological cobs from Gebollita Cave, New Mexico is being studied. Identification of the original maize (level-5) as Chapalote is possible because the cobs and kernels from this level are perfectly preserved by carbonization. In the next level up (level-4), which was not carbonized, there was sudden teosinte