VERTICAL DISTRIBUTION OF FUNGI IN TWO DIFFERENT SOILS OF DELHI

Occurrence and distribution of microfungi in different types of soils, both qualitatively and quantitatively, have been investigated by various workers[1–5], but the microfungal distribution at various depths of soils has been less extensively studied[6]. The present investigation deals with the vertical distribution of certain dominant groups of fungi in two different soils of Delhi.

Soil samples of two different sites, one from cultivated field (Soil-A) and the other from virgin field (Soil-B) were collected at monthly intervals from four different depths, 1", 6", 12" and 18", and were processed for microbial analysis using soil-dilution and soil-plate techniques. Soil dilutions of 1/100 1/1,000 and 1/10,000 were made and five replicates of each dilution were prepared taking one ml of the aliquot in each Petri dish containing sterilised agar medium. Czapek's Dox Yeast Extract Agar medium supplemented with rose bengal and streptopenicillin was used throughout the period of investigation. Population of fungi per gram dry soil = Mean number of fungal propagules × dilution factor/Weight of dry soil

In total 108 species were isolated of which the Phycomycetes represented 8 genera and 13 species, the Ascomycetes by 6 genera and 8 species, the Deuteromycetes by 35 genera and 87 species and the Basidiomycetes by a single species. Total number of fungal isolates and fungal species at different depths of both the soils have been presented in Table I. The highly dominant

TABLE I

Total number of fungal species and fungal population at different depths

	Soil–A		Soil–B	
Depth in inches	No. of species	Total population in thousands (Average of 12 months)	No. of species	Total population in thousands (Average of 12 months)
1	106	101·0	85	92·5
6	70	62·1	61	58·3
12	32	27·2	27	22·0
18	21	15·0	18	12·3

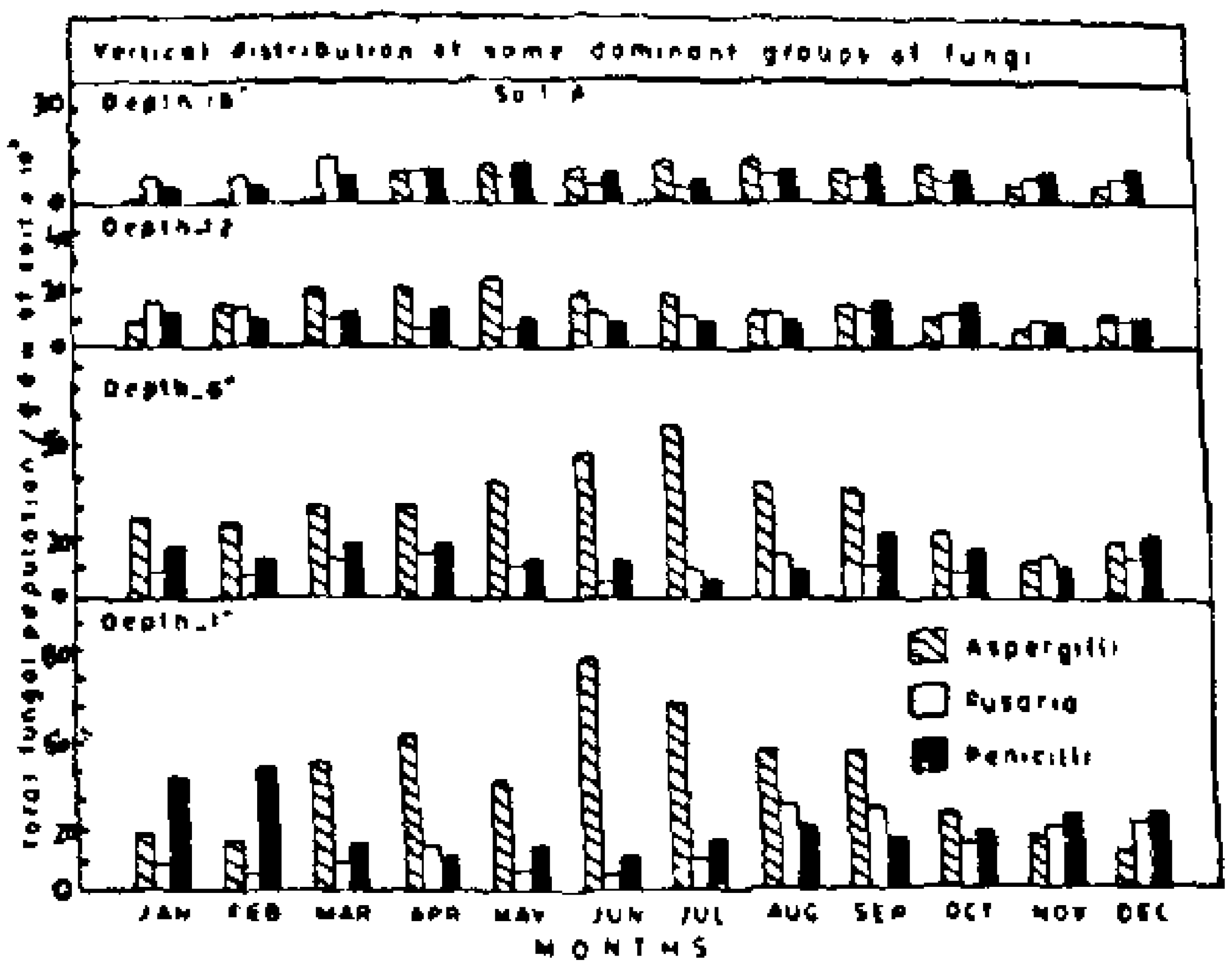

FIG. 1

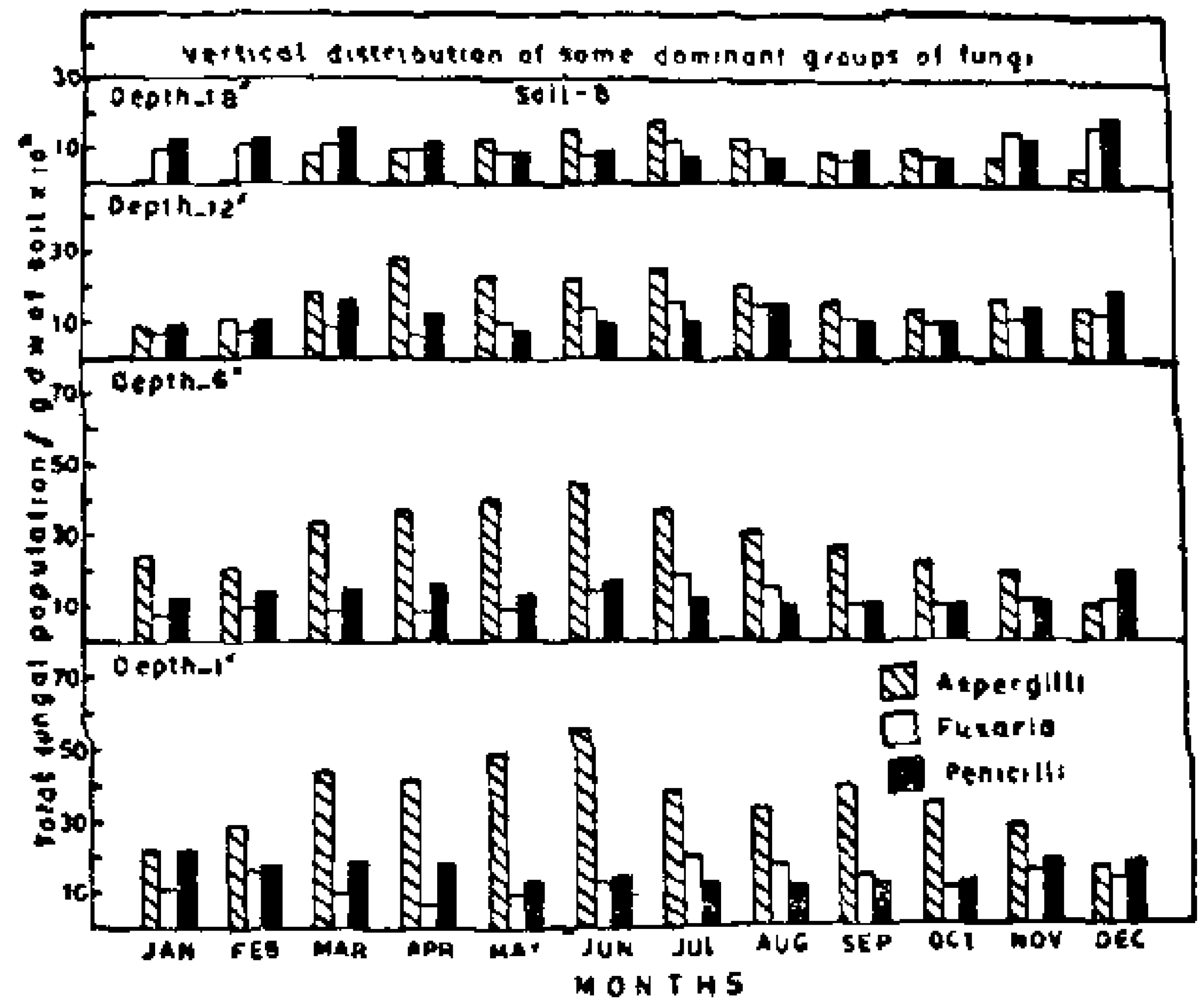

FIG. 2

FIGS. 1–2. Total population of three dominant groups of fungi at different depths.

groups of fungi were Aspergilli, Penicilli, and Fusaria, and their distribution pattern has been shown in Figs. 1 and 2. The results obtained in the present study clearly indicated that there was a marked decrease in the total number of fungal colonies and in total number of species with increasing depth. Eicker[6] studying the vertical distribution of fungi in Zululand soils reported that the moisture contents and the organic matter also had a tendency to decrease with increasing depth. Brown[7] expressed that there is a general tendency for the total population to be poorer in the deeper layers of the soil even if other factors remained the same. In the present study there was an appreciable variation in total organic matter and total nitrogen contents at various depths. These factors in coordination with other factors, *viz.*, temperature, moisture content, pH, carbon dioxide and oxygen concentration, size of soil, pore space, viability of fungal mycelium and spores and the interaction between soil fauna and soil flora might be influencing the distribution of fungi at various depths of soil.

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Department of Botany, Delhi University, Delhi 110 007, India, *June* 8, 1979.

N. BEHERA.
K. G. MUKERJI.

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AGE-RELATED LIPID STUDIES IN BRUCHIDS

THE lipids comprise 38·2% and 45·7% in females and males of *Zabrotes subfasciatus*; 32·3% and 36·9% in females and males of *Callosobruchus maculatus* respectively. Although there is a decrease in the lipid content with advancing age of bruchids, but no qualitative changes were observed. Relative high lipid content may be regarded as an adaptation to their non-feeding habit after emergence.

During the process of embryogenesis, post-embryonic development, metamorphosis and aging, lipids serve as an important source of energy[1,2], as the energy liberated by lipid molecules is more than that liberated by other macromolecules such as carbohydrates and proteins. Stored lipids are convenient reservoirs of metabolic energy. Analysis of lipids will suggest their role in aging bruchids.

Zabrotes subfasciatus Boh. and *Callosobruchus maculatus* Fabr. (Coleoptera: Bruchidae) were cultured[3] at 30° ± 1° C. For the present studies only fertile forms of *C. maculatus* were used. Triplicate samples of 100 bruchids, males and females separately, were taken at 24 hr intervals throughout the adult life, *i.e.*, from one day after emergence till sixth day. Lipids were extracted with petroleum ether (60°–80° C) in a Soxhlet for 24 hr. For qualitative lipid analysis and to study age-related changes in lipid classes, thin layer chromatography (TLC) was used. Plates (0·5 mm thick) were made of silica gel G. Solvent system used for TLC of neutral lipids comprised of petroleum ether (60°–80° C), solvent ether and acetic acid (90 : 10 : 1); for phospho- and brain-lipids, it comprised of chloroform, methanol and ammonia (75 : 25 : 4)[4]. The spots were developed with iodine, and were characterized using standards, which were run along with the samples.

Fast[5] recorded less than 10% lipids in three quarters of insects studied, but in *Z. subfasciatus* the lipids comprise 38·2% in females and 45·7% in males; and in *C. maculatus* 32·3% in females and 36·9% in males (Fig. 1) on the first day after emergence. Relatively high lipid content of bruchids may be regarded as an adaptation to their non-feeding habit after emergence. The non-feeding adults of *Lymantria dispar* contain even 55% lipids[6].

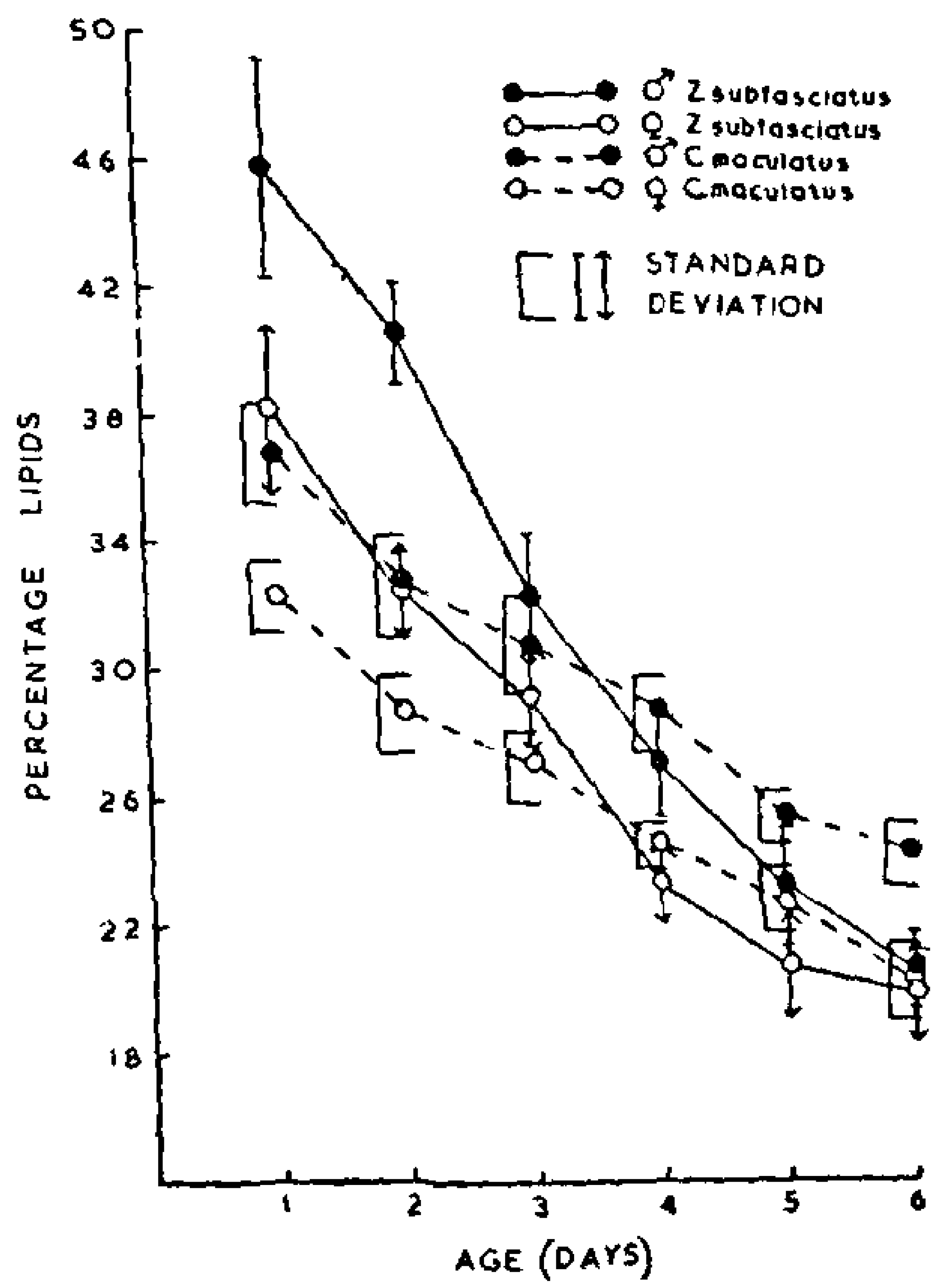

FIG. 1. Age-related changes in percentage lipid content of bruchids.

There is decrease in lipid content of bruchids with age. Similar observations have been made for *Lymantria dispar*[6] and *Sarcophaga tibialis*[7]. Males of the bruchids utilize more lipids than females. Higher energy needs for males than for females have been observed in *Aedes aegypti*[8]. Such a possibility may be envisaged in the present case also.

Neutral lipids of these bruchids comprise monoglyceride, 1,2-, 1,3-diglycerides, triglycerides, fatty acids, cholesterol and cholesterol esters. Among the phospholipids, lecithin and phosphatidyl ethanolamine are present. In addition, cerebrosides were also detected. There is no qualitative difference between the lipids of either the two types of bruchids or between the male and female of each species.

Besides serving as fuel for the aging organism, lipids play a role in the aging process by yielding free-radicals on oxidation[9]. These free radicles bring about the crosslinkage of macromolecules, making them non-