

Morelletpora (a dasycladacean alga) from the Fulra Limestone Formation of the south western Kachchh

SUMEDH K. HUMANE* AND P. KUNDAL

Postgraduate Department of Geology, R.T.M. Nagpur University, Nagpur 440 001 (MS), India.
*E-mail: sumedhahin@yahoo.com

(Received 20 April, 2006; revised version accepted 31 August, 2006)

ABSTRACT

Humane SK & Kundal P 2006. *Morelletpora* (a dasycladacean alga) from the Fulra Limestone Formation of the south western Kachchh. The Palaeobotanist 55(1-3): 45-50.

The carbonates of the Fulra Limestone Formation (Late Middle Eocene) revealed the presence of *Morelletpora* sp. from southwestern Kachchh, India. Earlier the genus *Morelletpora* was reported from the Khairabad Limestone (Ranikot beds) of the Nammal Gorge, Salt Range (Punjab, Pakistan). This dasycladacean alga has been recovered for the first time from the marine limestones of the Jadwa Stream section of south western Kachchh. The presence of dasycladacean alga, *Morelletpora* suggests that this carbonate shelf of the Fulra Limestone Formation was deposited at very shallow marine water.

Key-words—*Morelletpora*, Dasycladacean alga, Taxonomy, Late Middle Eocene, Kachchh.

दक्षिण-पश्चिमी कच्छ के फुलरा चूनापत्थर शैलसमूह से प्राप्त मोरेल्लेटपोरा (डैसीक्लेडेसीयन कवक)

सुमेध के. हुमाने व पी. कुंडल

सारांश

फुलरा चूनापत्थर शैलसमूह (अंतिम मध्य ईओसीन) के कार्बोनेटों ने भारत में दक्षिण-पश्चिमी कच्छ से *मोरेल्लेटपोरा* प्रजाति की उपस्थिति प्रकट की। इससे पहले *मोरेल्लेटपोरा* वंश को साल्ट रेंज (पंजाब, पाकिस्तान) में नम्मल जोर्ज के खैराबाद चूनापत्थर (रानीकोट संस्तरों) से अभिलिखित किया गया था। यह डैसीक्लेडेसीयन कवक दक्षिण-पश्चिमी कच्छ के जदवा धारा खंड के समुद्री चूनापत्थरों से प्रथम बार प्राप्त किया गया है। डैसीक्लेडेसीयन कवक, *मोरेल्लेटपोरा* की उपस्थिति यह प्रस्तावित करती है कि फुलरा चूनापत्थर शैलसमूह की यह कार्बोनेट उपतट अत्यंत गांध समुद्री जल में निक्षेपित थी।

संकेत-शब्द—*मोरेल्लेटपोरा*, डैसीक्लेडेसीयन कवक, वर्गिकी, अंतिम मध्य ईओसीन, कच्छ।

INTRODUCTION

KACHCHH Basin in the western part of India is a peri-cratonic rift basin which has exposed the

rocks of Triassic to Recent ages with some breaks in stratigraphy between transgressive cycles. The Cenozoic rocks of the Kachchh Basin mainly consist of limestone, shales and sandstone. The Cenozoic

sequence is grouped into various formations (Biswas, 1992; Fig. 1). A thick sequence of bedded white foraminiferal limestone overlying the argillaceous Harudi Formation forms a very distinct litho-unit in the Tertiary of Kachchh named as the Fulra Limestone Formation. This formation has characteristic faunas indicating Late Middle Eocene age equivalent to the tropical zones of *Orbulinoides beckmanni* and *Truncorotaloides rohri* zones (Biswas, 1992).

The Fulra Limestone Formation is overlain by dirty white to yellowish limestone of the Maniyara Fort Formation and underlain by the Harudi Formation (Biswas, 1992). The Fulra Limestone Formation and the Maniyara Fort Formation have shown the presence of green and red algae, while fossil calcareous algae are absent in the Harudi Formation (Middle Eocene). Few workers have reported calcareous algae from the above formations (Ghosh, 2002; Humane & Kundal, 2005; Humane *et al.*, 2006; Kar, 1979; Kundal & Humane, 2002, 2003, 2005, 2006a, b, c, d; Misra *et*

al., 2001; Pal & Ghosh, 1974; Singh & Kishore, 2001; Singh *et al.*, 2002; Tandon *et al.*, 1978).

The dasycladacean alga, *Morelletpora* sp. is described here for the first time from the Fulra Limestone Formation (Late Middle Eocene) of the Jadwa Stream section of south western Kachchh, India (Fig. 1).

The thickness of the creamy Fulra Limestone of the Jadwa Stream section is about 4 m. *Morelletpora* sp. recorded from two samples (JS1 & JS2) and their location is shown in lithocolumn (Fig. 2).

All the specimens and thin sections are repositied in the Micropaleontology Laboratory of the Postgraduate Department of Geology, RTM Nagpur University, Nagpur.

SYSTEMATICS

The taxonomic description used in the present paper follows Berger and Kaever (1992) and Deloffre and Granier (1993).

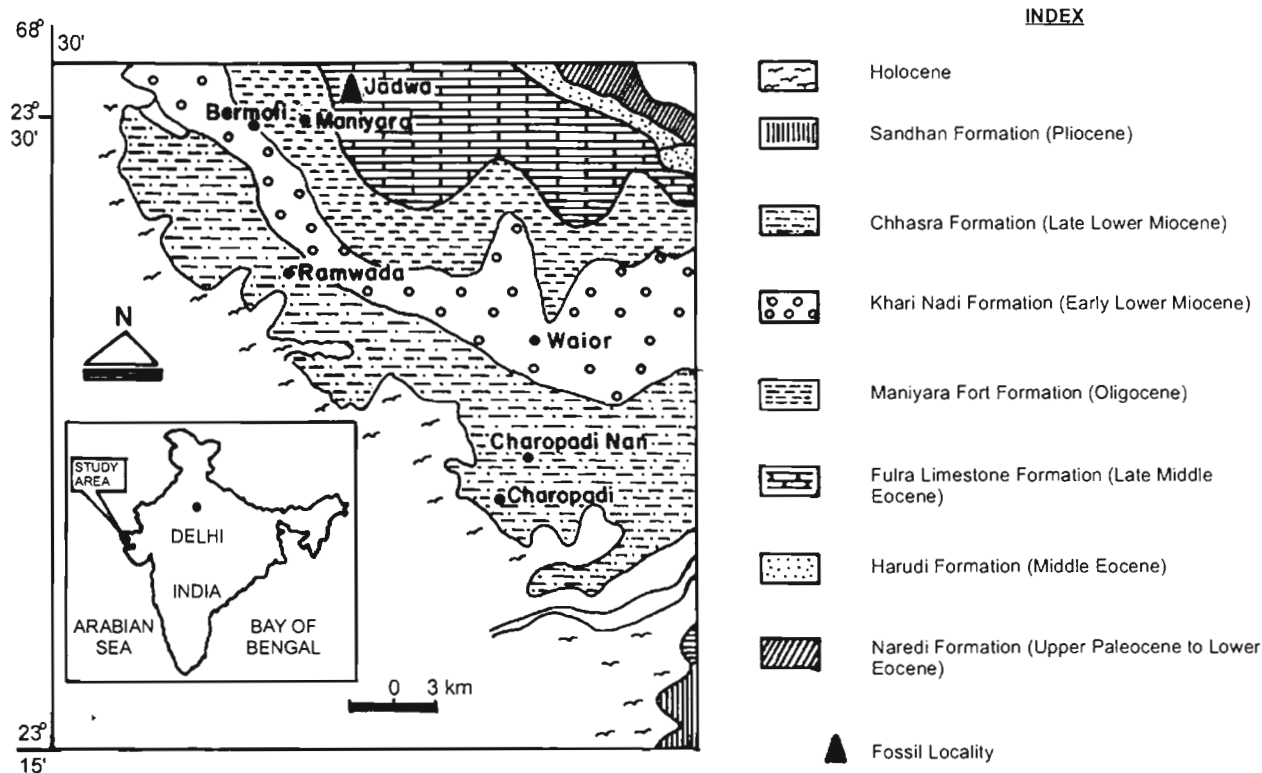


Fig. 1—Geological map of Kachchh Basin showing fossil locality (after Biswas, 1992).

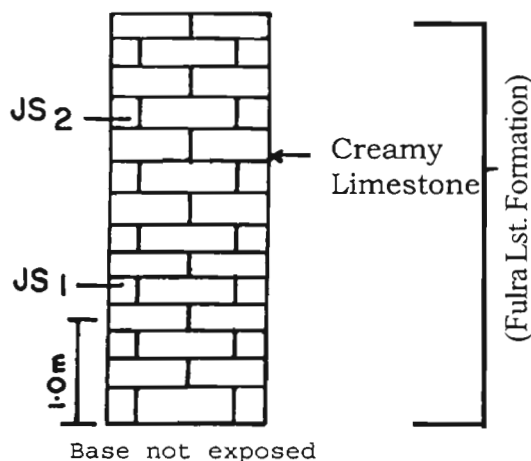


Fig. 2—Litholog of Jadwa Stream section showing position of samples.

Division—CHLOROPHYTA

Class—CHLOROPHYCEAE

Order—DASYCLADALES

Family—DASYCLADACEAE

Tribe—MORELLETPOREAE

Sub-tribe—MORELLETPORINAE

**Genus—*MORELLETPORA* Varma, 1950
emend. Varma, 1955**

Morelletpora sp.

(Pl. 1.1-8)

Description—Thallus appears to be jointed (Pl. 1.6). Each segment club shaped to subcylindrical (Pl. 1.1, 2, 4, 6-8). Axial siphons (Ax) moderate to thick and open towards both the ends. Segments circular to subcircular in cross sections. The central cavity filled by calcite crystals in some of the tangential specimens not cutting the broad axial tube (Pl. 1.3, 5). Segment bears a number of superimposed whorls (Pl. 1.1, 2, 4-8). Branches arise as thin inclined tubes and suddenly broaden giving rise to oval to barrel shaped sporangia. The base of the branches very thin giving stalk (St) like appearance. Stalks generally arise at an angle between 40° and 50°.

The measurement of organs is given below:

Remarks—*Morelletpora nammalensis* Varma described from Ranikot beds (Paleocene) of the Nammal Gorge, Punjab Salt Range (Varma, 1950, pp. 207-208; Varma, 1955, pp. 101-111; Deloffre & Genot, 1982, pp. 112-113, pl. 10, figs 1-2) has greater length, wider segments, larger axial siphons and longer

Specimen nos.	1	2	3	4	5	6	7	8
Length of segment (μm)	75	610	720	430	480	600	625	450
Diameter of segment (μm)	30	200	170	150	160	225	250	225
Diameter of axial siphons (μm)	25	225	100	110	100	250	200	100
Diameter of sporangia (μm)	15	150	100	100	110	80	150	170
Diameter of sporangial stalks (μm)	2	10-15	08	15-20	-	12	12-14	-
No. of stalked sporangia	15	17	26	13	14	11	12	07

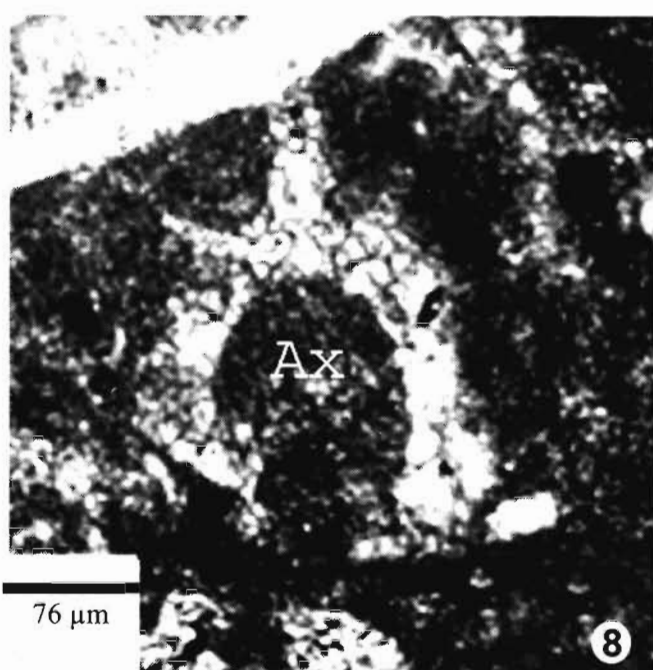
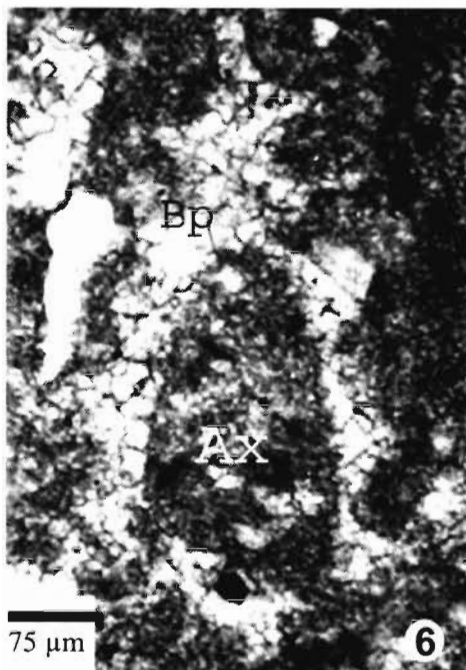
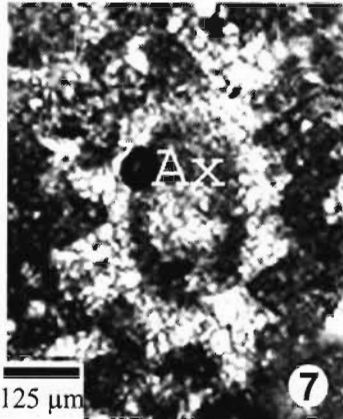
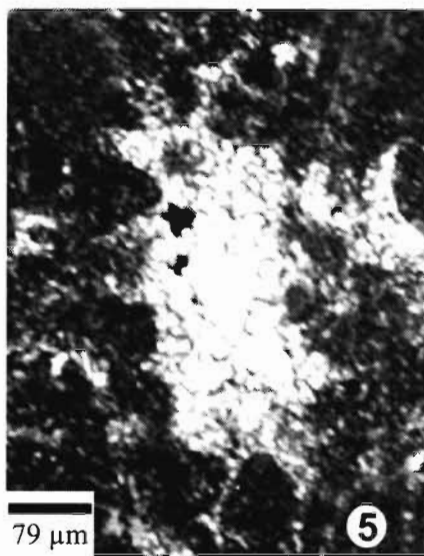
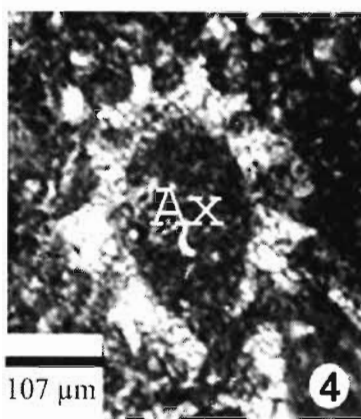
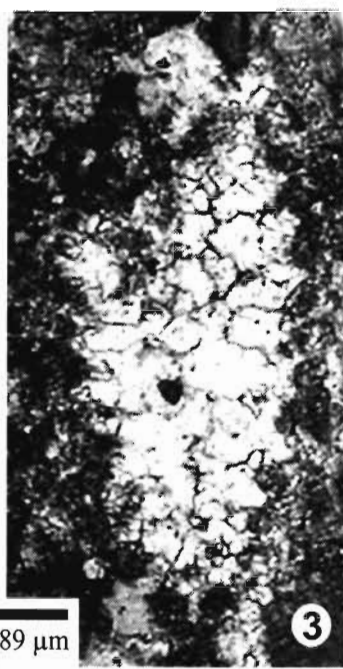
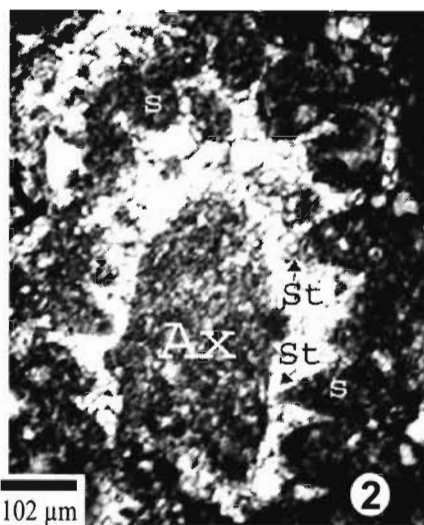
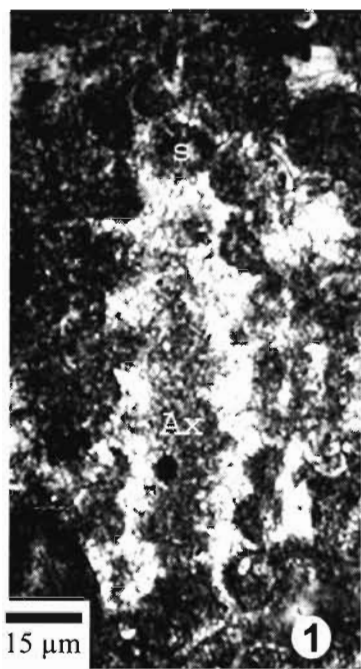


PLATE 1

and wider sporangia as compared to the present specimens. However, due to the wide range of variation in the dimensions and the limited number of fossil fragments, the present specimens are kept in open nomenclature as *Morelletpora* sp.

DISCUSSION

Dasycladacean algae very commonly exist in shallow depth down to 10-12 m in marine warm tropical to subtropical water (Genot, 1991; Ghosh, 2005; Johnson, 1961; Valet, 1979; Wray, 1977). Kundal and Humane (2006d) have interpreted shelf environment under low energy conditions for the deposition of the Fulra Limestone Formation. Biswas (1992), based on foraminiferal assemblages and lithology inferred low energy, possibly middle shelf, clear water environments for the deposition of the Fulra Limestone Formation. Therefore, it is suggested that *Morelletpora* sp. was growing at very shallow marine conditions under tropical to subtropical environment.

Acknowledgements—We gratefully acknowledge the financial support for the present work from DST under major research project (ESS/ 23 / VES / 096 / 2000). We are greatly indebted to Dr Daniel Vachard of France for giving suggestions to improve drafting of manuscript and in the identification of the present material.

REFERENCES

- Berger S & Kaefer M 1992. Dasycladales – An illustrated monograph of a fascinating algal Order. Stuttgart-New York: Georg Thieme Verlag : 247.
- Biswas SK 1992. Tertiary stratigraphy of Kutch. Journal of the Palaeontological Society of India 37: 1-29.
- Deloffre R & Genot P 1982. Cenozoic dasyclad algae. Bulletin of Centres for Research and Exploration-Production, Elf-Aquitaine, Memoir 4: 1-247.
- Deloffre R & Granier B 1993. Inventaire critique des algues Dasycladales fossils. Revue de Paléobiologie 11 : 331-356.
- Genot P 1991. Cenozoic and recent dasycladales. In: Riding R (Editor)—Calcareous algae and stromatolites : 131-145.
- Ghosh AK 2002. Cenozoic coralline algal assemblage from southwestern Kutch and its importance in paleoenvironments and paleobathymetry. Current Science 83: 153-158.
- Ghosh AK 2005. Dasycladacean green algae: their diversification in India in the geologic past. In: Keshri JP & Kargupta AN (Editors)—Glimpses of Indian Phycology. Bishen Singh and Mahendra Pal Singh. Dehra Dun, India: 303-316.
- Humane SK & Kundal P 2005. Halimedacean and Udoteacean algae from the Mid – Tertiary western carbonate platform of the Kachchh, India: Possible paleoenvironments and evolution. Journal of Environmental Micropaleontology, Microbiology and Meiobenthology 2: 4-27.
- Humane SK, Kundal P & Naitam SS 2006. Porostromata algae from the Burdigalian limestone of Kachchh District of Gujarat, India. Journal of the Paleontological Society of India 52(2): (In Press).
- Johnson JH 1961. Limestone building algae and algal limestone. Professional Contribution of the Colorado School of Mines: 1-290.
- Kar RK 1979. Fossil algae from Fulra Limestone (Middle Eocene) Kutch, Gujarat. Geophytology 9: 88-90.
- Kundal P & Humane SK 2002. Geniculate coralline algae from Middle Eocene to Lower Miocene of Kachchh, Gujarat, India. Gondwana Geological Magazine 17 : 33-46.
- Kundal P & Humane SK 2003. *Corallina*, a geniculate coralline alga from Middle Eocene to Lower Miocene of Kachchh, Gujarat, India. In: Kundal P (Editor)—Recent Developments in Indian Micropaleontology. Gondwana Geological Magazine Special Volume 6: 261-275.



PLATE 1

Morelletpora sp.

1. Showing axial siphon (Ax) and sporangium (S). Specimen No. PGTDG/ MF/ MRTPR/ 1 (Slide No. JS1/2/L).
2. Showing axial siphon (Ax), sporangium (S) and stalk-like part of the branch (St). Specimen No. PGTDG/ MF/ MRTPR/ 2 (Slide No. JS1/2/L).
3. Tangential section not cutting the broad axial siphon. Specimen No. PGTDG/ MF/ MRTPR/ 3 (Slide No. JS1/ 2/L).
4. Showing axial siphon (Ax). Specimen No. PGTDG/ MF/ MRTPR/ 4 (Slide No. JS1/1).
5. Tangential section not cutting the broad axial siphon. Specimen No. PGTDG/ MF/ MRTPR/ 5 (Slide No. JS1/ 1).
6. Showing the place from where the upper member of the segment may generally break (Bp). Specimen No. PGTDG/ MF/ MRTPR/ 6 (Slide No. JS1/ 1).
7. Showing axial siphon (Ax). Specimen No. PGTDG/ MF/ MRTPR/ 7 (Slide No. JS1/ 1).
8. Showing axial siphon (Ax). Specimen No. PGTDG/ MF/ MRTPR/ 8 (Slide No. JS1/2/L).

- Kundal P & Humane SK 2005. On First Indian record of fossil calcareous alga *Subterraniophyllum* from Late Lutetian of western Kutch and its biostratigraphical and paleobiogeographical assessment. *Gondwana Geological Magazine* 20 : 119-124.
- Kundal P & Humane SK 2006a. Record of *Metagoniolithon* (Corallinales, Rhodophyta) from Burdigalian of western India. *Current Science* 91 : 221-224.
- Kundal P & Humane SK 2006b. Stratigraphic, paleobiogeographic and paleoenvironmental significance of *Mesophyllum*, a nongeniculate coralline alga from western Kachchh (Middle Eocene to Oligocene), India. *Proceedings of XIX Indian Colloquium on Micropaleontology and Stratigraphy* (In Press).
- Kundal P & Humane SK 2006c. *Jania*, a geniculate coralline alga from Middle Eocene to Lower Miocene of Kachchh, Gujarat, India. *Journal of the Geological Society of India* (In Press).
- Kundal P & Humane SK 2006d. Chattian and Burdigalian Dasycladacean algae from Kachchh, western India and their implications on environment of deposition. *Journal of the Geological Society of India* (In Press).
- Misra PK, Jauhri AK, Singh SK, Kishore S & Choudhuri A 2001. Coralline algae from the Oligocene of Kachchh, Gujarat, India. *Journal of the Palaeontological Society of India* 46: 59-76.
- Pal AK & Ghosh RN 1974. Fossil algae from the Miocene of Kutch, India. *Palaeobotanist* 21 : 189-192.
- Singh SK & Kishore S 2001. Chlorophycean algae (Dasycladaceans and Udoteaceans) from the Eocene and Oligocene of Kachchh (= Kutch), Gujarat, India. *Biological Memoirs* 27 : 38-45.
- Singh SK, Kishore S, Misra PK & Jauhri AK 2002. Coralline algae from the Maniyara Fort Formation (Oligocene), South western Kachchh, Gujarat, India. *Biological Memoirs* 28 : 51-60.
- Tandon KK, Gupta SK & Saxena RK 1978. A new species of *Lithophyllum* from Oligocene of south western Kachchh. *Journal of the Palaeontological Society of India* 21- 22: 74-77.
- Valet G 1979. Approche paleoecologique du monde des Dasycladales a' partir de l'e'cologie des formes actuelles. *Bulletin of Centre for Research, Exploration and Production, Elf. Aquitaine* 3 : 859-866.
- Varma CP 1950. A new genus of calcareous alga (Dasycladaceae) from the Ranikot beds (Palaeocene) of the Punjab Salt Range. *Current Science* 19 : 207-208.
- Varma CP 1955. Further observation on *Morelletpora nammalensis* Varma from the Khairabad Limestone (Ranikot) beds of the Nammal Gorge, Punjab Salt Range. *Palaeobotanist* 4: 101-111.
- Wray JL 1977. *Calcareous algae, developments in paleontology and stratigraphy*. Elsevier Scientific Publishing Company, Amsterdam 4: 1-185.