
SWARMING OF THE TINTINNIDS (PROTOZOA: CILIATEA) IN THE VELLAR ESTUARY

The plankton collections were made intensively during August, 1976. The occurrence of 7 species of tintinnids, one of which formed a swarm, was noticed. On one occasion (18th September, 1976) twelve species of tintinnids occurred simultaneously in the plankton collections from the Porto Novo backwater, but no swarming was noticed; and in the previous report also no swarming was mentioned.

On 7th August, 1976, Favella philippinensis amounted to 1,28,58,000 organisms/\text{m}^3 out of the total tintinnid population of 1,33,26,000 Org./\text{m}^3. The total number of organisms in the plankton was 1,63,42,000 Org./\text{m}^3 made up of a phytoplankton component of 8,88,000 cells/\text{m}^3. *F. philippinensis* constituted 96.5\% of the total tintinnid population and 78.7\% of the total plankton population. Surface water temperature and salinity values were 28-0° C and 30-60‰ at the time of swarming. *F. philippinensis* was common in the estuary. The other tintinnid species recorded along with *F. philippinensis* were *F. brevis*, *Coelicaella amplex*, *Tintinnopsis tubulosa*, *T. tocantinensis*, *T. uruguayensis*, *Eutintinnus tenus*, and *Metacyclus jorgensenii*.

The associated species found with the tintinnids were the phytoplankton *Thalassiothrix frauenfeldii*, *Biddulphia sinensis*, *Ditylum brightwellii*, *Chacoteros curvisetus*, *C. diversus*, *Rhirosolenia alata* *Coscinodiscus ioneianus* and *Acrocalanus* sp. and veligers. The coeval appearance of a large number of veligers with the tintinnids may be attributed to their food web links as the veligers were found to feed on the tintinnids.

It has been reported from the experimental studies that tintinnids showed higher rates of metabolism and reproduction\(^2\). A tintinnid concentration of 4,800 to 39,300 Org./\text{m}^3 has been reported from the Arabian Sea\(^3\). Swarming of tintinnids presently found could be due to abundant food supply, particularly diatoms, upon which they feed.

The minimum dimensions of the lorica of *F. philippinensis* presently observed were: total length 154 \(\mu\)m; horn length 14 \(\mu\)m; inner oral diameter 129 \(\mu\)m; the maximum dimensions presently observed were: total length 228 \(\mu\)m; horn length 45 \(\mu\)m; inner oral diameter 133 \(\mu\)m. On other occasions the loral dimensions observed were (around) total length 250 \(\mu\)m; horn length 40 \(\mu\)m; inner oral diameter 110 \(\mu\)m. It is quite likely that swarms of some more species of tintinnids may also occur.

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Centre of Advanced Study, K. Krishnamurthy, in Marine Biology, Parangipettai 608 502, Tamil Nadu, India, January 21, 1977.


ON A POSSIBLE MODE OF ACTION OF HEMPA ON OVARIAN TISSUE

*PERIPLANETA AMERICANA* L.

During the course of investigations on effects of various chemosterilants on neuroendocrine and reproductive system of *Periplaneta americana*, it was observed that hempa also damages the ovarian structure. The effect of hempa on corpora allata has already been reported by Bhargava and Mathur\(^1\). Tandon and Bhargava\(^2\) opined that apholate perhaps damages the oocytes via corpora allata. The present paper deals with the effect of hempa on ovarian structure of *Periplaneta americana*. An attempt has also been made to correlate the damages of corpora allata and ovarian tissue in support of the hypothesis of Tandon and Bhargava\(^2\).

The ovaries of the cockroaches whose corpora allata were used in the previous paper\(^1,2\) were fixed in Bouin's fluid and sections were cut at 8 \(\mu\). Sections were stained with hematoxylin and eosin. Sections of ovaries of treated cockroaches were compared with similar preparations from untreated ones (Fig. 1).

The effects become apparent only after 48 h when a few vacuoles appear in peripheral cytoplasm of the oocytes. The vacuoles increase in number and size with lapse of time. After 96 h treatment germinal vesicle contents become granular. The interfollicular tissue starts thinning out. Later, it breaks (Fig. 3) to make the cytoplasm of adjacent immature oocytes continuous (Fig. 2).

Hempa damages mature oocytes more than the immature ones. The inner and outer cell boundaries of follicular epithelium cells of mature oocytes become thick and wavy (Fig. 5) while the lateral boundaries become more or less indistinct. Later their cytoplasm is reduced, nuclei become prominent and
Figs. 1–10. Fig. 1. Section of normal ovary, 10 × 10. Fig. 2. 72 h treated ovary showing the process of continuity of cytoplasm within adjacent oocytes, 10 × 40. Fig. 3. 120 h treated ovary showing the breaking of interfollicular tissue, 10 × 40. Fig. 4. 144 h treated mature oocyte showing vacuoles in the cytoplasm and karyorrhexis in the nuclei of follicular epithelium, 10 × 40. Fig. 5. 264 h treated mature oocyte showing vacuoles in the cytoplasm, 10 × 10. Fig. 6. Normal corpus allatum, 10 × 40. Fig. 7. 48 h treated corpus allatum showing beginning of the formation of vacuoles and clumping of the chromatin 10 × 40. Fig. 8. 72 h treated corpus allatum showing presence of vacuoles and clumped chromatin material in the nucleus, 10 × 40. Fig. 9. 144 h treated corpus allatum showing increased number of vacuoles and reduced amount of cytoplasm, 10 × 40. Fig. 10. 240 h treated corpus allatum showing vacuolated appearance and degeneration of the tissue, 10 × 40.

(CC, clumped chromatin; CY, cytoplasm; FE, follicular epithelium; GV, germinal vesicle; IF, interfollicular tissue; N, nuclei; OS, External ovariolic sheath; V, vacuoles.)
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Dumbbell-shaped (Fig. 4). A few nuclei show karyorhexis. The external ovariole sheath breaks at many places. Granular fibrous degeneration could not be observed even after 23 days of treatment.

The experiment clearly shows that hemp’s action resembles that of apholate, metepa and thionepa as described by Tandon and Bhargava in producing vacuolar degeneration and breaking the interfollicular tissue after thinning. The effect, however, is very slow and does not affect all the oocytes and ovarioles. It differs from all the three chemicals, in not producing granular and fibrous degeneration, possibly due to its different chemical nature. The experiment shows that hemp damages the nuclei more than cytoplasm. It is also interesting to note that only mature oocytes are damaged to a larger extent. Therefore, the possibility of overcoming the effect of chemosterilant cannot be ruled out. LaBrecque et al. also mentioned the recovery of fertility after hemp treatment in female houseflies. Morgan also expressed his doubt that the affected cells may be able to overcome the effect.

According to Lüscher and Engelmann and Scharrer and von Harnack, a decrease in the amount of cytoplasm, presence of vacuoles and densely packed nuclei with clumped chromatin mass are indications of inactivity and degeneration of corpora allata. Exactly the same picture was obtained by Bhargava and Mathur after hemp treatment. These authors reported that corpora allata show early signs of degeneration near about 48 h after the treatment when vacuoles appear in the peripheral cytoplasm (Fig. 7) and nuclei tend to move towards the centre. Almost at the same time the oocytes also show early signs of degeneration. Prolonged treatment increases the number of vacuoles (Figs. 8, 9 and 10) and the nuclei undergo pycnosis in corpora allata. Simultaneously, the ovarian tissue shows increased degeneration. After 240 h the size of corpora allata is reduced (Fig. 10) and the mature oocytes show a complete picture of degeneration.

Allatactomy has similar effects in many insects. It causes oosorption in Schistocerca and stops vitellogenesis in insects of various orders. According to Girardie egg maturation in Periplaneta americana also is controlled by corpora allata. A conclusion may, therefore, be drawn from the above experiment that the damage of the ovarian structure in Periplaneta americana is because of the inactivity of corpora allata which in turn is induced by hemp.

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Sudhir Bhargava,
G. N. Tandon,
Rakesh Mathur.

*Dayanand College, Ajmer, India.


SOME EXPERIMENTAL EVIDENCE ON THE VIABILITY OF ASCARIS LUMBRICOIDES OVA

Introduction

The prevention of soil-transmitted helminthic infections is mainly a problem of night-soil disposal, which is a major health hazard in a country like India. Recently, sanitarians have evolved a special type of latrine, ‘leach-pit bore-hole latrine’, in order to produce acceptable manure by composting the night-soil. In view of the health hazard due to the presence of parasitic cysts and ova, people are reluctant to use the digested sludge as manure. It has been shown that even dried, and digested sludge from some sewage plants contains viable ova of Ascaris. Keller (1951), Gotaas (1956) and Malviya (1964) reported that, of all the parasitic cysts and ova encountered in sewage sludges, the ova of Ascaris were the most resistant to composting. Such resistance is mainly attributed to the egg shell which consists of five layers, namely, an outer proteinous epithelial membrane, three layers of chitinous material and an inner fibrillar lipoidal membrane. Hence, in the present investigation, Ascaris ova have been used as the yardstick to assess the survival of parasitic organisms present in the sewage sludges. Experiments were carried out to determine the viability of Ascaris ova inoculated to digested sludge samples free from parasitic cysts and ova, using laboratory models, simulating the field conditions as in the leach-pit bore-hole latrines.

Although much work has been done on the influence of various factors, on the development of Ascaris ova, yet the findings of various workers regarding the viability of Ascaris ova in sewage sludges are at variance. Hence, an attempt has been made to assess, experimentally, the survival of Ascaris ova in sewage sludges using laboratory models.