

Atypical Growth in *Periplaneta* Brain After Malathion Treatment

Prabhu N. Saxena and S. C. Saxena

Toxicology Laboratory, Department of Zoology, University of Rajasthan,
Jaipur 302004, India

Insecticide induced tumors have so far been reported in mouse and rat only (Tomatis et al 1973). There is only one report of Bhatnagar and Saxena (1978) on chemically induced brain tumor in insect. The present report is on unidentified atypical outgrowth in the brain of Periplaneta americana induced by malathion, an organophosphorus insecticide.

MATERIALS AND METHODS

Twentyfive newly emerged adult cockroaches (average weight of males 1.270 gm and females 1.294 gm) from inbred colony were taken for treatment. Malathion, O,O-dimethyl S-bis (carboethoxy) ethyl phosphorodithioate technical (chemical purity 98.7%, impurity 1.3%) was dissolved in benzene to desired concentrations. The newly emerged adult cockroaches of both the sexes were treated with malathion by topical application of 0.01 ml of 5% solution to 4th abdominal segment. Necropsy was done after 5, 10, 15 and 30 minutes and one hour of treatment in physiological saline and the brain was dissected out to be fixed in Bouin's fixative. The serial sections of the brain were cut at 6/ μ and were stained with haematoxylin and eosin and Mallory's triple connective tissue stain separately to record the pathological changes. Equal number of cockroaches of both the sexes were treated with .01 ml of benzene simultaneously and served as controls. The results include data of experiments carried out on both male and female cockroaches.

RESULTS AND DISCUSSION

An outgrowth is observed on the right protocerebral lobe in 17 out of 25 female and none of the male American cockroaches, after 1 hour of

treatment with malathion. The growth seems to be a consequence of the extragrowth of the fibrous part of the brain i.e. acute fibrosis at the site of growth formation (Fig. 1). Glial cells are observed migrating towards the base of the growth; some of them are seen in the outer extremity of the growth which is also found covered externally by the connective tissue sheath. Neural cells migrate towards the base of the growth (Fig. 1). The glial cells which migrate inside the growth show chromatolysis and pycnotic condition of nuclei (Fig. 2). A numerical increase in glial cells is also observed. A few glial cells appear compressed and elongated as against the normal rounded ones (Fig. 2). No such outgrowth was observed in any of the control insects (Figs. 3 & 4).

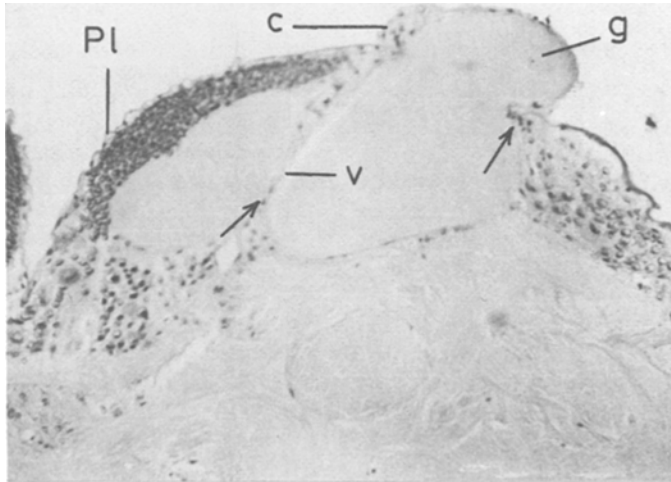


Fig.1 Photomicrograph showing outgrowth (g), connective tissue sheath around the growth (c), vacuolization in corpora pedunculata (V), protocerebral lobe (Pl) and arrow indicate movement of neuronal cells towards the base of growth. X 100.

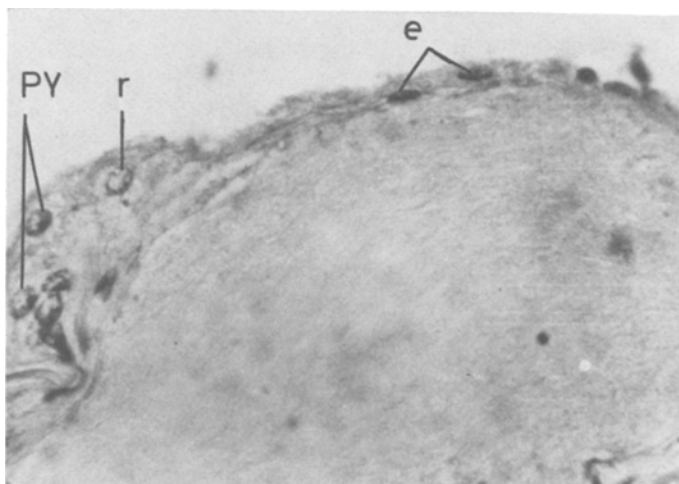


Fig.2 Photomicrograph showing rounded glial cells (r) and compressed glial cells (e) and pycnosis in glial nuclei (py) X 400.



Fig.3 Photomicrograph of the control brain (benzene treated) of male cockroaches X 100 showing no such growth.

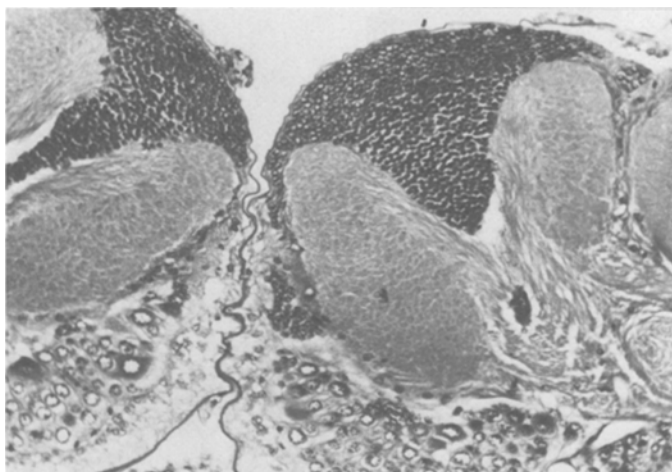


Fig.4 Photomicrograph of the control brain (benzene treated) of female cockroaches showing no such growth. X 100.

No growth has been observed upto 30 minutes of treatment (Fig.5).

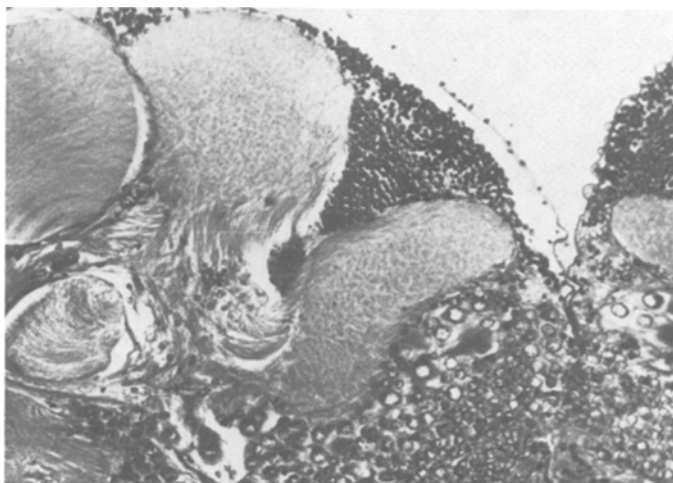


Fig.5 Photomicrograph after 30 minutes of treatment showing no such growth. X 100.

Due to altered stratification and change in the shape of glial cells on one hand and absence of cells inside the growth on the other, the so observed outgrowth from inner fibrous part of the right protocerebral lobe poses a dubious nature. Though some of the changes viz. altered stratification and change in cell shape favour the possibility of the tumor like outgrowth but at the same time absence of cells inside the growth assigns the nature to be of a cyst. Such types of growths have earlier been observed in cockroach brain after thiotepa treatment (Bhatnagar and Saxena 1978) but were of tumor like. Though enhanced DNA & RNA content have also been observed and are in accordance to Landa (1969) even then such a status (tumor like) in the present investigation needs some more biochemical explanations. Hence, the atypical nature of the growth has been sought.

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