TABLE I
*Segregation of leaf arrangement*

| Generation | Number of progenies | Number of plants: Paripinnate | Number of plants: Imparipinnate | $X^2$ 3 : 1 | P value |
|---|---|---|---|---|---|
| $F_3$ | 1 | 22 | 7 | 0·01 | 80–90 |
| $F_4$ | 8 | 180 | | | |
| | 14 | 187 | 49 | 2·22 | 10–20 |
| | 7 | | 80 | | |
| $F_5$ | 35 | 482 | | | |
| | 56 | 553 | 167 | 1·46 | 20–30 |
| | 26 | | 296 | | |

The variant after isolation in $F_3$ bred true in the succeeding generations. Plant growth, branching habit and flowering pattern were similar to SP and TG-16. Plant height was slightly reduced with thick stem and branches as in TG-17[6]. The leaves were dark green having waxy lamina. As shown in Fig. 1 the terminal leaflet was smaller in size compared to paripinnate leaflets. The first imparipinnate leaf developed at the 6th or 7th node on the stem. Subsequently, several imparipinnate leaves developed on the stem as well as on branches. On the stem, 25% of the leaves were imparipinnate, while such leaves were absent in the parents and SP. However, only 12% of leaves expressed the imparipinnate character in this variant unlike 45% of the leaves in the radiation-induced imparipinnate mutant[1]. In addition, 10% of the leaves had accessory leaflets at the basal pair. At seedling stage this resembled TG-16. During subsequent growth the new leaflets were elongated with apiculate tip. The curving of the leaflet margin towards dorsal side (Fig. 1D) in this variant resembled that in the lupinus mutant[7].

The pod setting, yielding and other economic factors in the variant were inferior to those of the parents indicating its importance only as a genetic marker.

The parents used in the cross had normal leaflets and hence the occurrence of the variant in $F_3$ generation could not be due to recombination. It is, therefore, presumed to be a result of spontaneous mutation.

*March 2, 1981.*

1. Patil, S. H., *Indian J. Genet.*, 1966, **A26**, 334.
2. —, *Ibid.*, 1969, **29**, 387.
3. Ashri, A., *Oleagineux*, 1970, **25**, 153.
4. Patil, S. H. and Chandra Mouli, Symp. Proc. "Induced Mutations for Crop Improvement in Africa," *TAEA* : *TECDOC.*, 1979, **22**, 93.
5. Chandra Mouli and Patil, S. H., *Symp. Proc. The Role of Induced Mutations in Crop Improvement, DAE,* Govt. of India, 1979, p. 248.
6. Patil, S. H. and Chandra Mouli, *Indian J. Agric. Sci.*, 1978, **48**, 351.
7. Gregory, W. G., *Radiation Botany*, 1968, **8**, 81.

## ADAPTIVE SIGNIFICANCE OF SEED POLYMORPHISM IN *LAGERSTROEMIA PARVIFLORA* ROXB.

R. P. SHUKLA AND P. S. RAMAKRISHNAN
Department of Botany, School of Life Sciences, North-Eastern Hill University, Shillong 793 014 India

THE phenomenon of genetic polymorphism in various organisms has been defined and discussed at length by earlier workers[1,2]. Somatic polymorphism in seeds of higher plants, is the production by individual plants of two or more sizes or shapes of seeds. Recently, herbaceous weeds[5] in particular have received attention. An association of seed polymorphism with differences in germination behaviour and its ecological significance have also received some attention[4-6]. Germination polymorphism in *Rumex crispus* and *Rumex obtusifolius* in relation to seed position on the plant[3] and that in *Chenopodium album* wherein seeds of different colour and size categories, having different germination requirements[4], are all related to the ability of the species to germinate and establish under diverse micro-environmental situations.

The present study deals with the germination behaviour of three different seed types in *L. parviflora* and a discussion on the adaptive significance of this phenomenon. The collection of mature fruits was made in March 1978 from a single tree from two different forest types at Tura, Meghalaya and Korba, Madhya Pradesh to ascertain the ubiquity of the phenomenon in this species. Replicates of fruits (10) were collected from each tree, each replicate having 5 fruits randomly sampled. The seeds extracted from the fruits, were segregated into three different types (Fig. 1) on the basis of size, weight and wing characteristics of seeds : (i) Large and heavy seeds with solid wing (type A), (ii) small and heavy seeds with solid wing (type B) and (iii) Large and light seeds with scaly wing (type C). The seed characteristics of the three types as mentioned above along with the frequency of occurrence of these within the seed population are shown in Table I. It may also be noted from this table that type C is most frequent in the seed

TABLE I

*Seed characteristics and occurrence pattern of polymorphic seeds in* Lagerstoemia parviflora *Roxb. from Tura and Korba.*

| Parameters | Tura population | | | Korba population | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| Max. length (cm) | 1·56±0·212 | 1·20±0·165 | 1·51 ±0·204 | 1·61±0·206 | 1·225±0·168 | 1·53 ±0·187 |
| Max. breadth (cm) | 0·56±0·602 | 0·59±0·042 | 0·55 ±0·057 | 0·59±0·072 | 0·53 ±0·462 | 0·54 ±0·048 |
| Max. thickness (cm) | 0·41±0 0112 | 0·49±0·0103 | 0·38 ±0·0092 | 0·43±0·0124 | 0·47 ±0·0094 | 0·40 ±0·0036 |
| Wing thickness (cm) | 0·22±0·0085 | 0·15±0·0067 | 0·051±0·0023 | 0·23±0·012 | 0·175±0·0071 | 0·065±0·0033 |
| Seed weight (mg/seed) | 23·20±2·36 | 17·75±1·540 | 12·80 ±0·076 | 25·48±2·410 | 20·52 ±2·032 | 15·2 ±0·085 |
| Frequency of occurrence (%) | 43±5·20 | 10±3·68 | 47±3·10 | 43·4 ±6·48 | 12±4·15 | 44·6 ±3·76 |

population, closely followed by type A ; the type B seeds are least frequent.

No dormancy or photosensitivity was noted in any of the three seed types. The seeds collected in March 1978, were stored at two temperature regimes ; 0° ± 2° C and 25° ± 2° C in polyethylene bottles in April 1978, in order to test the response of various types to storage temperatures. Germinability and viability tests were done at 30° C in the dark every alternate month. The two populations were nearly similar in behaviour for a given seed type except for the somewhat lower viability and germination percentage of all the seed types of Korba population. Type C seeds exhibited initially a maximum viability of 89 and 63% for Tura and Korba populations respectively, in the month of May. Germination and viability of seeds declined with storage. The type B seeds started in May with a low viability of 3-4% in both the populations from Korba and Tura. Germination percentage was also very low (2 to 3%) in May. Both the viability and germination percentage further declined with storage more sharply than that of type C seeds. Type A seeds also were closely similar to type B except that viability and germinability of the seeds were even lower. Type C seeds had a viability of 80% and 53% and germination of 76% and 50% (respectively for Tura and Korba populations) after 15 months of storage at 0° ± 2° C. For all seed types, storage at two different temperatures did not significantly alter germination and viability between May–September when tests were done. Storage effects on germination and viability became noticeable only in subsequent months for type C ; in general types A and B seeds lost their viability completely beyond September except for type B of Tura population where differences due to storage were observable up to the following November or January (Fig. 2).

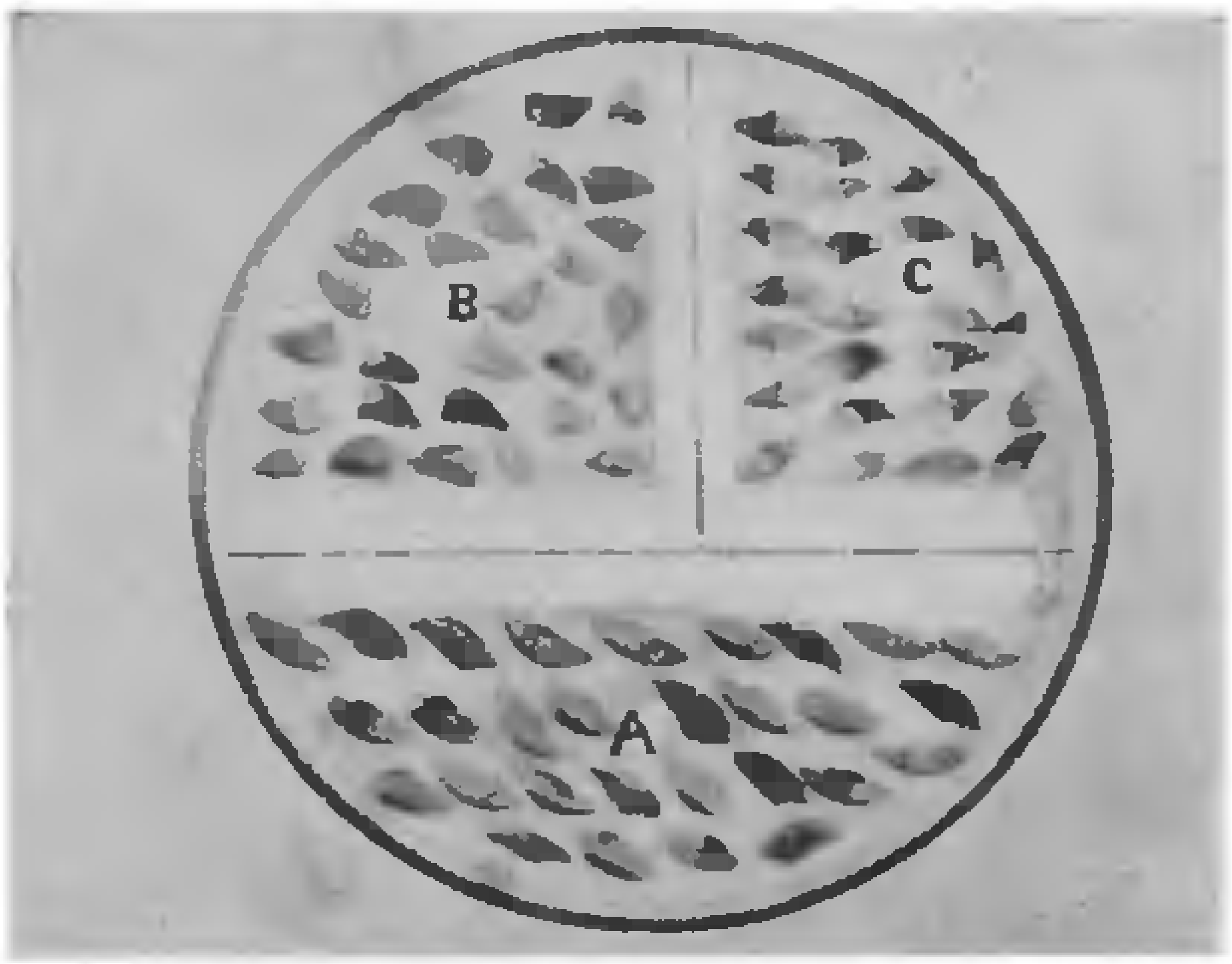



FIG. 1. Polymorphic seeds in *Lagerstroemia parviflora* Roxb. based on size weight and wing characteristics.

Germination of the seeds is an important phase *in the ecological life-history of any species in that it* determines the potential of the species to spread, given favourable conditions for establishment. Germination polymorphism is of particular significance in

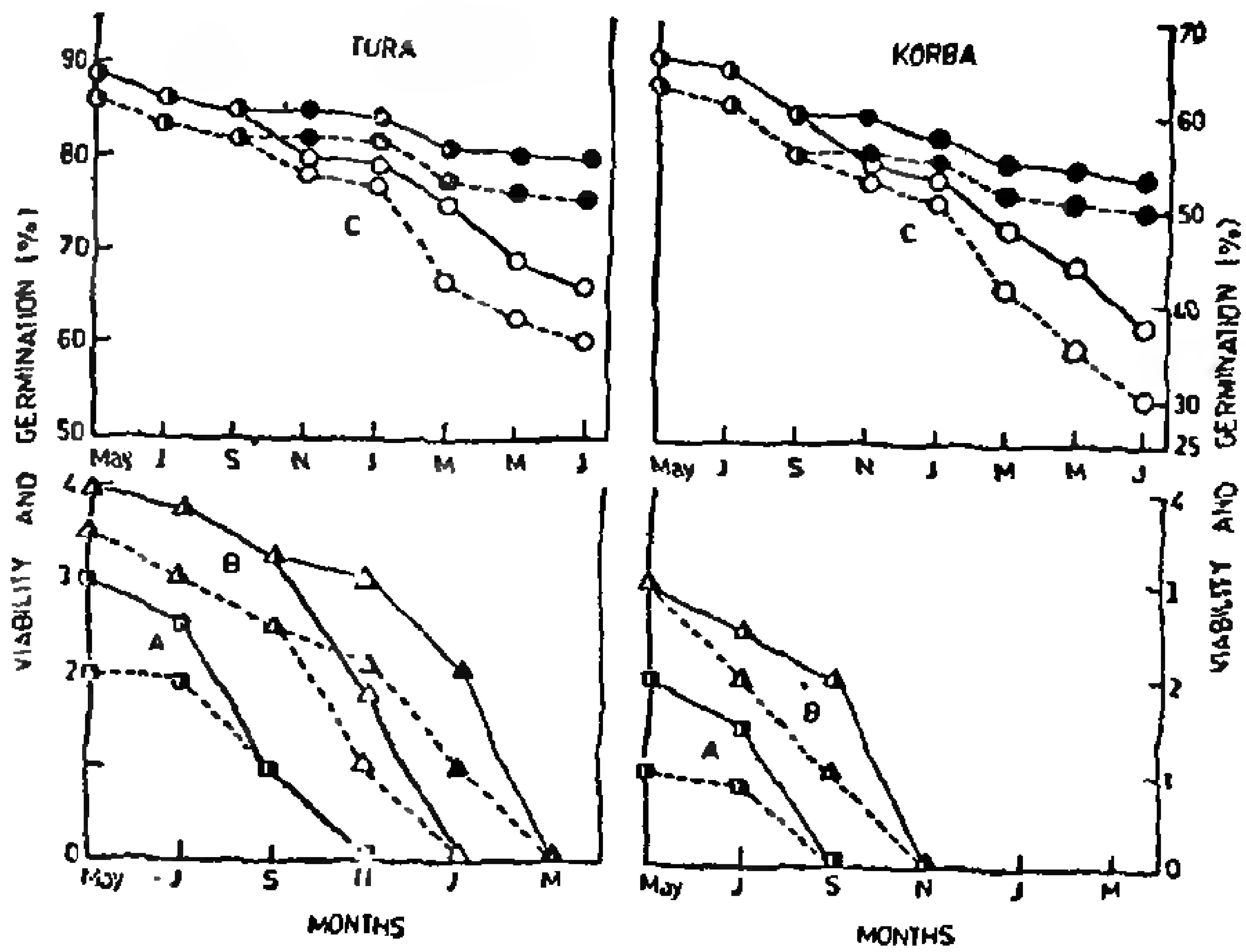



FIG. 2. Viability and germination pattern of seed types of two populations (Tura and Korba) of *Lagerstroemia parviflora* Roxb. stored under a low temperature of 0 ± 2° C (closed symbols) and a high temperature of 25 ± 2° C (open symbols), ——, viability; - - -, germination. Half closed and half open symbols show no response to storage temperatures.

determining this potentiality of the species for colonization as it implies the existence of different seed types within the same individual with diverse requirements for germination so that the species is able to colonize a wide range of environmental situations. The special ecological significance of size and shape of seeds has been well reviewed by Harper *et al.*[5] It is obvious from the account presented above that the type C seeds which are large and light, are superior as far as germinability is concerned. Due to their seed structure, they also ensure wide dispersal from the parent tree and prolonged storage in the soil due to their longer viability, so that the species may tide over unfavourable conditions. Types A and B seeds, though with poor germinability, ensure seed fall in the close vicinity of the parent tree on account of their heavier seeds. Because of short viability of these two types of seeds, germination and establishment have to be immediate, if favourable conditions exist. Thus the different seed types may be advantageous or disadvantageous to the species through space and time depending upon the micro-environmental conditions prevailing at the site where the seed fall may occur.

This work was financed by the Department of Science and Technology, Government of India.

*June 7, 1980.*

1. Ford, E. B., *Biol. Rev.*, 1945 *a*, **20**, 73.
2. Fisher, R. A., *Ecology*, 1958, **46**, 289.
3. Cavers, P. V. and Harper, J. L., *J. Ecol.*, 1966, **54**, 367.
4. Williams, J. T. and Harper, J. L., *Weed Res.*, 1965, **5**, 141.
5. Harper, J. L., Lovell, P. H. and Moore, K. G., *Annu. Rev. Ecol. Syst.*, 1970, **1**, 327.
6. Maurya, A. N. and Ambasht, R. S., *J. Ecol.*, 1973, **61**, 213.

## NEUROSECRETORY SYSTEM OF THE BRAIN OF THE COTTON BUG *SERINETHA AUGUR* [FABR] [HETEROPTERA: COREIDAE]

M. M. Samal and N. Ramalingam
Department of Zoology, Annamalai University
Annamalainagar 608 002, India

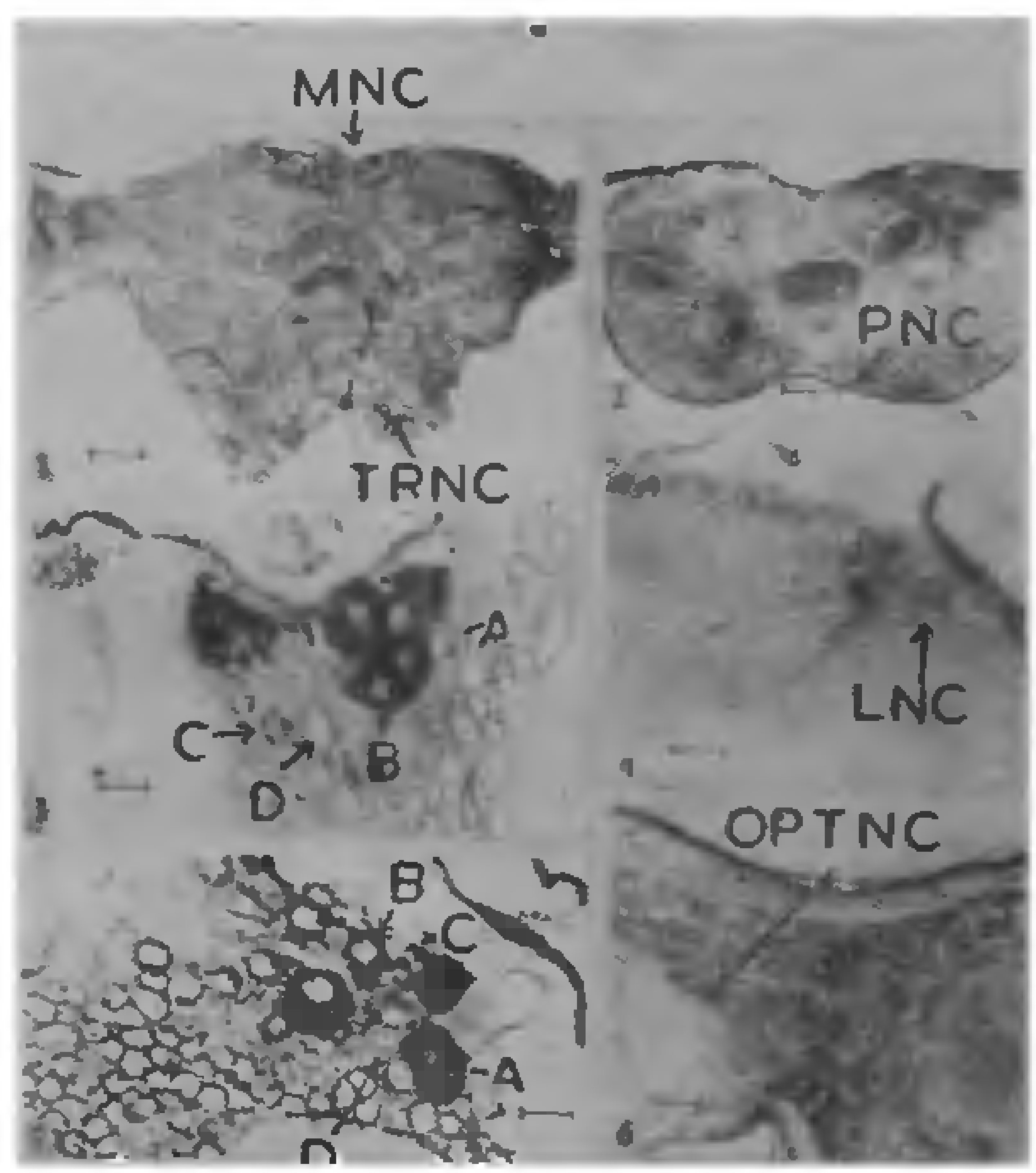
Studies on neurosecretory system of Gymnocerate heteropterans indicate the existence of great variability in the types of neuro-secretory cells (NSC) present in the brain of these insects[1]. This variation in the types of NSC of the brain has not been studied in detail at family level to understand its significance in systematics. The present paper gives a brief histomorphological account of the neurosecretory system of the adult female Coreid bug, *S. augur*.

The brains were dissected out under insect ringer solution and were fixed in Bouin's fluid. Paraffin sections were cut at $6\,\mu$–$8\,\mu$ thickness and were stained in Aldehyde fuchsin (AF)[2] and chrome alum haematoxylin phloxin (CHP)[3] to demonstrate the neurosecretory cell types.

Five distinct groups of neurosecretory cells are recognised in each lobe of the brain (Figs. 1, 2, 4 and 6). These neurosecretory cells of different groups are further classified into A, B, C and D types on the basis of their tinctorial affinities with AF and CHP stainings.

The median group of the pars intercerebralis consisting of 7–8 cells is characterised by the presence of four distinct cell types, namely, A, B, C and D (Figs. 3 and 5). A-cells stain dark purple with AF and blue black with CHP.

The cytoplasm of these cells contains large amounts of neurosecretion as evidenced by its strong reaction




Figs. 1–6. Fig. 1. Entire brain showing the distribution of neurosecretory cells in protocerebrum (MNC) and tritocerebrum (TRNC), CHP. Fig. 2. Entire brain showing the B-cells of the posterior group (PNC), AF; Fig. 3. A portion of the brain showing the A, B, C and D types of neurosecretory cells of the median group, AF. Fig. 4. A portion of the brain showing B-cells of the lateral group (LNC), AF. Fig. 5. A portion of the brain showing the A, B, C and D types of neurosecretory cells, CHP; Fig. 6. A portion of the brain showing the B-cells of the optic group (OPTNC), Bouin's, $6\,\mu$, AF; Figs. 1 and 2, Scale: $80\,\mu$. Figs. 3–6. Scale: $20\,\mu$.