Climate Change and Human History in Ganga Plain during Late Pleistocene-Holocene

INDRA BIR SINGH

Geology Department, Lucknow University, Lucknow 226 007

ABSTRACT

Singh IB 2005. Climate Change and Human History in Ganga Plain during Late Pleistocene-Holocene. Palaeobotanist 54 : 1-12.

The Ganga Plain exhibits a large variety of landforms produced essentially during last about 100 kyrs in response to base level, tectonic and climate change. Prominent changes in the monsoon rainfall in the Ganga Plain have been identified, namely, 45 kyrs BP, humid climate; 20-13 kyrs BP, low rainfall; 13-11.5 kyrs BP, high rainfall; 11.5-10.5 kyrs BP, low rainfall; 10.5-5.8 kyrs BP, high rainfall; 5.8-2.0 kyrs BP, low rainfall; and 2.0-0 kyrs BP, high rainfall. Palaeo-vegetation studies indicate that the Ganga Plain was a grassland, at least, since 45 kyrs BP, where C-4 type vegetation dominated. The lakes supported C-3 type vegetation and they show changes in the water budget in response to the changes in rainfall. There is evidence of occupation of Ganga Plain by humans, at least, since 45 kyrs. They occupied the high grounds close to the water bodies, mostly lakes and ponds. Initially human population was hunter-gatherer depending on rich fauna and wild vegetation. Frequent climate changes in latest Pleistocene-Early Holocene probably led to adaptation of agricultural practices by humans. Large-scale occupation of the Ganga Plain took place between 3.5-3.0 kyrs BP. Study of oxygen isotopes in teeth enamel show century-scale rainfall changes in the last 3.5 kyrs BP which show some correlation to the cultural changes in the Ganga Plain. Climate change and human history in the Ganga Plain is closely related and need to be studied by high-resolution investigations.

Key-words—Ganga Plain, Climate change, Human history, Late Pleistocene-Holocene, Palaeovegetation.

Organic-walled microfossils from the Proterozoic Vindhyan Supergroup of Son Valley, Madhya Pradesh, India

BIJAI PRASAD*, S. N. UNIYAL AND RAMSON ASHER

KDM Institute of Petroleum Exploration, Oil and Natural Gas Corporation Limited,

9 Kaulagarh Road, Dehra Dun- 248 195, India.
**Email: bijaiprasad@indiatimes.com*

ABSTRACT

Prasad B, Uniyal S N & Asher R 2005. Organic-walled microfossils from the Proterozoic Vindhyan Supergroup of Son Valley, Madhya Pradesh, India. Palaeobotanist 54 : 13-60.

Well-preserved and diversified organic-walled microfossil assemblages are recorded from the Vindhyan sediments of Son Valley and DMH-A well, in Madhya Pradesh. The microfossils include acritarchs, coccoid and filamentous taxa that suggest a Meso-Neoproterozoic age for the Vindhyan Supergroup which, hitherto, was assigned a Late Paleoproterozoic to Early Paleozoic age, based on fossil evidences and radiometric datings.

The Kajrahat Limestone, within the basal Semri Group, recorded abundant filamentous microfossils, viz. *Polythrichoides, Karamia, Arctacellularia* and *Siphonophycus* along with simple unornamented sphaeromorph acritarchs (*Leiosphaeridia* spp.), suggesting ca.1500-1450 Ma age of Early Mesoproterozoic. The microfossil assemblage of Deonar Formation also includes the above taxa; however, *Satka*, *Eomicrocystis* and acanthomorph acritarchs, *Tappania* spp., appear within this formation along with abundant polygonomorph acritarchs referable to *Octoedryxium.* The Deonar microfossil assemblage resembles the assemblage of Roper Group (northern Australia) and suggests ca.1450-1350 Ma age of Early to Middle Mesoproterozoic.

The sediments of Kheinjua Subgroup are marked by the appearance of various species of *Navifusa*, *Simia* and *Pterospermopsimorpha* in the Koldaha Shale with overall abundance of *Tappania*, *Satka, Eomicrocystis, Kildinosphaera* and *Leiosphaeridia*. The presence of Middle to Late Mesoproterozoic marker taxa, viz. *Tappania plana, T. tubata* and *Navifusa segmentata* helps to correlate the Koldaha Shale and Salkhan Limestone assemblages with the assemblage of the Ruyang Group (China), suggesting an Ectasian-Stenian (ca.1350-1050 Ma) age. In additon to the above taxa, the appearance of Early Neoproterozoic marker taxa, such as, *Vandalosphaeridium, Bavlinella, Melanocyrillium* and budding leiosphaerids in the Rampur Formation indicates a Late Stenian-Tonian age (ca.1050-850 Ma) for this formation.

The microfossil assemblage of the Rohtas Subgroup is quite distinct as the marker taxa of the Kheinjua Subgroup, viz. *Tappania* spp.and *Navifusa* spp.

disappear. The presence of *Trachysphaeridium laufeldi, Vandalosphaeridium reticulatum, Bavlinella faveolata* and *Stictosphaeridium* spp., and the disappearance of *Eomicrocystis, Satka* and budding leiosphaerids within this formation allow its correlation with Middle Neoproterozoic Miroyedikha (Siberia) and Husar-Kanpa (central Australia) assemblages, suggesting an Early Cryogenian (ca.850-750 Ma) age for the Rohtas Subgroup.

The microfossil assemblages from the Kaimur and Rewa groups are represented by the species of *Symplassosphaeridium, Synsphaeridium* and *Leiosphaeridia.* The occurrence of *B. faveolata, T. laufeldi* and *Octoedryxium truncatum* in their assemblages suggest a Middle to Late Neoproterozoic (Late Cryogenian; ca.750-650 Ma) age. The sediments of the Bhander Group also include the above taxa. However, the appearance of Ediacaran (Vendian) marker species of *Obruchevella*, viz. *O. parva* and *O. valdaica* in the Ganurgarh Shale, and their abundance in the overlying Nagod Limestone and Sirbu Shale, suggests a Late Cryogenian-Early Ediacaran (ca. 650-570 Ma) age for the Bhander Group. Yet, the appearance of *Obruchevella delicata, Lophosphaeridium tentativum* and *Cymatiosphaera* sp. in the Nagod Limestone, and *Obruchevella parvissima, Cristallinium* sp. and *Dictyotidium* sp. in the Sirbu Shale suggest that the age of the Bhander Group extends into the Late Ediacaran (ca.570-544 Ma).

The record of Calymmian (ca.1500 Ma) to Late Ediacaran (ca. 544 Ma) organic-walled microfossil assemblages categorically suggests an Early Mesoproterozoic to Terminal Proterozoic age-range for the Vindhyan Supergroup. The occurrence of well-developed Middle and Late Mesoproterozoic microfossil assemblages in the Deonar Formation and Kheinjua Subgroup negates the Late Paleoproterozoic (ca. 1630 Ma) age assignment to them, based on radiometric datings. The presence of Ediacaran (Vendian) marker species of *Obruchevella* and the absence of distinctive Early Cambrian acritarchs in the Bhander Group brackets the upper age limits of Vindhyan Supergroup to the Late Ediacaran, and does not encompass the Lower Paleozoic.

Key-words—Meso-Neoproterozoic, organic-walled microfossils, Vindhyan Supergroup, Son Valley, India, acritarch biostratigraphy.

Palaeogene plant fossils of Manipur and their palaeoecological significance

J.S. GULERIA[1*], R.K. HEMANTA SINGH[2], R.C. MEHROTRA[1], I. SOIBAM[3] AND RAJKUMAR KISHOR[4]

[1]*Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow - 226 007, India*

[2]*Department of Geology, Imphal College, Imphal - 795 001, India*

[3]*Department of Earth Sciences, Manipur University, Imphal- 795 003*

[4]*Department of Life Sciences, Manipur University, Imphal - 795 003*

**Email: guleriajs@yahoo.com*

ABSTRACT

Guleria JS, Hemanta Singh RK, Mehrotra RC, Soibam I & Kishor RK 2005. Palaeogene plant fossils of Manipur and their palaeoecological significance. Palaeobotanist 54 : 61-77.

The paper describes for the first time some Palaeogene plant fossils from Manipur, Northeast India. The fossils were recovered from the late Eocene and early Oligocene sediments in the vicinity of the boundary of the Disang and Barail Groups of rocks of the Imphal Valley and its adjoining areas. All the fossils belong to Angiosperms and represent monocots and dicots. The assemblage consists of mainly dicotyledonous leaves, two types of palm leaves, a fruiting shoot, a leguminous fruit and a bark. The fossil leaves show a rich morphological diversity and indicate the existence of warm and humid tropical vegetation at the time of deposition.

Key-words—Plant fossils, Angiosperms, Late Eocene-Early Oligocene, Imphal Valley, India.

Occurrence of *Jiangsupollis* from the Upper Cretaceous of North Eastern India and its Significance

SONG ZHICHEN, WANG WEIMING AND HUANG FEI

Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China; E-mail: wmwang@jlonline.com

ABSTRACT

Song Z, Wang W & Huang F 2005. Occurrence of *Jiangsupollis* from the Upper Cretaceous of North Eastern India and its significance. Palaeobotanist 54 : 79-85.

*Jiangsupollis striatu*s was widely distributed in the Upper Cretaceous of southern China. Some species assignable to this genus were also reported from eastern part of India, which indicate that unknown parent plants of the pollen grains were also growing in India and geographically there was certain connection between southern China and eastern India in the Late Cretaceous for migration. This also reveals the fact that the taxa *Aquilapollenites* and *Integricorpus* which is morphologically identical to *Jiangsupollis* species in eastern India might have migrated from Asian Plate rather than northern African Plate at that time.

Key-words—*Jiangsupollis*, Late Cretaceous, Migration, China, India.

Palynological analysis of Lower Gondwana sediments exposed along the Umrar River, South Rewa Basin, Madhya Pradesh, India

RAM-AWATAR, MADHAV KUMAR AND NEERU PRAKASH

Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow 226 007, India.

ABSTRACT

Ram-Awatar, Kumar M and Prakash N 2005. Palynological analysis of Lower Gondwana sediments exposed along the Umrar River, South Rewa Basin, Madhya Pradesh, India. Palaeobotanist 54 : 87-97.

The palynflora and other organic content in carbonaceous shales, exposed along Umrar River, District Umaria have been studied. The organic matter comprises rich black debris, biodegraded, amorphous and structured material, mainly composed of land-derived plant fragments, e.g., leaf cuticles, twigs, stem (elements with bordered pits, xylem and phloem tissues) and roots with their various degradational phases. The basal part of the sequence indicates reducing environment of deposition while upper part denotes a slow depositional setting under moderately oxidizing conditions. Two palynozones have been recognized: the basal-most sequence is characterized by the dominance of *Callumispora* and *Jayantisporites*, while the younger sequence is dominated by *Parasaccites–Plicatipollenites* and zonate triletes in association with striate-bisaccate pollen affiliated to the Lower and Upper Karharbari miofloras. Record of

Dictyotidium, *Muraticava*, *Leiosphaeridia*, *Balmeella*, *Foveofusa* and *Tetraporina* suggests a brackish water regime during deposition of these sediments. The present study deals with the age of spores-pollen assemblages and the characteristics of organic matter in order to assess the depositional environment of lithologically undifferentiated, coal-bearing Early Permian strata of South Rewa Basin, Madhya Pradesh.

Key-words—Palynology, Organic matter, Early Permian, Umaria Coalfield, Madhya Pradesh, India.

Occurrence of *Aninopteris* (Matoniaceae) from the Middle Jurassic of East central Iran

MAJID MIRZAIE ATAABADI[1]*, MOHAMMADALI DJAFARIAN[2] AND JAFAR MOHAMMADALIZADEH[3]

1- Department of Geology, Faculty of Science, University of Esfahan, Esfahan, Iran

2- Esfahan Natural History Museum, Teymoori Hall, Esfahan, Iran

3- Hamedan Museum of Natural History, Bu Ali Sina University, Hamedan, Iran

**Corresponding author, E-Mail: majid.mirzaie@helsinki.fi,*

Present address: Department of Geology, Faculty of Science, University of Helsinki,

P. O. Box 64, FIN-00014 Helsinki, Finland.

ABSTRACT

Mirzaie Ataabadi M, Djafarian M & Mohammadalizadeh J 2005. Occurrence of *Aninopteris* (Matoniaceae) from the Middle Jurassic of East central Iran. Palaeobotanist 54 : 99-106.

Aninopteris Givulescu and Popa 1998, a matoniacean fern originally known from the Lower Jurassic deposits of Romania, has been recently reported from the Middle Jurassic coal bearing deposits of Mazino mine, south of Tabas region, east central Iran. This is the second record of this genus, excepting its original occurrence from the Anina region of Romania. Besides the younger age, the Iranian material differs from the type material in having a higher

number of sporangia, and less branched secondary veins. Thus, *Aninopteris formosa* var. *persica* var. nov. is proposed for the studied material.

Key-words—Filicales, Matoniaceae, Middle Jurassic, Hojedk (Mazino) Formation, East central Iran.

Evaluation of earliest Permian flora of India and its equivalents in other Gondwana continents

KAMAL JEET SINGH, ANIL CHANDRA AND SHAILA CHANDRA

Birbal Sahni Institute of Palaeobotany, 53,University

Road, Lucknow - 226007, India

E: Mail - kamaljeet31@hotmail.com

ABSTRACT

Singh KJ, Chandra A & Chandra S 2005. Evaluation of earliest Permian flora of India and its equivalents in other Gondwana continents. Palaeobotanist 54 : 107-113.

The Talchir Formation occurs at the base of the Indian Gondwana sequence resting directly on the Precambrian basement and is conformably overlain by the coal bearing Damuda Group. It is a treasure trove of plant fossils and holds clue to the origin and subsequent rise of Glossopteris flora. Mega and palynofossils of the Talchir Formation reported from various basins of peninsular India are reviewed in the light of new researches. A comparative study of homotaxial flora from other Gondwana continents indicates uniformity and similarity in plant types at the generic level. The flora reconfirms an Early Permian age equivalent to Asselian-Sakmarian for the Talchir Formation.

Key words—Talchir Formation, Gondwana, Early Permian, Floral evaluation.

Ultrastructure of the pericarp in the fruit of *Calophyllum inophyllum* Linné (Clusiaceae)

USHA BAJPAI

Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow 226 007, India.

ABSTRACT

Bajpai U 2005. Ultrastructure of the pericarp in the fruit of *Calophyllum inophyllum* Linné (Clusiaceae). Palaeobotanist 54 : 115-119.

The family Clusiaceae is represented in the Tertiary flora of India by leaves, wood and a solitary fruit. The identification of the fruit with Clusiaceae is suspect. Therefore, the pericarp in the fruits of C*alophyllum inophyllum* Linné of the family Clusiaceae (= Guttiferae) has been examined under the scanning electron microscope to generate anatomical data that may help in identification of fossil clusiaceous fruits.

Key-words—fruit, pericarp, ultrastructure, *Calophyllum*.

Short Communication

New names for two angiospermous pollen grains from the Tertiary sediments of Assam, India

G.K. TRIVEDI

Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow 226 007, India.