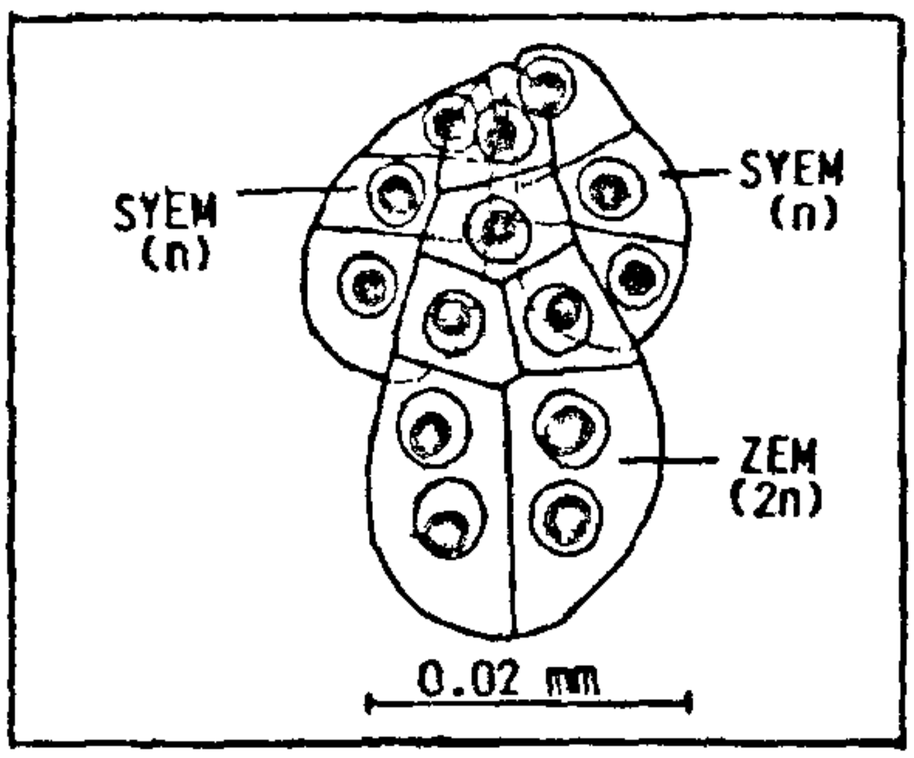


**Figure 1.** Polyembryony in *Melothria maderaspatana* (L.) Cogn.; note synergid embryos and zygotic embryo. (SYEM = Synergid embryo; *n* = haploid; 2*n* = diploid; ZEM = Zygotic embryo).

of embryos developing from both the synergids was noticed by the present author. The fertilized egg developed into a normal diploid embryo and endosperm development is also normal. The additional proembryos are seen in the embryo sac in the position normally occupied by the synergids and hence the additional embryos are presumed to be of synergid origin (figure 1). Since no additional pollen tubes are seen to enter the embryo sac, the synergid embryos are presumed to be haploid. The zygotic embryo alone reaches maturity while the additional proembryos get absorbed in the embryo sac during further development.

Polyembryony is uncommon in the Cucurbitaceae. In a recent study, Maheshwari Devi and Naidu[2] recorded a rare instance of twin embryos in *Melothria perpusilla* and they presumed that the second embryo might have originated from one of the synergids. Nucellar polyembryony has been previously recorded in *Momordica charantia*[3] and *Cucumis melo* var. *pubescens*[4].

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1. Lakshmanan, K. K. Ambegaokar, K. B., In: *Embryology of Angiosperm*, (ed.) B. M. Johri, Springer-Verlag, Berlin, Heidelberg, 1984, p. 445.
2. Maheshwari Devi, H. and Naidu, K. C., *J. Indian Bot. Soc.*, 1984, **63**, 306.
3. Agarwal, J. S. and Singh, S. P., *Curr. Sci.*, 1957, **22**, 630.
4. Singh, D., *J. Indian Bot. Soc.*, 1955, **34**, 72.

## EFFECT OF SCENT COMPONENTS ON SOMATIC CELLS OF *ALLIUM SATIVUM* L.

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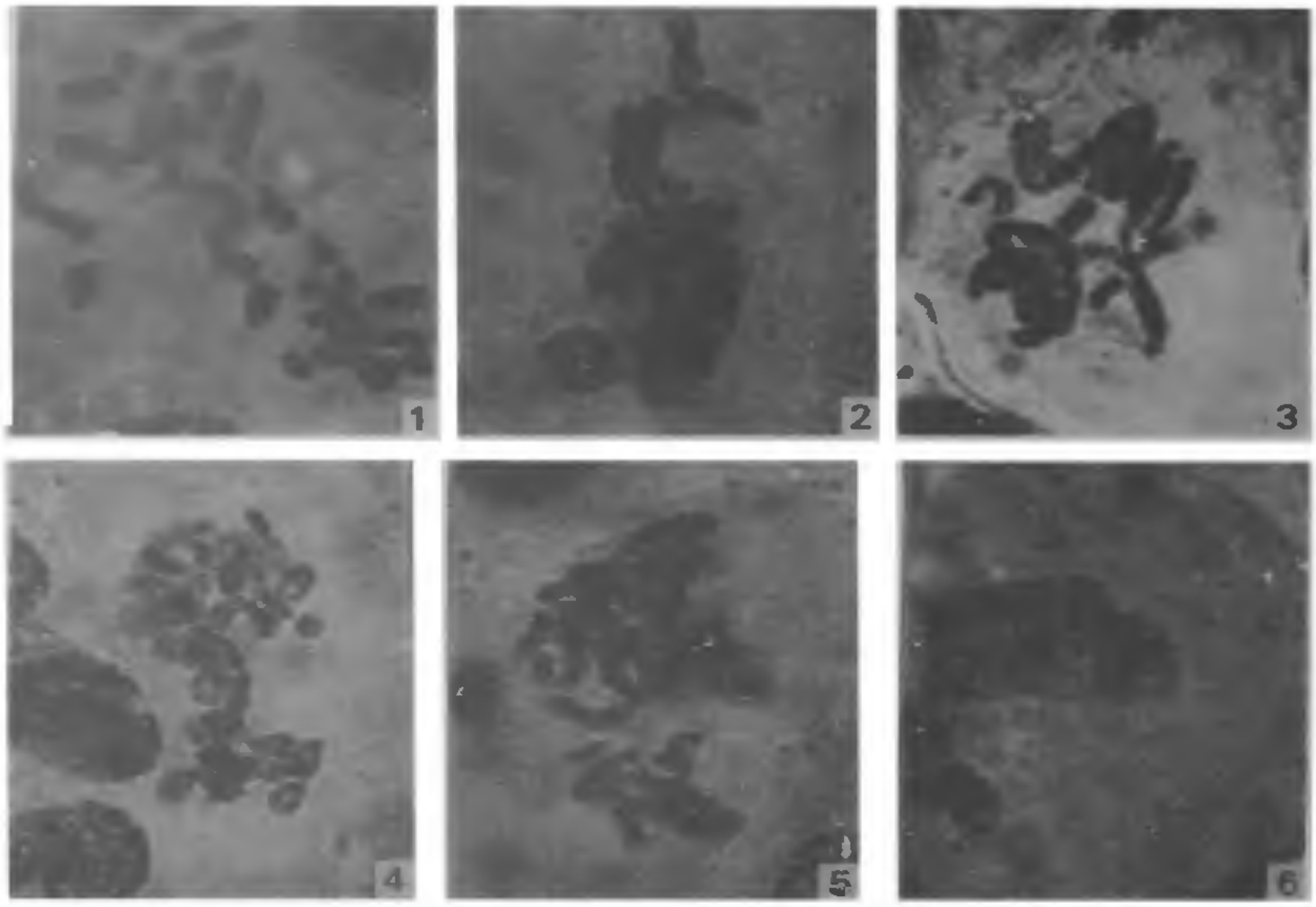
CERTAIN hemipteran insects are known to discharge a pungent volatile liquid from the abdominal and metathoracic scent glands and their secretion contains aldehydes, ketones, tridecanes etc[1,2]. Although, some of the aldehydes were reported to be antirespiratory[3], carcinostatic[4], antifungal[5], and antimitotic[6], there seems to be no adequate information of *n*-dodecane and *n*-pentadecane at the chromosomal level. In the present investigation an attempt has been made to study the effect of scent components (*n*-dodecane and *n*-pentadecane) on the course of mitosis and on the mitotic chromosomes of *Allium sativum L.*

Actively growing healthy root tips of *A. sativum* were treated with 0.01, 0.5, 1, and 2% concentrations of *n*-dodecane and *n*-pentadecane (ICN K&K Lab, New York) for 1,2 and 6 hr. The scent gland secretion for nymphal pentatomid bug, *Chrysocoris purpureus* was compared with the authentic samples on GLC[7]. The required concentrations were prepared in acetone as the compound did not dissolve in distilled water. Root tips treated with acetone were used as control. After treatment, root tips were fixed in 1:3 acetic alcohol for 24 hr and then squashed using acetoorcein. For determination of mitotic index (MI) and percentage aberrations, 1000 randomly selected dividing cells from 10 different root tips were analysed for each treatment.

The data presented in table 1 show that the mitotic indices at various concentrations were consistently low in all treatments of both the presently employed chemicals and the decline is greater at higher concentrations. Maximum reduction in MI was recorded at 2% concentration of *n*-pentadecane, treated for 6 hr (table 1). The fall in the mitotic indices soon after *n*-dodecane and *n*-pentadecane treatments indicate that a preceding $G_2$ stage affected many cells entering the mitosis and suggests the chronic effect on all or some of the preceding stages[8].

**Table 1** *Mitotic index (MI) and percentage aberrations in Allium sativum following n-dodecane and n-pentadecane (values in parentheses) treatments*

| Concentration percentage | Duration of treatment (hr) | Mitotic Index | | Mitodepression | | Types of abnormalities: Metaphase: Unoriented chromosomes | | Metaphase: Stickiness | | Anaphase: Bridges | | Anaphase: Stickiness | | Telophase: Bridges | | Telophase: Stickiness | | Diagonal spindles | | Disturbed cells | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Control | – | 12.4 | (12.4) | – | (–) | 0.05 | (0.05) | – | (–) | – | (–) | – | (–) | – | (–) | – | (–) | 0.04 | (0.04) | 0.05 | (0.05) |
| 0.01 | 1 | 12.3 | (12.2) | 0.8 | (1.61) | 0.2 | (0.2) | – | (–) | – | (–) | – | (–) | – | (–) | – | (–) | 0.2 | (0.2) | 0.2 | (0.2) |
| | 2 | 12.2 | (12.1) | 1.61 | (2.42) | 0.2 | (0.3) | – | (–) | – | (–) | – | (–) | – | (–) | – | (–) | 0.4 | (0.4) | 0.3 | (0.3) |
| | 6 | 11.5 | (12.0) | 7.26 | (3.23) | 0.3 | (0.5) | – | (0.4) | – | (–) | 0.2 | (0.2) | – | (–) | 0.2 | (–) | 0.5 | (0.5) | 0.5 | (0.5) |
| 0.5 | 1 | 12.2 | (12.2) | 1.61 | (1.61) | 0.2 | (0.3) | – | (0.3) | – | (0.2) | 0.1 | (0.2) | – | (0.2) | – | (–) | 0.3 | (0.4) | 0.2 | (0.3) |
| | 2 | 12.0 | (11.5) | 3.23 | (7.26) | 0.4 | (0.6) | 0.4 | (0.4) | 0.2 | (0.3) | 0.3 | (0.3) | – | (0.2) | 0.1 | (0.2) | 0.5 | (0.5) | 0.4 | (0.4) |
| | 6 | 11.2 | (11.2) | 1.61 | (9.68) | 0.5 | (0.7) | 0.5 | (0.5) | 0.3 | (0.3) | 0.3 | (0.4) | 0.1 | (0.3) | 0.3 | (0.4) | 0.6 | (0.5) | 0.5 | (0.5) |
| 1.0 | 1 | 12.2 | (12.0) | 1.61 | (3.23) | 0.3 | (0.3) | – | (0.4) | – | (0.3) | 0.2 | (0.2) | – | (0.4) | 0.2 | (0.3) | 0.3 | (0.4) | 0.4 | (0.4) |
| | 2 | 11.6 | (11.6) | 6.45 | (6.45) | 0.4 | (0.8) | 0.6 | (0.4) | 0.2 | (0.4) | 0.4 | (0.3) | – | (0.5) | 0.3 | (0.4) | 0.5 | (0.6) | 0.5 | (0.5) |
| | 6 | 11.4 | (11.2) | 8.06 | (9.68) | 0.6 | (1.0) | 0.8 | (0.6) | 0.5 | (0.5) | 0.5 | (0.4) | 0.1 | (0.6) | 0.3 | (0.5) | 0.7 | (0.8) | 0.8 | (0.5) |
| 2.0 | 1 | 12.0 | (10.8) | 3.23 | (12.90) | 0.5 | (0.8) | 0.3 | (0.6) | 0.1 | (0.5) | 0.3 | (0.4) | – | (0.4) | 0.3 | (0.4) | 0.5 | (0.6) | 0.5 | (0.5) |
| | 2 | 11.4 | ( 9.6) | 8.06 | (22.58) | 1.0 | (1.5) | 0.8 | (0.9) | 0.4 | (0.6) | 0.5 | (0.5) | 0.3 | (0.6) | 0.4 | (0.4) | 0.6 | (0.8) | 0.9 | (0.6) |
| | 6 | 10.8 | ( 8.7) | 12.90 | (29.84) | 2.8 | (3.9) | 1.2 | (1.6) | 0.6 | (0.9) | 0.7 | (0.8) | 0.4 | (0.7) | 0.6 | (0.6) | 0.8 | (1.2) | 1.2 | (0.8) |



**Figures 1–6.** Various cytological aberrations in *Allium sativum* L.(× 3000). **1.** Scattering of diplochromosomes with stickiness and condensation at 2% *n*-pentadecane treated for 6 hr; **2.** Sticky diplochromosomes with clumping at 2% *n*-dodecane treated for 6 hr; **3.** Multipolar groupings with sticky bridges at 1% *n*-dodecane treated for 6 hr; **4.** Sticky bridge at 1% *n*-pentadecane treated for 2 hr; **5.** Unequal grouping at early telophase at 2% *n*-dodecane treated for 6 hr; **6.** Micronuclei at 2% *n*-pentadecane treated for 6 hr.

The spectrum of cellular responses included scattering of chromosomes (figure 1) and the daughter chromatids held together only at the centromeric region and these are referred to as diplochromosomes (figure 2). This may possibly be due to the inactivation of the spindle apparatus and the consequent delay of the division of centromere[9]. The spectrum of anomalies also includes non-orientation, irregular grouping (figure 3) of chromosomes, bridges (figures 3, 4), unequal groupings (figure 5) and micronuclei (figure 6). Contraction, different stages of condensation, stickiness and clumping of chromosomes were commonly observed in both the chemical treatments. Diagonal spindles bi-, tri- and multi-nucleate cells were frequently observed at higher concentration (2%) for both the chemicals under study. Interestingly, little fragmentation was noticed in 2% concentration of *n*-pentadecane, treated for 6 hr only. It was found that higher concentrations of *n*-dodecane and *n*-pentadecane showed greater effect (table 1).

*n*-Dodecane and *n*-pentadecane (hydrocarbons) are present in the abdominal scent glands of larvae and act as contact poison for predators[7]. The inhibitory action of the presently investigated chemicals on mitosis included inhibition of cell division, spindle apparatus and cell wall development. This inhibitory effect may be due to the blockage of DNA synthesis[10]. Sinha and Godward[11] suggested that the less acute disturbances caused at the cellular level either to the gene-controlled biochemical, physiological process or chromosomal aberrations, may be responsible for mitotic delay. The spindle anomalies induced by these chemicals may be due to the disturbances of spindle apparatus.

Bridges seemed to have arisen due to stickiness and the micronuclei observed in the present study might be due to the unoriented acentric chromatid fragments[12]. Similar clastogenic effects in *A. sativum* after *n*-butyl butyrate have been recorded[6].

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1. Waterhouse, D. F. and Gilby, A. R., *J. Insect Physiol.*, 1964, **10**, 977.
2. Janaiah, C., Rao, P. S., Chari, N., Venkat Reddy, P. and Subba Rao, Y. V., *Indian J. Exp. Biol.*, 1979, **7**, 1233.
3. Canuto, R. A., Biocca, M. E., Muzio, G., Garcea, R. and Dianzani, M. U., *Cell Biochem. Funct.*, 1985, **3**, 3.
4. Schauenstein, E., Esterbauer, H. and Zoliner, H., In: *Aldehydes in biological systems. Their natural occurrence and biological activities*, (ed.) J. R. Lagnado, Pion Limited, London, 1977.
5. Surender, P., Janaiah, C., Krishna Reddy, V. and Reddy, S. M., *Indian J. Exp. Biol.*, 1987, **25**, 233.
6. Digamber Rao, B., Surender, P., Janaiah, C. and Vidyavati, *Curr. Sci.*, 1987, **56**, 98.
7. Leela Kumari, S. J., Ph.D. thesis, Kakatiya University, Warangal, 1986.
8. Sharma, C.B.S.R. and Sahu, R. V., *Mutation Res.*, 1977, **46**, 19.
9. Vijaya Bhaskar, K. and Bir Bahadur, *Indian J. Bot.*, 1983, **6**, 103.
10. Heiner, R. E., *Mutation Res.*, 1971, **12**, 249.
11. Sinha, S. N. and Godward, M. B. E., *Cytologia*, 1972, **37**, 685.
12. Mogili, T. and Vidyavati, *Plant Nature*, 1983, **1**, 196.

## OVIPOSITION-INDUCING AND MATING-INHIBITING FACTOR IN THE MALE ACCESSORY GLANDS OF *OPISINA ARENOSELLA* WALKER (LEPIDOPTERA: CRYPTOPHASIDAE)

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DURING our study involving courtship and mating in *Opisina arenosella*[1], the larva of which is a pest of coconut palm, it was noted that usually the females are monogamous (Chandran, unpublished observations). It was therefore thought that some principle in the male accessory gland might be involved in inhibition of mating in this insect, especially in the light of recent work on male accessory glands[2,3]. The present report shows that the male accessory gland of this animal does indeed contain a factor which not only inhibits mating when transferred to the female during copulation, but stimulates oviposition as well.

*O. arenosella* was maintained in the laboratory as already described[4]. Fifty accessory glands of 0-day-old adult males (day of emergence) already containing plenty of secretory material (unpublished observations) were dissected out. Their extract in ice-cold insect Ringer[5] made up to 1 ml was injected into the abdomen of a 0-day virgin females at the rate of 2 $\mu$l, 5 $\mu$l and 20 $\mu$l per individual, after ether anaesthesia, using a microcapillary attached to a polythene canula. Ringer-injected animals served as controls. The injected females were kept either along with males of the same age or without males. Normal uninjected females were also used for comparison. The animals were kept either individually or in pairs (of one male and female each) in bell jars; cotton swabs soaked in 10% sucrose solution kept hanging from the top of the bell jars served as the food source. The animals were kept under constant watch under a 15 W red incandescent lamp at night enabling observation of their mating and ovipositing without disturbance. After continuing the experiment for requisite number of nights the females were dissected out to locate spermatophore if any, to confirm mating. The eggs laid, if any, were counted.

Figure 1 shows the male reproductive tract and the terminal portion beyond the arrows was used for preparing the homogenate, though we do not

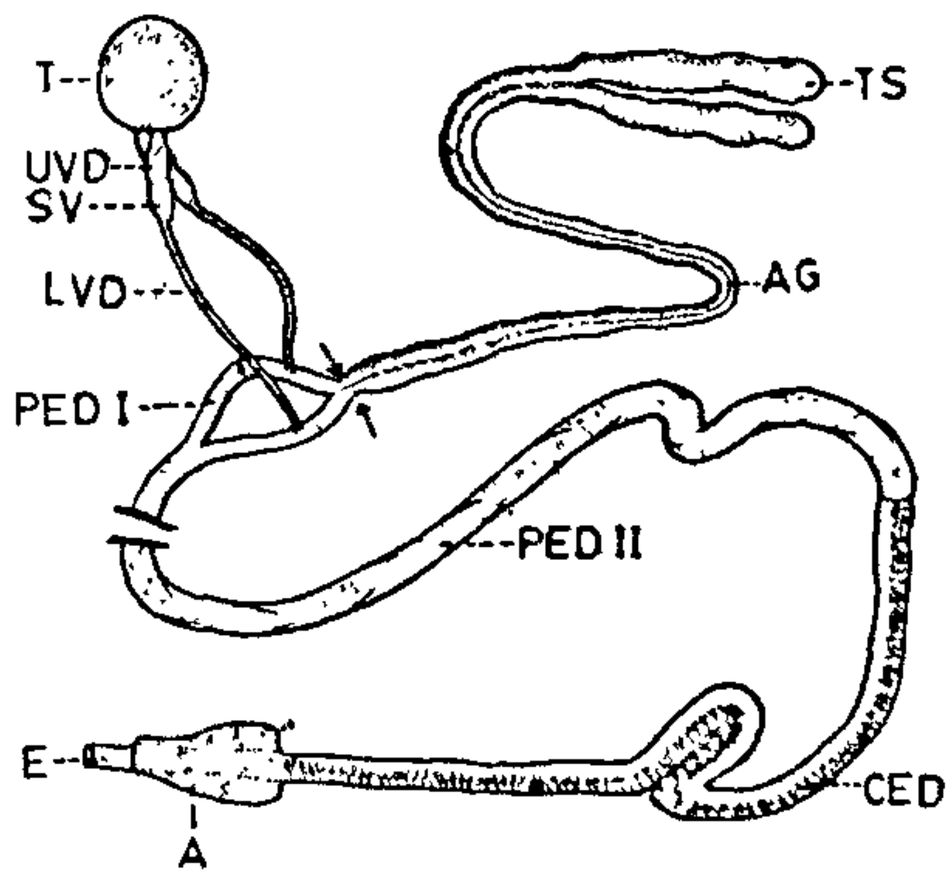


**Figure 1.** Adult male reproductive system of *Opisina arenosella*. The accessory gland was separated at the arrow for preparation of extract. A–Aedeagus, AG–Accessory gland, CED–Cuticular ejaculatory duct, E–Endophallus, LVD–Lower vas deferens, PED I–Primary ejaculatory duct (paired); PED II–Primary ejaculatory duct (unpaired); SV–Seminal vesicle; T–Testes; TS–Terminal sac; UVD–Upper vas deferens.