

Figure 1a-e. *Poltys bhavnagarensis* sp. nov. **a.** Dorsal view of female, legs omitted; **b.** Head, front view; **c.** Sternum, labium and maxillae; **d.** Epigyne (ventral view), and **e.** Internal genitalia. [AB, Abdomen; AL, Anterior lateral eyes; AM, Anterior median eyes; PL, Posterior lateral eyes; LA, Labium; MA, Maxillae; ST, Sternum].

Abdomen

Large, triangular, high in front, with two big tubercles on the antero-lateral sides, and small tubercles on the periphery. Dorsum of abdomen yellowish, with median dark patches posteriorly and with irregular dark spots as in figure 1a. Epigyne and internal genitalia as in figure 1d and e.

Holotype: Female stored in spirit.

Type-locality: Vicinity of Bhavnagar, Gujarat, India.

The spider resembles *Poltys bhabanii* (Tikader), but it differs as: (i) Ocular quad is wider behind than in front, (in *P. bhabanii* the width is uniform), (ii) Median patches on abdominal dorsum are dark while (yellow in *P. bhabanii*), and (iii) There are differences in the structure of epigyne and internal genitalia.

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STERILIZATION OF POTATO TUBERMOTH, *PHTHORIMAEA OPERCULELLA* (ZELLER), WITH ETHYL METHANE SULPHONATE

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POTATO tuber moth, *Phthorimaea operculella* (Zeller) is a widespread pest of potatoes¹. Due to insecticide resistance², this pest cannot be controlled effectively with insecticides³. In sterile male release approach, potato tuber moth has been sterilized with metepa^{4,5} and thiotepa⁶⁻⁸. However, the histopathology of gonads of this insect pest has not been studied. In the present studies, ethyl methane sulphonate which is a mutagenic substance was used to determine its effects on fecundity, viability and gonads of potato tuber moth.

Potato tuber moth was reared under laboratory conditions (at $25^{\circ} \pm 2^{\circ}\text{C}$, 12L: 12 photoperiod) for many generations before commencing the experiment. Sexing was done at pupal stage on the basis of morphological characteristics. One μl of 10% EMS (in distilled water) was applied on the dorsal side of the abdomen of each pupa using a topical micro-applicator. In control, the pupae were treated with the same quantity of distilled water. Different combinations of treated and control insects were made and data on the fecundity and viability of eggs of moths that emerged from these pupae were recorded. Three replicates of different combinations having four pairs in each were taken and the actual sterility⁹ induced was calculated. In histopathological studies, the testes and ovarioles of treated individuals were fixed in Bouin's fixative for 24 h, dehydrated in alcoholic series and embedded in paraffin wax. Sections ($7\ \mu\text{m}$ thickness) were cut using a microtome and were stained in Delafield's haematoxylen and alcoholic eosine.

Data on fecundity, viability of eggs and actual sterility induced after treatment with 10% EMS are

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Table 1 Effect of 10% solution of ethyl methane sulphonate in water, on fecundity and viability of eggs of potato tuber moth *P. operculella* (1 µl applied topically to pupal stage)

Type of combination*	Average number of eggs laid per female	Average number of eggs hatched per female	Percentage egg hatch	Actual sterility (%)	Corrected sterility (%)
Treated male × treated female	103.2 ± 2.32	54.0 ± 2.31	52.3	47.7	37.2
Treated male × untreated female	102.7 ± 1.67	64.7 ± 2.16	62.9	37.1	24.4
Untreated male × treated female	77.0 ± 2.57	49.0 ± 3.22	63.6	36.4	23.6
Control	105.0 ± 1.90	87.5 ± 2.07	83.3	16.7	—

*Three replicates of these combinations each having four pairs were taken; ± Standard error about the mean.

given in table 1. In the combination where both the sexes were treated, the sterility induced was 37.2%. In only male-treated and only female-treated combinations, the sterility induced was 24.4 and 23.6% respectively (table 1). However, Thompson and Rodrigues¹⁰ observed no sterility effects of EMS on the pupae and adults of *Aedes aegypti* L. This may possibly be due to specific action of EMS against some insect pests. Earlier studies also indicated that busulphan which is an effective mutagenic agent in adult house flies, *Musca domestica* L.¹¹, had no effect on adults of *Diparopsis castanea* Hmps¹². According to Jackson¹³, the largest doses of ethyl methane sulphonate produced a peak level of mutagenic effects but no sterility in *Drosophila melanogaster* (Meigen).

In the present investigation, it was observed that ethyl methane sulphonate did not cause any shrinkage of the testes. Similar results were reported in other insect species after treating with different chemosterilants. Outram and Campion¹⁴ reported that no change occurs in the testes of tepa treated *Diparopsis castanea*. Similarly, Saxena and Aditya¹⁵ also observed no change in the testes size of tepa and apholate treated *Poeciloceris pictus* Fabr. However, other workers reported the reduction in size of testes in Mexican fruit flies, *Anastrepha ludens* (Loew.)¹⁶ treated with chormbucil; *Cochliomyia hominivorax* (Coquerel)⁹ treated with apholate; *Anthonomus grandis* Boheman¹⁷ treated with apholate; *Hippelates pusio* Loew¹⁸ treated with metepa and tepa and *Hypera postica* (Gylh.)¹⁹ treated with apholate. From this it may be concluded that different chemosterilants have different modes of action in different insects.

Degeneration of germ cells was observed in ethyl methane sulphonate-treated testes of adult potato

tuber moth. Testicular sheath was also broken and there was no clear differentiation between different zones of testes of treated insect (figure 1). Degeneration of germ cells may reduce the number of spermatozoa produced and the males can be rendered sterile by inducing aspermic condition. Moreover, there may be induction of dominant lethal mutations in sperms as some eggs laid by the females mated with treated males were nonviable.

Ethyl methane sulphonate did not cause shrinkage or reduction in size of ovarioles and externally they were similar to those of normal females. The number of ovarioles in treated insects was also the same as that of the untreated female. However, in *Dysdercus cingulatus* Fabr²⁰, the treatment of metepa and apholate resulted in the reduction in the size of the ovarioles.

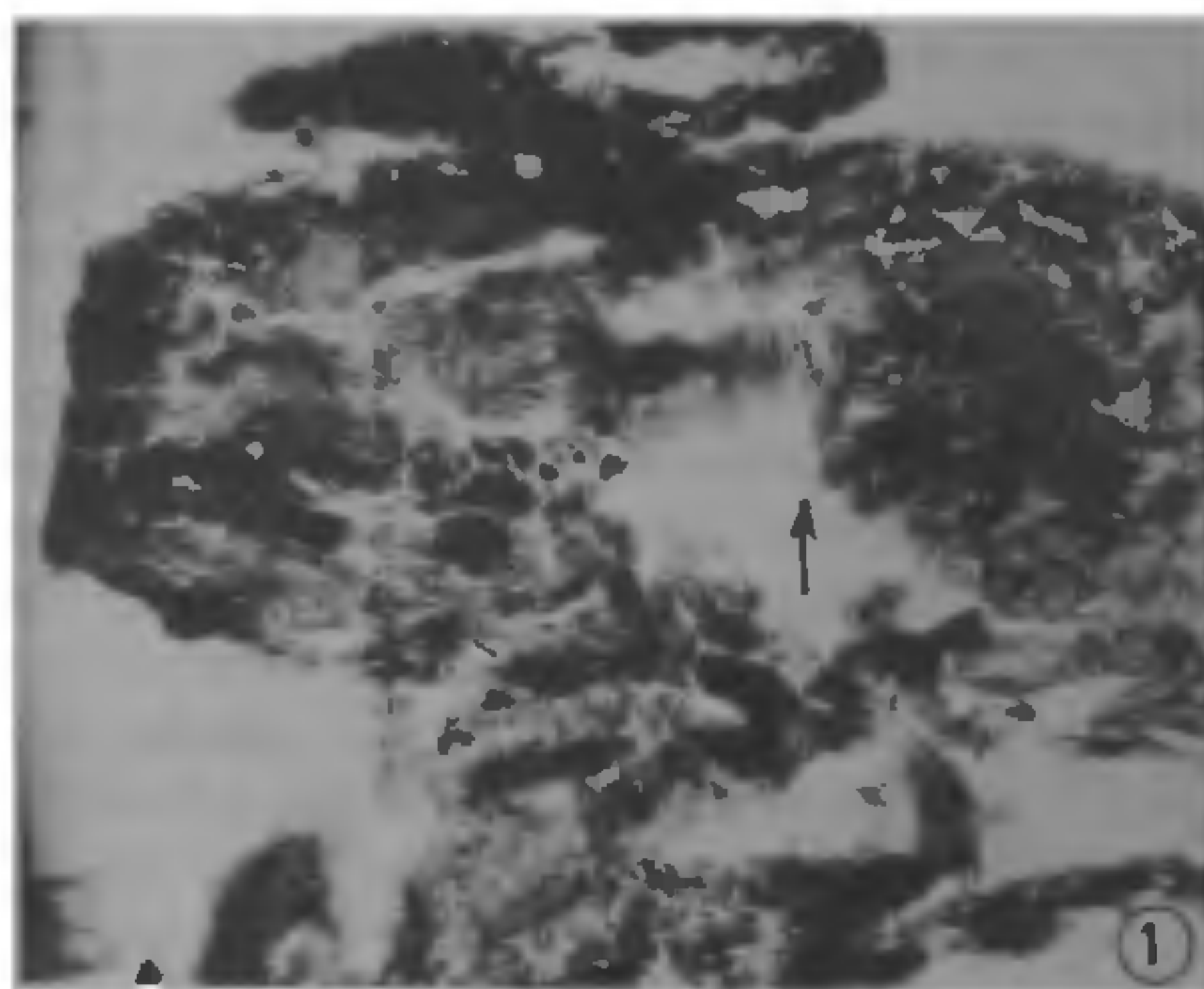


Figure 1. A part of TS of testes of 1 day old male potato tuber moth treated with 10% EMS showing degeneration of germinal tissue (×240).

The present results show that EMS acts as a sterilant and sterilizes both males and females of potato tuber moth.

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EFFECT OF JUVENILE HORMONE ANALOGUE METHOPRENE (ZR-515) ON THE PREPUPAL AND PUPAL STAGES OF THE POTATO TUBER MOTH, *PHTHORIMAEA OPERCULELLA* ZELLER (LEPIDOPTERA: GELECHIIDAE)

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POTATO tuber moth, *Phthorimaea operculella* Zeller, is a major pest of potatoes both in the field and in stores. It causes 30–70% losses in the country stores in India¹. Juvenile hormone analogues (JHA) have been reported to have high biological activity against insect pests, intermediate specificity, low mammalian toxicity and short environmental persistence². The effect of the JHA, Methoprene (ZR-515), on development of eggs and larvae of *Corcyra cephalonica* has already been demonstrated³. This paper attempts to study the effect of different concentrations of Methoprene (ZR-515) on the prepupal and pupal stages of *P. operculella* Zeller.

The test insects were from a pure culture maintained in the laboratory on potato tubers. Concentrations of 0.25, 0.50, 0.75, 1 and 1.50% of the JHA were prepared in 1% acetone solution; for control only 1% acetone was used. Each of these concentrations was applied (5 µl per insect) to the prepupae individually on the dorsal surface using an automatic microapplicator. The same concentrations were applied to the pupae topically (1 µl per individual) on the dorsal surface. In each experiment (prepupae, pupae) and for each concentration, ten individual insects were used. Each set of experiments was replicated four times. The data are presented in tables 1 and 2.

There was a significant reduction in percentage of pupation with increase in the concentration of Methoprene (ZR-515) applied. Devaraj Urs and Byakod⁴ reported that pupation percentage in *Spodoptera litura* decreased with increase in the concentration of JHA (Altozar).

In the present studies, adult emergence was 70% in control, 30% in pupae treated with 0.5 and 0.25% JHA and 20% in pupae treated with 0.75% JHA; there was no adult emergence at all in pupae treated with 1 and 1.5% JHA. The percentage of adult