

f acid is also minimised. After oxidation a further distillation is not necessary owing to the present method. This is a distinct advantage over Grottlisch's method.¹ The results of the table show that propionic and butyric acids get estimated as accurately but this is so with other methods also. Although Grottlisch claims that butyric acid does not appear in the final distillate in his method the claim appears doubtful. As a matter of fact the proportions of these acids in the liquor are small enough not to affect the gravimetric acid estimation to any appreciable extent.

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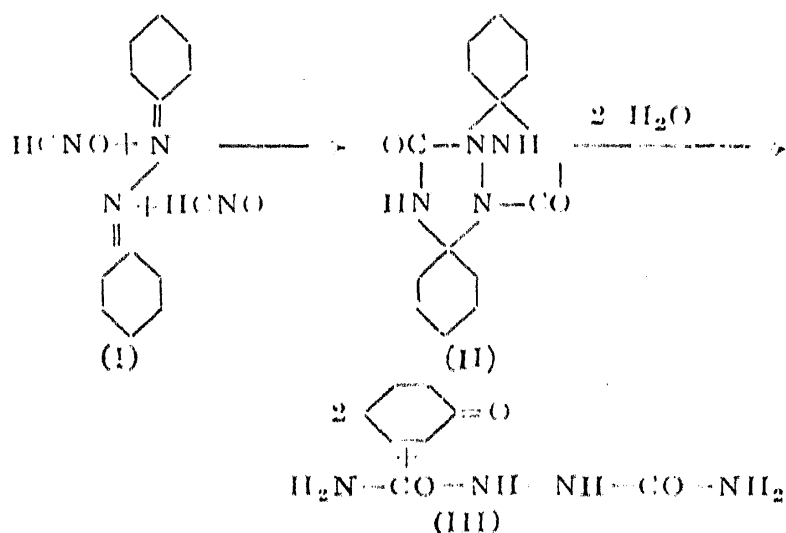
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CRISSCROSS ADDITION TO HYDRO-AROMATIC KETAZINES

Conjugated systems of double bonds and nitrogen generally takes place at 1, 4 or 1, 2 positions.^{1,2,3} However, conjugation between carbon and nitrogen, like $-C=N-C-$ as in azines, shows some peculiarities in addition reactions and Bailey, *et al.*, have observed a number of cases of 1,3 and 2,4 addition by the azine system.^{4,5} This type of reaction was named "Crisscross Addition" by Bailey and McPherson.⁵ A number of such additions with the azine system were subsequently observed.^{6,7}

These observed cases of crisscross addition are, however, confined to aldazines and now the reaction has been extended to ketazines for the first time. Azines of hydroaromatic ketones add two molecules of cyanic acid in acetic acid below 10°C. with surprising ease, giving sharp melting, crystalline solids. The addition products

have been proved to be bitriazole compounds (II) by hydrolytic degradation to hydrazodicarbonamide (III); the course of reaction being as follows:



Crisscross addition of cyanic acid to cyclohexanone azine and 2-methyl and 4-methyl cyclohexanone azines gives the corresponding bitriazoles melting at 210°, 219° and 228-5° C. respectively.

The hydroaromatic ketazines also react with thiocyanic acid, maleic anhydride and α -naphthoquinone with the same ease, giving crystalline adducts. Work is in progress towards settling the structure of the addition products.

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EMBRYO CULTURE TO OBTAIN F₁ PLANTS OF INCOMPATIBLE CROSSES IN CORN (MAIZE)

In wide crosses, as a rule, in nearly all the ovules, after a definite period from the time of pollination, the endosperm begins to collapse. Shortly thereafter the embryo too collapses as its growth thereby gets arrested (Blakeslee and Satina, 1944). Occasionally in the hybrid one or more ovules may be found which are almost comparable with

nose of the same age in a normal plant. These are usually only partially filled and ordinarily responds to embryo culture when young, while it is noticed that germination is very poor for these seeds when mature. The object of this experiment is to compare the germination by embryo culture of such immature partially filled seeds against that by the ordinary method of pot sowing, of such but mature seeds from incompatible crosses like a diploid \times tetraploid or a triploid \times tetraploid, in corn.

prepared by the usual paraffin section method, using crystal violet for staining.

Since as a rule, the embryos of the mature partially filled seeds of wild crosses do not germinate even under embryo culture, the embryo having already collapsed beyond the pro-embryo stage, an estimate of successful germination in a wide cross by embryo culture method, has to be attempted at an early stage of embryo development. With this end in view, the above triploid was crossed to a tetraploid.

In this cross between the triploid as the male parent and tetraploid as the female, it was observed that when the ovules were two weeks old, there were three distinct classes of kernels (Figure 1). They

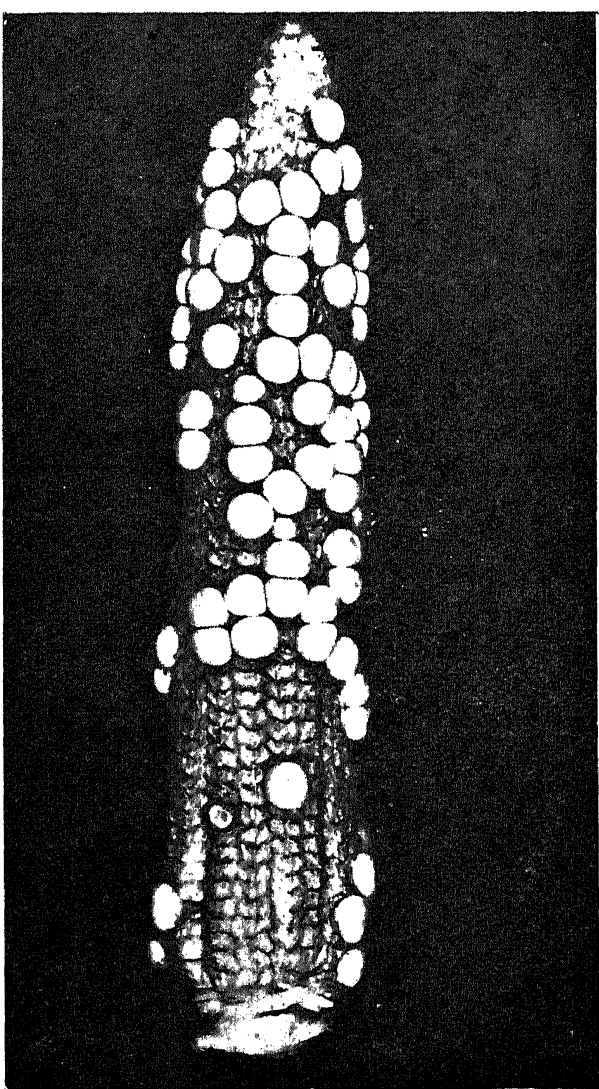


FIG. 1

A 2-Week old corn ear obtained by crossing a tetraploid female parent with a triploid male parent. Notice the different types of grains showing the fully filled, partially filled and the unfilled grains.

Out of the 13 diploid \times tetraploid crosses, that were made, 66 partially filled seeds were obtained. These seeds when pot sown, gave only 15 plants of which one turned out to be a triploid, the others showing varying numbers of chromosomes from 28 to 33. Chromosomes were counted from root tips

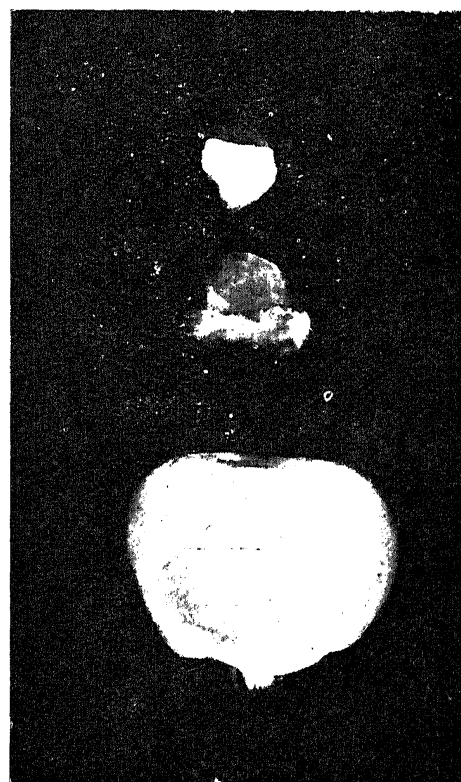
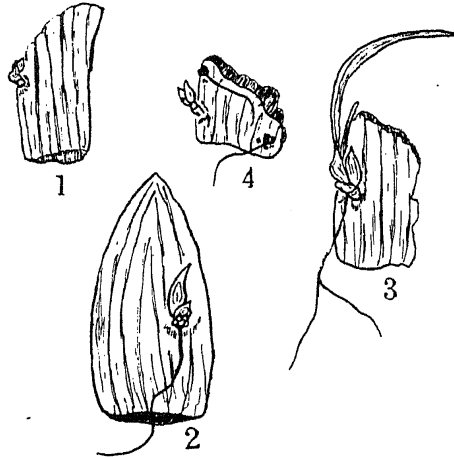


FIG. 2

Photograph of the 3 types of grains indicated in Fig. 1 were (1) full round normal kernels, (2) partially filled small-sized kernels and (3) very small unfilled kernels (Figure 2). Evidently the last class represents the unfertilized ovules. The semi-filled and the intermediary sized kernels represent the real hybrid seeds. The counts made of kernels belonging to these three classes showed a ratio of 104 : 3 : 532. The ovules of the three hybrid kernels, when 16 days old, were dissected out and the embryos cultured in the Tukey's medium (Tukey, 1934) plus growth-promoting substances (Van-Overbeek and others, 1941). All the three

grew into seedlings. The chromo-
somes from the root tips revealed them
as tetraploids with chromosome numbers
above and below the triploid num-
ber. It may be recalled here that out of the
totiparously filled tetraploid \times diploid crosses
shown in pots only 15 germi-
nated. Thus it will be seen that the per-
centage of germination by the ordinary
method of sowing and by embryo culture at
an early stage of seed development,
was found to be 23 and 100 respectively in
these cases. Embryo culture of very young
seeds in this way helps to secure a greater
percentage of F_1 plants out of incompati-
bles than by the ordinary method of
sowing of these seeds when ripe by pot

outer surfaces (Figs. 1, 2 & 3). A single
scale leaf sometimes produced as many as
three such buds (Fig. 4). These made their
appearance as small papillæ consisting of
two overlapping opposite scale leaves.
Later, however, they assumed the form of
normal bulbs.



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Blakeslee, A. F., and Satina, S., "New
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by culture of excised embryos on malt
agar," *Science*, 1944, 99, 331-34. 2. Van-Over-
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In an experiment a portion of the stem
disc was cut and grown separately. It was
observed that the innermost scale leaf form-
ed a bud in the manner described above and
when this scale leaf was removed the scale
next to it behaved in a similar fashion. It
is apparent that the scale leaves possess an
inherent character for the production of ve-
getative buds. When, however, the scale
leaves were separated from the stem disc
and put on soil they failed to produce these
buds.

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NOTE ON THE VEGETATIVE
PROPAGATION OF *LILIUM LONGI-
FLORUM* WALL.

Lilium longiflorum Wall. belongs to the
Liliaceae. It grows in Western Hima-
layas from Nepal to Kumaon at an altitude
of 1000 ft. and is commonly cultivated in
India as an ornamental plant.
Bulbs of this species were obtained from
the Chandra Nursery, Sikkim, and from
garden sand and garden soil respectively.
A few months when the bulbs were
cultivated an interesting formation of ve-
getative buds on the scales was observed.
The usual method of vegetative propaga-
tion known in bulbs is bud formation on
the inner edges of the scale leaves. In this
species besides such propagation, buds
were also formed on the scale leaves
on their edges, the inner and the

A NOTE ON THE MICRO-ORGANISMS
PRESENT IN DATE-PALM JUICE
(SENDHI)

In the year 1928 M. Damodaran has done
extensive work on "The fermentation of Toddy and
an account of the micro-organisms produc-
ing it",¹ while later in 1939 V. S. Basrur
and M. Qureshi² have done extensive
work on the Date-Palm juice (*sendhi*) con-
fining their attention to analysis only. The
present note deals with the microscopic exa-
mination of fresh and fermented juice of
Phoenix Sylovestris Roxb.

Samples of *sendhi* were obtained with the
help of the Excise Department for our inves-
tigations. Possible precautions were taken