treatments was performed and was found to be significant at $P<0.01$ level. Comparison of mean 4c DNA values employing Duncan's Multiple Range Test revealed six distinct groups among diploids with some overlapping (table 1). Linear regression analysis of total chromosome lengths to the DNA amounts of the 10 genotypes showed a positive relationship ($r=0.973$, $P<0.01$; figure 1). A similar relationship between nuclear DNA amount and total chromosome length has also been reported in several other plant species[9-19].

The intraspecific nuclear DNA variation observed in the present study might have been brought about either due to tandem and/or structural alterations caused by duplications or deletions in different genotypes[9-11] or due to adaption to different climatic and other ecological situations[2,20].

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A FOSSIL MARINE BROWN ALGA FROM THE GANGAPUR FORMATION, PRANHITA–GODAVARI GRABEN

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A fossil marine alga *Padina* sp. has been described for the first time from the clay shales of Gangapur Formation. This alga is characterized by its fan-shaped thallus coupled with conspicuous zonation pattern. The recovery of this marine alga is significant and further concerted efforts are needed to trace such forms from the Early Cretaceous sediments of the Pranhita–Godavari Graben. A comparison with the living taxon is also attempted. Phaeophycophyta; Dictyotales; *Padina* Adanson; *Padina* sp.; (figures 1 and 2). Thallus 6 cm. in height, fan-shaped; frond thick, dark brown or slightly yellow, broadly fan-shaped, flat, 0.5–1.5 cm broad, dark and light bands distinct, concentric zones on fans several; hairs inconspicuous; surface smooth, uneven; sporangia not preserved; margin curved.

In general morphological appearance of fossil *Padina* sp. closely resembles[1] *Padina tetrastromatica* in the characteristic fan-shaped blades and conspicuous zonation of dark and light bands.

The present fossil impression was recovered from a clay quarry near the village Kondapalle (19°19': 79°24'), Adilabad District, Andhra Pradesh. *Padina* is the only marine benthic brown alga which is strictly calcified. $CaCO_3$ is precipitated over the surface of the frond blades. It usually occurs in tropical and subtropical seas throughout the world. The recovery of this doubtful marine alga is significant and an extensive search for such marine forms is essential to understand possible marine influence in the Pranhita–Godavari Graben during Early Cretaceous times[2].

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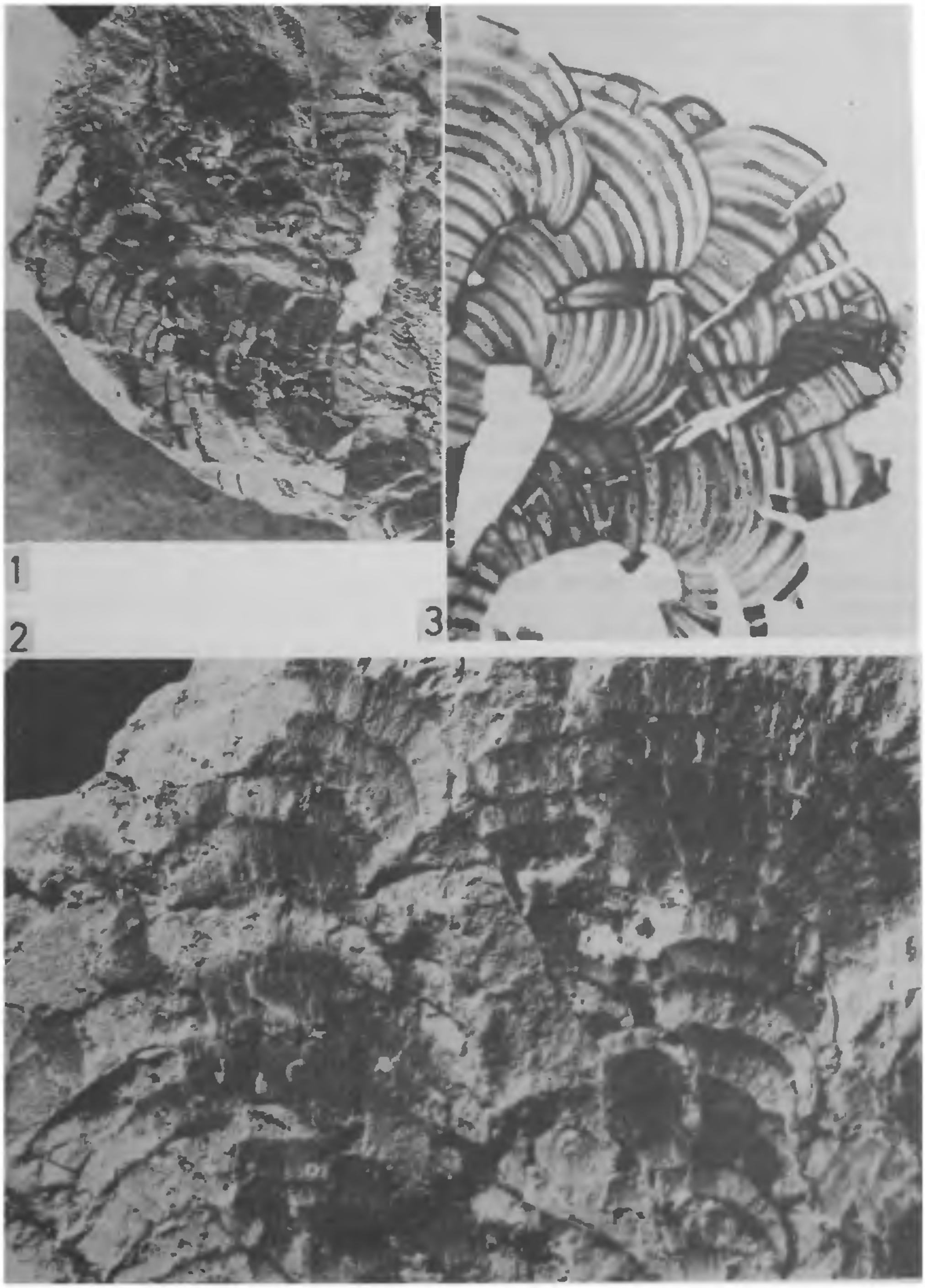

Figures 1–3. **1.** *Padina* sp. BSIP Specimen No. 36277 (× 1); **2.** Same, a portion enlarged showing bands of concentric zones (× 3), and **3.** *Padina tetrastromatica* Hauck, a part showing frond blades (× 1) (after Srinivasan 1969).

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POLLEN GRAINS: A POSSIBLE SOURCE OF FUNGAL INFESTATION IN SEEDS OF *CEDRUS DEODARA* LOUDON

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CEDRUS DEODARA is an important tree species which is well-known for its valuable timber. Its multiplication chiefly depends upon its seed setting. Despite heavy pollination, the seed setting is low and a good percentage of seeds is sterile. Besides other environmental and physical factors, the mycoflora may also be responsible for this seed sterility. Holmes and Burzewicz[1] observed many fungi during routine testing of conifer seeds, the most frequent being *Penicillium* spp.

One of the most important sources of fungal infestation in seeds while they are in the course of development on the tree may be pollen grain which is unfortunately almost overlooked. Since pollen can easily be contaminated due to their high starch content, when mature either at male cone or during pollination which is of anemophilous type, they subsequently carry their contamination to the ovules and ultimately to the seeds. Therefore, the present investigation was planned to study the mycoflora associated with pollen grains and seeds of *C. deodara* at hilly areas of Nainital where the trees are widely grown.

Fresh, mature, male and female (unopened) cones were collected from the trees in sterilized polythene bags (for two years) and soon brought to the laboratory. Pollen grains were collected from the mature male cones on sterilized glazed paper and the seeds were collected by mechanically opening the female cone scales with the help of a sterilized scalpel. Dilution plate and direct plate techniques were applied for the isolation of associated fungi. The seeds with coat removed and twice washed with sterilized water were also screened.

The results are given in table 1. In all, 16 fungi were isolated, of which 14 were associated with pollen grains, 12 with whole seeds and only 7 with coat removed seeds. Five fungi were isolated from pollen grains, whole seeds as well as from the coat removed seeds.

Table 1 *Fungal infestation of pollen grains and seeds of C. deodara*

Fungi isolated	From pollen grains	From seeds: Whole seeds	From seeds: Coat removed seeds
Mucor luteus (Linn.) Schipper	+	+	−
Rhizopus nigricans Ehrenb.	+	+	+
Aspergillus flavus Link	+	+	+
A. fumigatus Fresenius	+	+	+
A. niger Tieghem	+	+	−
A. pulvinus Kwon & Fennell	+	+	−
Penicillium chrysogenum Thom	+	+	+
P. nigricans (Bainier) Thom	+	+	−
P. oxalicum Currie and Thom	+	+	+
P. purpurogenum Stoll	+	−	−
P. simplicissimum (Oudem) Thom	+	+	−
Alternaria alternata (Fr) Keissler	+	−	+
Cladosporium cladosporioides (Fr.) de Veries	+	−	+
Fusarium moniliforme Sheld.	−	+	−
Trichoderma viride Pers. ex. Gray	+	−	−
Mycelia sterilia	−	+	−

+, present; −, absent.

It is clear from table 1 that the mycoflora which reaches the seeds is carried by pollen grains because the fungi which were isolated from the pollen grains, {some of them (10)} were also present on the seed surfaces and some (7) inside the seeds of which the coat has been removed. It is due to the fact that pollen grains are sticky in nature and pollination is of anemophilous type; therefore, the spores of aeromycoflora can easily be adhered to the surface of pollen grains which in turn can carry them to the ultimate site (i.e. ovule) and finally to the seeds. After the pollination the scales of female cones again close rendering the cone compact.

The ovule is the most protected part of female gametophyte and it is not possible for many fungi to survive even after they reached there through pollen grains; this may be the reason for the lesser number of fungi in the coat removed seeds. The number of fungi on the surface of seeds was higher than that inside of the seeds because pollen grains could also be trapped in the space between the scales and ovules since all pollens that take part in the pollination do not necessarily take part in fertilization. However, there were two fungi, viz., *Fusarium*