treatment of animal wastes with photosynthetic bacteria to reduce the B.O.D. The outflow after adjusting the pH encourages the growth of *Euglena.* The algal cells together with the bacteria constitute a high grade protein.

TABLE II

Growth potential of Spirulina platensis *in cattle urine with and without added bicarbonate* (18 g/l)

Conc. urine	pH	Dry wt. alga (g/l)
1%	7·90	..
1% + $NaHCO_3$	8·80	1·33
3%	8·6	..
3% + $NaHCO_3$	8·80	0·88
5%	8·7	..
5% + $NaHCO_3$	8·80	..
7%	8·80	..
7% + $NaHCO_3$	8·80	..
Control	9·2	0·91

Unlike the slurry effluent, cattle urine failed to support the growth of the alga in the absence of bicarbonate (Table II), presumably because of the absence of available carbon source. Supplementation of cattle urine with bicarbonate supported the algal growth upto a level of 3% urine, beyond which urine *per se* was inhibitory. Microscopic examination revealed heavy cell damange at higher concentration levels of urine. This may possibly be due to an increase in the internal pH of the cells due to the penetration of undissociated ammonium hydroxide molecules resulting in the precipitation of the intracellular proteins[3] or volatilization of ammonia at high pH resulting in contact injury to the cells. Parallel sets of experiments with ammonium chloride and urea also showed such cell damage. Urea is known to be utilized by a wide range of algae as a source of nitrogen through urease or through urea : ATP amido lyase[4]. The mechanism of urea utilization by *S. platensis* is not known and deserves further investigation.

Table III suggests that the contribution of urine at 1% level is only towards nitrogen and there was no growth either in urine or NaNo₃ or $NaHCO_3$ alone.

TABLE III

Growth of Spirulina platensis *in cattle urine supplemented with* $NaHCO_3$ (18 g/l) *and* $NaNO_3$ (2·5 g/l)

Treatment	Dry wt. alga (g/l)
1% urine	..
$NaHCO_3$	..
$NaNO_3$	..
Urine + $NaNO_3$	..
Urine + $NaHCO_3$	1·07
$NaHCO_3$ + $NaNO_3$	1·12
Urine + $NaHCO_3$ + $NaNO_3$	1·31

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OCCURRENCE OF PALYNOFOSSILS FROM THE PINJOR FORMATION (UPPER SIWALIK) EXPOSED NEAR CHANDIGARH

THE Siwalik Group, bordering the northern limit of Indo-Gangetic Plain and extending from Potwar Plateau in the west to Burma in the east, constitutes a very important and interesting stratigraphic unit. Very little work on the palynology of this group has so far been done[1-8]. Nandi[6] and Ghosh[2], for the first time, attempted a palynostratigraphic zonation of the Siwalik Group exposed in the Jawalamukhi Unit of Punjab. A perusal of the published literature on the Siwalik palynology reveals that these studies have mainly been restricted only to the Lower and Middle Siwaliks. A systematic description of the Upper Siwalik palynoflora has, however, not been published though Nandi[6] and Ghosh[2] mentioned names of a few palynotaxa occurring in Upper Siwalik. These are: *Cyathidites, Alsophilidites, Leptolepidites, Pinuspolle-*

nites, Podocarpidites, Monoporopollenites, Alipollenites and *Tetradomonoporites*. The present palynological assemblage from the Pinjor Formation (Upper Siwalik) is, therefore, significant as it may serve as a reference assemblage for the future studies on Upper Siwalik palynology.

The material for the present work was collected from a carbonaceous shale bed exposed in the vicinity of Chandigarh. The palynotaxa recorded are listed below: *Cyathidites minor* Couper, *Cyathidites* sp., *Lygodiumsporites* sp., *Todisporites* sp., *Striatriletes* sp. *Podocarpidites ellipticus* Cookson, *P. microreticuloidatus* Cookson, *Pinuspollenites* sp., *Cedripites* sp. *Laricoidites magnus* (Potonie) Potonie, Thomson and Thiergart, *L. punctatus* Saxena, *Araucariacites australis* Cookson, *Retiinaperturites pinjoricus* Saxena and Singh, *Palmidites maximus* Couper, *Psilamonocolpites* sp., *Pinjoriapollis magnus* Saxena and Singh, *P. lanceolatus* Saxena and Singh, *Liliacidites matanomadhensis* Saxena. *Favitricolporites* sp., *Graminidites chandigarhensis* Saxena and Singh, *Triorites* sp., Pollen types 1–3, *Inapertisporites vulgaris* Sheffy and Dilcher and *Monoporisporites minutus* van der Hammen.

The systematic description of the above mentioned palynomorphs will be published later. An analysis of the present Pinjor assemblage reveals that out of a total of 19 genera and 23 species, 4 genera and 5 species belong to pteridophytes (3%), 6 genera and 8 species belong to gymnosperms (65%), 7 genera and 8 species belong to angiosperms (23%) and 2 genera and 2 species belong to fungal spores (9%). It is interesting to note that inaperturate pollen grains are the dominant element, constituting 61% of the assemblage.

The recovered palynomorphs have been compared with the living ones. On the basis of this comparison it has been surmised that they represent the spores and pollen grains of the families Cyatheaceae, Schizaeaceae, Parkeriaceae, Podocarpaceae, Araucariaceae, Pinaceae, Palmae, Liliaceae, Gramineae, Magnoliaceae, Proteaceae and Oleaceae. The possible representation of the above mentioned families indicates that the Pinjor assemblage consists of tropical as well as temperate elements. It may, therefore, be surmised that the basin of deposition would have received the palynomorphs from two different regions, the temperate elements from the north and tropical ones from the south.

Comparison of the present Pinjor assemblage with those recorded by Nandi[6] and Ghosh[2] from Jawalamukhi, Punjab reveals that only 3 genera, *viz.*, *Cyathidites, Podocarpidites* and *Pinuspollenites* are common to both the assemblages and as such the two assemblages are not comparable. Such a difference may be attributed to the disparity in stratigraphic horizons as the Jawalamukhi assemblage comes from the basal part of Upper Siwalik (Nandi[6], pp. 417–419) while the present assemblage has been derived from the middle part.

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WALKEROMYCES THAUNG AND *PARAPITHOMYCES* THAUNG, TWO NEW GENERIC RECORDS FROM INDIA

During a survey of the terai belt of North Eastern U.P. for the fungi parasitizing angiospermic flora, two leaf spotting fungi were collected on *Grewia asiatica* Linn. and *Bridelia squamosa* Gehrm. which were identified as *Walkeromyces grewiae* Thaung and *Parapithomyces brideliae* Thaung respectively (Thaung[3], 1976) for the first time from the country (Bilgrami *et al.*[1]). They are described and illustrated in this paper.

Walkeromyces grewiae Thaung

Spots hypogenous in the beginning but becoming amphigenous with age, marked with dark brown necrotic areas on the upper surface of leaf; colonies hypophyllous, more or less orbicular to irregular, appearing as small spots but radiating gradually to assume considerably large size in due course, whitish to dark grey, effuse, cottony, tufted; hyphae mostly superficial partly immersed; superficial hyphae mostly repent measuring 3·5–4·5 μm, olivaceous grey, branched, septate, smooth walled; stromata absent; conidiophores solitary to rarely in groups, macronematous, septate, unbranched to branched, almost straight to flexuous, erect or sub erect, pale olivaceous grey, cylindrical, geniculate, smooth, 35·0–218·5 × 4·5–5·2 μm; conidiogenous cells integrated, terminal, polyblastic, sympodial, distinctly cicatrized, more or less denticulate, scars either pressed along the sides or situated at the apices of denticle-like structures;