

# When did *Ctenolophonidites* disappear from India?

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THE genus *Ctenolophon* comprising two species, viz., *C. englerianus* and *C. parvifolius* referable to Ctenolophonaceae is represented in fossil condition by two morphologically characteristic pollen taxa, *Ctenolophonidites* and *Retistephanocolpites*. Of the various species of *Ctenolophonidites*, *C. costatus* shows striking resemblances with the pollen of the modern African *Ctenolophon englerianus*. On the other hand, among *Retistephanocolpites* taxa, *R. williamsii* resembles the pollen of the Southeast Asian *Ctenolophon parvifolius*.

Though fossil pollen referable to *Ctenolophon* (*Ctenolophonidites*) are known from various Tertiary strata of India this genus is conspicuous by its absence in the modern floristic complexes of India. The earliest records of *Ctenolophonidites* are from the Palaeocene-Eocene deposits of Cambay basin (Rawat *et al.* 1977) and Gujarat (Kar 1985; Phadtare & Samant 1996). Misra *et al.* (1996) argued convincingly that *Ctenolophonidites* migrated to India from Africa sometime during Early Palaeocene.

While there is general unanimity and consensus that the antiquity of *Ctenolophonidites* pollen in India could be traced to the Palaeocene age, opinions regarding the probable time of its disappearance from India continue to be divergent in nature. Venkatachala *et al.* (1988) and Srivastava (1987-88) were of the view that *Ctenolophonidites* became extinct by the end of the Eocene age. More recently Phadtare and Samant (1996) also toed the path of the above authors. The evidence furnished for the Eocene extinction of *Ctenolophonidites* by all these authors seems to be tenuous and grossly lopsided. Listed below are the various records of *Ctenolophonidites* (*C. costatus* in particular) from the Oligocene and Miocene sediments of southern India.

Ramanujam and Rao (1973), Kar and Jain (1981), Rao and Ramanujam (1982), Ramanujam (1987), and Varma *et al.* (1986) recorded various species of excellently preserved *Ctenolophonidites* pollen including *C. costatus* from the outcrops of the Miocene Quilon and Warkalli formations, both from the southern and northern parts of Kerala.

Raha *et al.* (1987) recorded the pollen of *C. costatus* from the Oligocene and Miocene sediments (subsurface) of Kerala. According to these authors, *Ctenolophonidites* is one of the frequently encountered taxa in the Miocene palynoassemblages of a 600 m deep borewell near Ambalapuzha.

Rajendran *et al.* (1989) highlighted *C. costatus* as one of the significant pollen types of the Neogene (Miocene) palynofloras recovered from the lignites and clays of various localities of Kerala viz., Thonokkal, Kundara, Padappakkara, Varkala, Edvai, Paravur, Palayangadi and Cannanore.

Ramanujam and Reddy (1984), Ramanujam *et al.* (1984), and Alpana Singh *et al.* (1986) documented this pollen type from the first, second and third mine areas of the Neyveli lignite deposits, which megafloristically and microfloristically are of Miocene age.

Rao (1990, 1995) recorded well preserved *C. costatus* pollen not only from the Eocene but also from the Oligocene and Miocene sediments (subsurface) in Alleppey district of Kerala.

Ramanujam *et al.* (1991a, 1991b, 1989) and Muralidhar Rao *et al.* (1992, 1995) recorded repeatedly the pollen of *C. costatus* from the subsurface Miocene sediments of a number of borewells in the Quilon, Alleppey and Kottayam districts of Kerala and Godavari basin of Andhra Pradesh.

Neogene deposits from well sections around Mangalore on the west coast of Karnataka also show the frequent presence of *C. costatus* pollen (author's unpublished work).

The above records overwhelmingly testify to the presence of *Ctenolophonidites* pollen in the post Eocene times i. e., during Oligocene and Miocene ages. Therefore, the contention that this pollen type became extinct by the end of Eocene is patently untenable and merits rejection. One may then conclude that the genus *Ctenolophon* (represented by *Ctenolophonidites* pollen) disappeared from India either towards the terminal phase of Miocene or sometime during the dawn of Pliocene. As of today, the author is not aware of any Pliocene records of this pollen type from India. Lastly, the Tertiary palynofloras of southern India clearly point toward *Ctenolophonidites* not as an age indicator but an environmental marker highlighting warm humid conditions and fresh water swampy habitats.

## REFERENCES

- Kar R.K. 1985. The fossil flora of Kutch IV. Tertiary palynostratigraphy. *Palaeobotanist* 34: 1-280.
- Kar R.K. & Jain K.P. 1981. Palynology of Neogene sediments around Quilon and Varkala, Kerala Coast, South India 2. Spores and pollen grains. *Palaeobotanist* 29 : 113-131.
- Misra B.K., Singh A. & Ramanujam C.G.K. 1996. Trilatiporate pollen from Indian Palaeogene and Neogene sediments, evolution, migration and continental drift. *Rev. Palaeobot. Palynol.* 91 : 331-352.
- Muralidhar Rao G., Reddy P.R. & Ramanujam C.G.K. 1992. Miocene spore and pollen complex from a borewell at Thakkazhi in Alleppey district, Kerala. *Gondwana Geol. Mag.* 4 & 5: 80-86.
- Muralidhar Rao G., Reddy P.R. & Ramanujam C.G.K. 1995. Palynoassemblage of the subsurface sediments at Kulasekaramangalam in Kottayam district, Kerala. pp. 371-374 in : Pant D.D. et al. (eds)-*Birbal Sahni Centenary Volume*, Society of Indian Plant Taxonomist Allahabad.
- Phadtare N.R. & Samant B. 1996. Morphologic evolution in fossil pollen of *Ctenolophon* and its Indian phytogeographic implications. pp. 671-681 in: *Pandey J. et al. (eds): Contrs. XV Ind. Colloq. Micropal. Strat.* Dehradun, 1996. K.D.M. Institute of Petroleum Exploration, Dehradun.
- Raha P.K., Rajendran C.P. & Kar R.K. 1987. Records of Early Tertiary deposits in Kerala, India and its phytogeographic significance. *Geophytology* 17 : 209-218.
- Rajendran C.P., Raha P.K. & Kar R.K. 1989. Palynological assemblages from Neogene outcrops of Kerala Coast, India. *Ind. Min.* 43 : 39-46.
- Ramanujam C.G.K. 1987. Palynology of the Neogene Warkalli beds of Kerala State in South India. *Jour. palaeont. Soc. Ind.* 32: 26-46.
- Ramanujam C.G.K. & Rao K.P. 1973. A study of the pollen grains of *Ctenolophonidites* from the Warkalli deposits of South India with a note on the geological history of *Ctenolophon*. *Palaeobotanist* 20: 210-215.
- Ramanujam C.G.K. & Reddy P.R. 1984. Palynoflora of Neyveli lignite: floristic and palaeoenvironmental analysis. *J. Palynol.* 20: 58-74.
- Ramanujam C.G.K., Muralidhar Rao G. & Reddy P.R. 1991a. Palynological studies of subsurface sediments at Mynogapally, Quilon district, Kerala State. *Biovigyanam* 17 : 1-11.
- Ramanujam C.G.K., Ramakrishna H. & Mallesham C. 1989. Palynoassemblage of the subsurface Miocene sediments of the east coast of southern India: Its floristic and environmental significance. pp 113-117, in: Biradar N.V. (eds)-*Proc. Spl. Ind. geophytol. Conf.* Pune (1986). The Palaeobotanical Society. Lucknow.
- Ramanujam C.G.K., Reddy P.R. & Muralidhar Rao C. 1991b. Palynoassemblages of the subsurface Tertiary strata at Pattanakad, Alleppey district, Kerala state. *Jour. palaeont. Soc. Ind.* 36: 51-58.
- Ramanujam C.G.K., Sarma P.S. & Reddy P.R. 1984. Quantification of the palynoassemblages of the first and second mine areas of Neyveli lignite. pp. 269-276. in: Badve R.M. et al. (eds) : - *Proc. X Ind Colloq. Micropal. & Strat.* Pune 1982, Maharashtra Association for Cultivation of Science, Pune.
- Rao K.P. & Ramanujam C.G.K. 1982. Palynology of the Quilon beds of Kerala State in South India-2. Pollen of dicotyledons and discussion. *Palaeobotanist* 30 : 68-100.
- Rao M.R. 1990. Palynological investigation of Arthungal borehole, Alleppey district, Kerala. In: Jain K.P. & Tiwari R.S. (eds) - *Proc. Symp. Vistas in Indian Palaeobotany.* *Palaeobotanist* 38: 243-255.
- Rao M.R. 1995. Palynostratigraphic zonation and correlation of the Early Eocene-Miocene sequence in Alleppey district, Kerala, India. *Rev. Palaeobot. Palynol.* 86: 325-348.
- Rawat M.S., Mukherjee J.S. & Venkatachala B.S. 1977. Palynology of the Kadi Formation, Cambay basin, India. pp. 179-192. in: Venkatachala B.S. & Sastri V.V. (eds) - *Proc. IV Ind. Colloq. Micropal. & Strat.* Dehradun. 1974-75, K.D.M. Institute of Petroleum Exploration, Dehradun.
- Singh Alpana, Misra B.K., Singh B.D. & Navale G.K.B. 1986. The Neyveli lignite deposits (Cauvery basin), India: Organic composition, age and depositional pattern. *Inter. Jour. Coal Geol.* 21 : 45-97.
- Srivastava S.K. 1987-88. *Ctenolophon* and *Sclerosperma*: Palaeogeography and Senonian Indian plate position. *J. Palynol.* 23-24: 239-253.
- Varma Y.N.R., Ramanujam C.G.K. & Patil R.S. 1986. Palynoflora of Tertiary sediments of Tonakkal area, Kerala. *J. Palynol.* 22: 39-53.
- Venkatachala B. S., Caratini C., Tissot C. & Kar R.K. 1988. Palaeocene-Eocene marker pollen from India and tropical Africa. *Palaeobotanist* 37: 1-25.