mortality of larvae, hatched from such eggs, thus showing that the fungus had no effect on hatching. Two applications of the fungus given at an interval of 7 days on II instar larvae were found to be not only effective in reducing the period of incubation appreciably but also increased per cent mortality from 80 to 100%. *N. rileyi* was reisolated from diseased larvae in all cases (Fig. 1). The larvae in controls remained healthy. These trials were conducted during September–November 1977, yielding positive results in all cases, thus confirming the highly pathogenic nature of the *N. rileyi*.

FIG. 1. Mummified caterpillars of castor semilooper parasitized by *Nomuraea rileyi*.

FIG. 2. Glass containers showing healthy parasites (*Telenomus proditor* Nixon) of castor semilooper, 40 days after spraying.

In host-range studies, *N. rileyi* also proved pathogenic and inflicted high mortality on jowar web worm (*S. elongella*). Pathogenicity trials were also conducted using *N. rileyi* on *Telenomus proditor* Nixon, which is a well-known egg-parasite of *A. janata* used in biological control. This was carried out by spraying a heavy aqueous spore-suspension of the fungus directly on parasitized eggs of *A. janata* in some cases and in others by releasing adults of parasite in glass containers heavily dusted with live amorphous spore-powder. Both the trials yielded negative results and the parasites so treated remained entirely unaffected by the fungus, even after a period of 40 days in both the cases (Fig. 2). This is a valuable contribution and should be considered as of great advantage and an effective safeguard in the biological control programme against the semilooper, through the use of the egg-parasite. It may also be of interest to note that the fungus is not phytocidal to the plant-hosts of the three pests and is, therefore, safe to handle involving no hazards.

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## A SHORT-CUT METHOD FOR MAKING PERMANENT MOUNTS OF STAINED EPIDERMAL PEELS

SLIDES of epidermal peels described by earlier workers generally represent glycerine mounts, which being semi-permanent are easily spoilt when examined under immersion oil. Though there are some methods of making permanent peel slides,[1–4] the latter do not display the different cell parts in good contrast. The adaptation of 'aniline-blue in lactophenol' staining technique of mycologists[5,6] to the epidermis of plants does provide good contrast between cell elements, but these preparations are also semi-permanent. Therefore, the present procedure was developed which enables preparation of peel slides which have been

found in good condition even after six months. The details are as follows:

1. A peel (obtained from preserved materials) is placed on the lside and stained with 2–3 drops of aniline-blue or fast green in lactophenol (diluted to 50% with water if the peel bears glands, so as to avoid contraction of the latter) for 10–15 minutes or more depending on the material. Excess stain is drained off.

2. The peel is treated 2 or 3 times with 75% or 80% *t*-butanol. If the stain is too dense, the treatment could be for a longer period.

3. The peel is treated with 100% *t*-butanol two or three times for thorough dehydration.

4. About 3 drops of thin canada balsam in *t*-butanol, is placed on the peel and the cover glass is mounted.

*Results*

The nucleus, certain cytoplasmic granules and general cytoplasm all stain bright blue, but show decreasing intensity in that order, providing differentiation. The cell walls remain unstained or appear bluish, but are quite distinctive, from the other cell contents.

The method described has several advantages over the usual ethanol-xylol procedure[2] and cuts down much of the time normally needed. Since xylol is avoided, neihter brittleness, nor folding of peels is encountered. The ethanol-xylol treated peel mounts, do not show bright image of the cell characters, but the *t*-butanol treated ones are found to be quite translucent comparable to those with clove oil treatment[2]. The authors consider this to be due to *t*-butanol's nonshrinkage effects on cell components, and its superior clearing properties over xylol.

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## MUTAGENIC, POTENTIATING AND ANTIMUTAGENIC ACTIVITY OF CERTAIN METALLIC IONS IN THE RICE GENETIC SYSTEM

THE grotesque poisoning of the biosphere caused by industrial effluents pose a grievous threat to the genetic hygiene of human population. The discovery that some of the metals, which are common constituents of industrial pollutants, mimic radiations[1,2] in their action has stimulated research on their role on the genetic damage in various test systems[3–12]. In the experiments reported here the genotoxicity of certain metallic ions was assessed in comparison and conjunction with gamma rays on rice seed (Cv. *Sona*).

Nine sets of rice seeds were treated with $10^{-4}$ M aqueous solutions (100 ml) of nine metallic salts for 24 hours at the room temperature (26° C). The salts used were chlorides of strontium (Sr), cadmium (Cd), mercury (Hg), barium (Ba), copper (Cu), lead (Pb), manganese (Mn), iron (Fe) and calsium (Ca). One set of seeds was immersed in distilled water for 24 hrs. which served as the control. In a second experiment, ten sets of seeds were irradiated with 20 kR gamma rays ($^{60}$Co source). Out of these one set was soaked in $H_2O$ and the other nine were immersed in 100 ml each of $10^{-4}$ M solutions of the nine metallic salts, for 24 hrs. Selfed panicles were collected, treatment-wise, from surviving $M_1$ plants, and the $M_2$ generation was raised in panicle progenies. The chlorophyll mutation and mutant frequencies, as well as the amount of synergism (K values) in sequential treatments, were computed as reported earlier[13]. For testing the differences in mutation and mutant frequencies between gamma ray treatment *versus* sequential treatments, standard normal deviate (Z) test was applied.

Out of nine metals tested, seven, *viz.*, Sr, Cd, Hg, Ba, Cu, Pb and Fe, displayed mutagenic activity in the rice genetic system (Table 1). Salts of Ba and Cd produced chlorophyll mutation and mutant frequencies on par with those of 20 kR gamma rays. Chlorides of Cu and Hg also showed fairly potent mutagenic effects. Compounds of Sr, Fe and Pb, however, showed weak mutagenic effects. In contrast, two metals, *viz.*, Mn and Ca, failed to provoke chlorophyll mutations in rice seed.

Sequential treatments with gamma rays and five metals, *viz.*, Sr, Cd, Hg, Pb and Cu, produced synergistic yields of chlorophyll mutations in the $M_2$ generation. These results suggest that radiation- and metal-induced