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(w.e.f. 20.06.2003)

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Professor of Botany
Department of Botany
Banaras Hindu University
Varanasi 221 005

(up to 19.06.2003)

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Dean of University Instructions &
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Panjab University
Chandigarh 160 014

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DST, Technology Bhavan
New Mehrauli Road
New Delhi 110 016

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New Mehrauli Road
New Delhi 110 016

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CGO Complex, Lodhi Road,
New Delhi 110 003

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Former Professor of Botany
University of Allahabad
Allahabad 211 002

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University of Chandigarh
441, Sector 6
Panchkula 134 109, Haryana

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Professor V.S. Ramamurthy,
Secretary or his Nominee
DST, Technology Bhavan
New Mehrauli Road
New Delhi 110 016

Shri Arun Sharma,
Joint Secretary
& Financial Adviser or his Nominee
DST, Technology Bhavan
New Mehrauli Road
New Delhi 110 016

Professor J.S. Singh
Department of Botany
Banaras Hindu University
Varanasi 221 005

Professor Manju Banerjee (From 06.11.2001)
Department of Botany
Calcutta University
35, Ballygunge Circular Road
Kolkata 700 019

Dr H.K. Gupta,
Secretary,
Department of Ocean Development,
Mahasagar Bhavan, Block 12,
CGO Complex, Lodhi Road,
New Delhi 110 003

Members (Ex-officio)
Professor M.P. Singh
Pro-VC and Head, Department of Geology, Lucknow University, Lucknow 226 007

Shri. P.C. Mandal
Director General

Geological Survey of India,
27, Jawaharlal Nehru Road,
Kolkata 700 016

Dr. M. Sanjappa
Director
Botanical Survey of India,
P-8, Brabourne Road,
Kolkata 700 001

Member-Secretary (Ex-officio)

Director,
Birbal Sahni Institute of Palaeobotany,
Lucknow 226 007

Non-Member Assistant Secretary (Ex-officio)

Registrar,
Birbal Sahni Institute of Palaeobotany,
Lucknow 226 007

Geological Survey of India,
27, Jawaharlal Nehru Road,
Kolkata 700 016

Dr. M. Sanjappa
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P-8, Brabourne Road,
Kolkata 700 001

Member-Secretary (Ex-officio)

Director,
Birbal Sahni Institute of Palaeobotany,
Lucknow 226 007

Non-Member Assistant Secretary (Ex-officio)

Registrar,
Birbal Sahni Institute of Palaeobotany,
Lucknow 226 007

RESEARCH ADVISORY COUNCIL

Chairman
(w.e.f. 01.10.2003)

Professor G.K. Srivastava
Former Professor of Botany
University of Allahabad
Allahabad 211 002

Member-Convener (Ex-officio)

Director,
Birbal Sahni Institute of Palaeobotany,
Lucknow 226 007

Members

Dr K.R. Gupta
Adviser (ESS), DST
Technology Bhavan, New Mehrauli Road
New Delhi 110 016

Professor B.D. Sharma
Kathmandi
Narnaul 123 001

Professor A.K. Singhvi
Planetary and Geosciences Division
Physical Research Laboratory, Navrangpura

(up to 30.09.2003)

Professor J.S. Singh
Department of Botany
Banaras Hindu University
Varanasi 221 005

Member-Convener (Ex-officio)

Director,
Birbal Sahni Institute of Palaeobotany,
Lucknow 226 007

Members

Dr K.R. Gupta
Adviser (ESS), DST
Technology Bhavan, New Mehrauli Road
New Delhi 110 016

Professor B.D. Sharma
Kathmandi
Narnaul 123 001

Professor I.B. Singh
Department of Geology
Lucknow University

Ahmedabad 380 009

Dr N.D. Mitra
49 D, Townshend Road
Bhawanipur
Kolkata 700 025

Professor C.G.K. Ramanujam
Emeritus Professor, Dept. of Botany
University P.G. College of Science
Osmania University, Saifabad
Hyderabad 500 004

Professor P.K. Khare
Department of Botany,
Allahabad University,
Allahabad 211 002

Dr. R.R. Rao
Director Grade Scientist
CIMAP Research Station
Allalasandra, GKVK PO
Bangalore 560 065

Dr. D. Ray
Group General Manager, Head
KDMIPE
Oil & Natural Gas Corporation Limited
9, Kaulagarh Road,
Dehradun 248 195

Professor D.M. Banerji
Department of Geology
Delhi University
Delhi 110 007

Member (Ex-officio)

Senior Dy. Director General,
Geological Survey of India,
Northern Region,
Sector 'E', Aliganj,
Lucknow 226 020

Non-Member Secretary

Dr. Jayasri Banerji or her Nominee,
Birbal Sahni Institute of Palaeobotany
53 University Road, Lucknow 226 007

Lucknow 226 007

Dr N.D. Mitra
49 D, Townshend Road
Bhawanipur
Kolkata 700 025

Professor S.N. Agashe
Department of Botany,
Bangalore University
401, 41st Cross, 5th Block
Jayanagar,
Bangalore 560 041

Professor P.K. Khare
Department of Botany,
Allahabad University,
Allahabad 211 002

Professor Manju Banerjee
Department of Botany
Calcutta University
35, Ballygunge Circular Road
Kolkata 700 019

Dr. D. Ray
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Panchkula 134 109

Member (Ex-officio)

Senior Dy. Director General,
Geological Survey of India,
Northern Region,
Sector 'E', Aliganj,
Lucknow 226 020

Non-Member Secretary

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

FINANCE & BUILDING COMMITTEE
(w.e.f October 01, 2003)

Chairman (Ex-officio)

Professor J.S. Singh
Chairman, Governing Body
Birbal Sahni Institute of Palaeobotany

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Shri Arun Sharma
Joint Secretary & Financial Adviser
or his Nominee, DST, New Delhi

Professor M.P. Singh
Member, Governing Body
Birbal Sahni Institute of Palaeobotany

Shri V.P. Garg
71, Mall Avenue
Avas Vikas Colony
Lucknow 226 001

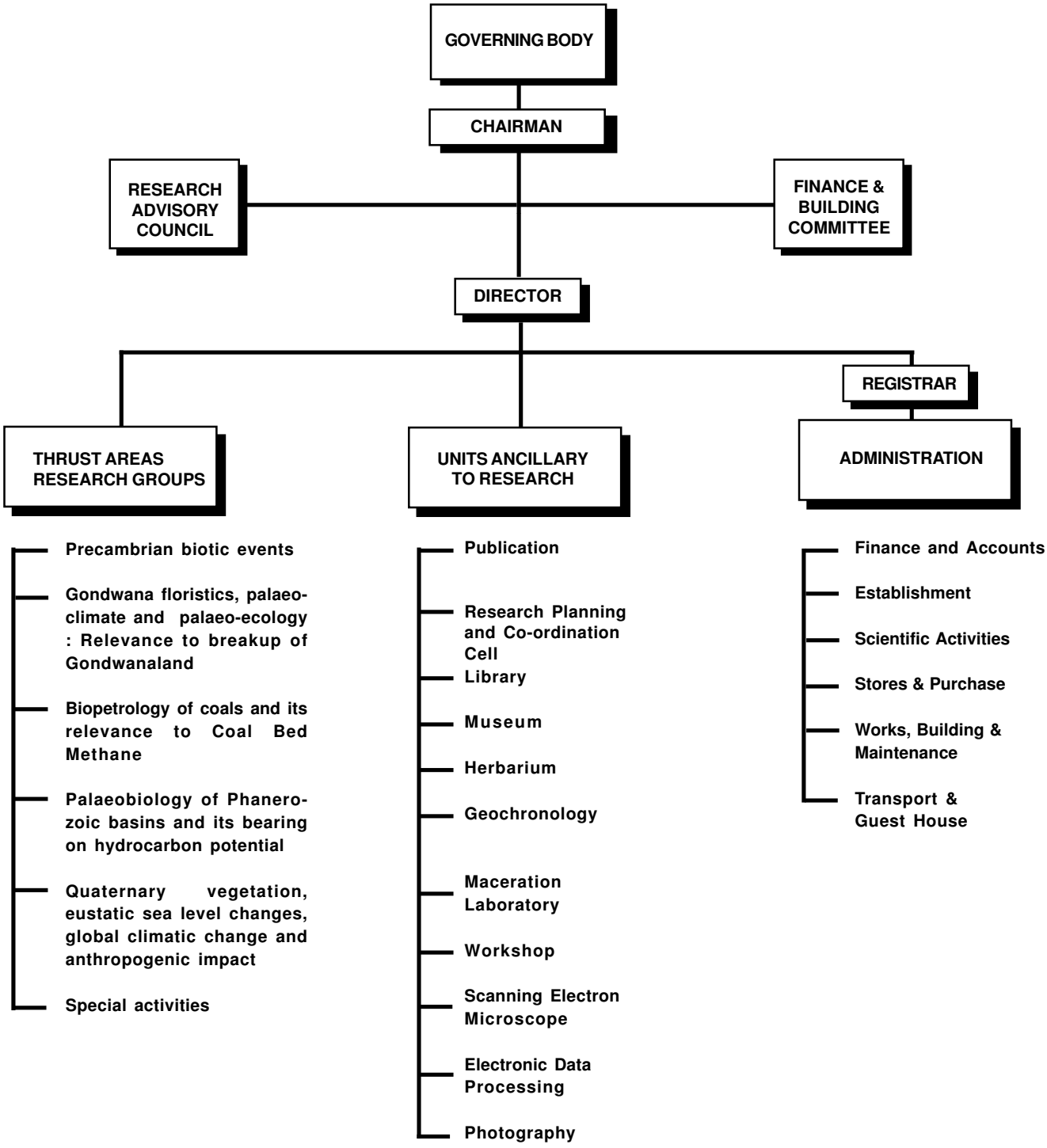
Member (Ex-officio)

Director
Birbal Sahni Institute of Palaeobotany
Lucknow 226 007

Non-Member Secretary (Ex-officio)

Registrar
Birbal Sahni Institute of Palaeobotany
Lucknow 226 007

BSIP ORGANISATIONAL SET-UP



Research

Thrust Area: PRECAMBRIAN BIOTIC EVENTS

Project 1: Biodiversity and Sedimentary history in Meso-Neoproterozoic sediments of Vindhyan and Chhattisgarh Supergroups

Component 1: Biodiversity in Meso-Neoproterozoic sediments of the Vindhyan Supergroup

Studied samples from Satna and Nagod areas to identify mega- and micro-fossils. The studies yielded carbonaceous mega-remains from the Sirbu Shale Formation (Bhander Group) exposed near Satoli village in well cutting section on Nagod-Amangunj road. The forms recorded include *Chuaria, Tawuia, Protoarenicola, Longfengshania, Tyrasotaenia, Mioheophyton, Glossophyton, Beltinia* and complete form of model of Chuaria's lifecycle proposed by Kumar (2001). This assemblage indicates presence of the upper part of Tawuia assemblage zone, and the zone is just below the Vendian, thus indicates Pre-Vendian age for the Bhander Group. The stromatolites and microfossils recorded earlier also indicate Late Precambrian age for these sediments.

Manoj Shukla

Recorded a rich assemblage of akinetes from the Mesoproterozoic Jaradag Fawn Limestone (~1.6 Ga) of Semri Group exposed in the Son Valley. Large ellipsoidal microfossils have been found in the early diagenetic cherts associated with stromatolites in this limestone. The population of nostocalean akinetes belongs to different species of Archaeoellipsoides, viz. *A grandis, A. minor, A. major* and *Brevitrichoides* sp. Although the cyanobacterial records are in plenty but heterocysts and akinetes are not well recorded in Proterozoic rocks. Heterocyst forming cyanobacteria have evolutionary significance, in making estimates of presence of environmental oxygen.

Undertook field work and collected samples from Vindhyan sediments exposed around Sonebhadra. Stromatolites, viz. *Conophyton, Ephyaltes, Colonnella, Siren, Minicollumella, Mistassinia, Stratifera* and *Thyssagetes* have been recorded from Kajarahat and Fawn Limetsone formations in Son Valley. Carbonaceous microfossils are noted in the Olive Shales and Rohtas Limestone Formation. Occurrence of carbonaceous mega-remains in the Olive shales is the oldest level of their report in the Vindhyan sediments.

Mukund Sharma

Component 2: Biodiversity in Meso-Neoproterozoic sediments of the Chhattisgarh Supergroup

Carried out further studies on the biological remains, both mega carbonaceous remains from the shales and microfossils from the chert material, available in museum, belonging to Tarenga Formation (upper part of Raipur Group) collected from Kodwa village, Durg district. The carbonaceous macrofossils are of three types- i) longfengshanids: a) frond containing long stipe, and b) short stipe; ii) Chuarids, eg., *Chuaria circularis*; and iii) septate trichome (*Palaeosiphonella*). The morphology of the longfengshanids is similar to the sporophyte of the extant form, viz., *Dictyoneuropsis sanbogusa* belonging to brown algae. The isolated organic-walled microfossils (OWM) from the macerated residue and thin section of the chert include 4 genera belonging to the Chroococaceae and Stegonemataceae families and one problematical form- perforated tongue shaped structure containing stipe cf with extant genus *Erythrocystis saccata* Golf. The acritarchs comprised

of 5 genera of 2 subgroups (Sphaeromorphida, Sphaerohystrichomorphida) are present in the assemblage. The genera are *Cymatiosphaerida, Leiosphaeridia, Meghystrchosphaeridium, Gangasphaera* and *Saharadia*.

The recovered forms are very significant for assigning the age and palaeoenvironment of the upper part of the Chhattisgarh Supergroup. The analysis of OWM indicates Vendian age and calm environment during the deposition of the Tarenga Formation. Prepared two provisional drafts of the manuscript on the OWM.

Rupendra Babu

Thrust Area: GONDWANA FLORISTICS, PALAEOCLIMATE AND PALAEOECOLOGY: RELEVANCE TO BREAKUP OF GONDWANALAND

Project 2: Floral evolution and Biostratigraphic significance in Damodar and Son-Mahanadi basins

Component 1: Palynostratigraphy and patterns of evolution in palynofloras through Permian and Mesozoic sequences in Damodar-Panagarh-Birbhum Basin

Carried out palynological study on samples from 213 to 905 m thick Gondwana sequence encountered in bore-hole DPD-3 of Deocha-Pachami area, Birbhum Coalfield. Tentatively 12 palynozones are identified in the total of 692 m strata, comprising three formational units- Talchir Formation (earliest Permian - 893.50-905.00 m), coal horizon Barakar Formation (Early Permian - 311.60-893.50 m) and Dubrajpur Formation (Triassic-Jurassic - 212.45-311.60 m). Further study for precise dating of these lithologic units is in progress.

Vijaya

Component 2: Floristics, biostratigraphy and palaeoenvironmental studies of the Gondwana sediments in Sohagpur Coalfield

Identified two palynoassemblages in samples from bore-hole SMP-1. Assemblage-I (depth 140.30-53.00 m) revealed the dominance of *Plicatipollenites* over *Parasaccites* in association with *Faunipollenites*, *Crescentipollenites, Potonieisporites, Cahenia-saccites*, etc. indicating Early Permian age, which correlates with lower Talchir palynoassemblage. Assemblage-II (47.00-14.00 m) shows dominance of *Parasaccites*, *Jayantisporites* and *Callumispora*. Early Permian age has been assigned to the assemblage. The palynological analysis from bore-hole SMP-3 (71.00-117.70 m) also revealed the prominence of *Parasaccites, Plicatipollenites, Jayantisporites* and *Callumispora* in association with *Crescentipollenites, Brevitriletes, Faunipollenites, Striatopodocarpites, Cahenia-saccites* and *Microfoveolatispora*. This palynoflora indicates Early Permian age, and correlates with the lower Karharbari assemblage. Chemical processing of 5 samples from Tala area (Bandhogarh Formation) was found to be barren. Collected fresh samples from bore-holes and outcrop sections of the field.

Ram Awatar

Component 3: Morphotaxonomy, floristics, evolution, biostratigraphy and palaeo-environmental studies of Ib-River Coalfield (Orissa) and Mand-Raigarh Coalfield (M.P.)

Identified two palynoassemblages in sediments of bore-hole OIOC-74 from Brijaraj Nagar Area, Ib-river Coalfield. Assemblage I (depths 86.50-125.00 m and 144.20-238.00 m) dominate with *Striatopodocarpites* followed by *Faunipollenites*. Other genera include *Crescentipollenites, Scheuringipollenites, Ibisporites, Striapollenites, Verticipollenites, Densipollenites magnicorpus, Rhizomaspora, Aperturopollenites, Microbaculispora, Parasaccites*, etc. Occurrence of younger elements *Arcuatipollenites* with *Densoisporites* and *Lundbladispora* at 56.50 m shows the closing end of coal sequence. Hence, this part of the sequence is suggested to be of latest Late Permian age. Palynoassemblage II (256.00-287.00 m) dominates with Faunipollenites and Ibisporites. This composition indicates late Early Permian (equated with Upper Barakar Formation). Palynoassemblages correlatable with the palynoflora of Upper Barakar and Raniganj formations are also recovered from the surface samples in the Bakibihar area of Gopalpur Pahar.

K.L. Meena

Component 4: Palaeofloral and dispersed organic matter characterization in Early Cretaceous deposits of central India

Carried out palaeofloral (mega) and palynofacies (SEM and LM images of polished and thin sections of sediments, frequency distribution of palynoflora and organic matter) studies from beds (samples collected at 10-15 cm interval of the vertical section) exposed along Sher River cutting near Sehora, District Narsinghpur (MP). Several forms of Ptilophyllum leaf are reported. The section is divided into three units- Unit-I shows megaflora, abundant recycled Permian saccate grains and rich amorphous OM; Unit-II shows rich Early Cretaceous spores, amorphous, biodegraded and black debris; while Unit-III displays scanty spores and pollen grains, rich black debris and structured terrestrial OM. The overall palynofacies and palaeofloral data indicate that the sedimentary sequences were deposited in a fluvio-lacustrine framework.

The Early Cretaceous deposits at Chhoti Pali, District Umaria (MP) contain rich leaves and ovules of Ginkgo, which shows morphological similarity with its extant counterparts *G. biloba*. An attempt has been made to study evolutionary lineage, comparison of morphological as well as transitional phenotypic features of this fossil genera recorded from various horizons of South Rewa, Satpura, and Rajmahal basins, Raghavpuram mudstone, etc. It is observed that all these fossil forms occur in various geological age retained primary as well as advanced vegetative features. The plant fossils of South Rewa Gondwana Basin, which are preserved as compressions, possess leaves, leafy twigs and seeds.

Wood flora is not reported so far except *Araucarioxylon* sp. from Triassic bed of Tikki Formation. The report of *Podocarpoxylon* is made for the first time from Bansa Bed of Jabalpur Formation with occurrence of a new species *P. bansaense*, differs from earlier reported woods in radial and cross-field pit characters (with A. Rajanikanth).

Undertook field work for further collection of plant fossils and palynological samples from various localities of South Rewa and Satpura basins. Traversed and collected samples from river cutting sections exposed along Umrar River near Jhala (Chandia). Megafloral impressions collected from Chhoti Pali showing rich *Ginkgo* and *Gleichenia, Elatocladus, Araucarites*, etc. In Satpura Basin a good exposure is noticed along the Belkher and Baihram, located at MP-Maharashtra boarder.

Madhav Kumar & Neeru Prakash

Component 5: Morphotaxonomy, floristics, biostratigraphy and palaeoecological studies in Korba and Hasdo-Arand coalfields

Out of 300 specimens collected from Manikpur, Kusmunda, Laxman, Dipika and Gevra coal mines of Korba field, more than two third of the material belonging to the last 3 collieries have been thoroughly processed,

identified, and 40 good specimens are photographed. The overall assemblage is dominated by the genus Glossopteris with 10 species (*G. communis, G. indica, G. damudica, G. browniana, G. karanpurensis, G. pantii, G. nimishea, G. stenoneura, G. intermittens, G. sastrii*) followed by the taxa *Vertebraria indica, Gangamopteris cyclopteroides, Cordaites* sp., *Noeggerathiopsis hislopii, Euryphyllum indicum, Dictyopteridium sporiferum*, scale leaves of *Eretmonia ovoides* and equisetalean stems. The presence of *Gangamopteris*, *Noeggerathiopsis*, *Euryphyllum* and *Cordaites* along with *Glossopteris* in Gevra Colliery suggests an age equivalent to Lower Barakar, while the sediments of Dipika and Laxman collieries have been dated as Upper Barakars as the flora here has plenty of equisetalean stems, Vertebraria axes, *Noeggerathiopsis*, some fructifications and the genus *Glossopteris*.

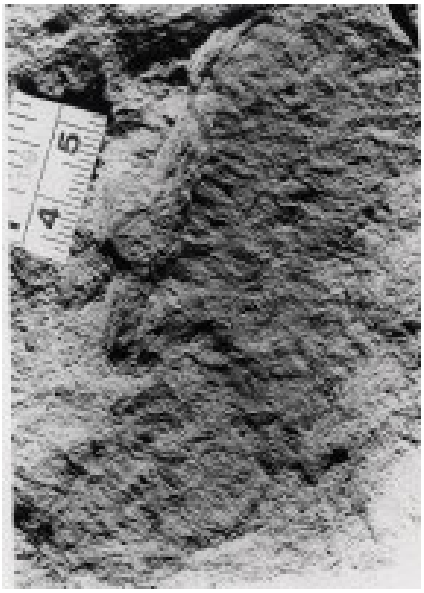
Undertook field trip to Korba Coalfield (Chhattisgarh) and collected fresh megafossil specimens (315) from eastern and southern parts of the field covering 5 different collieries and an outcrop belonging to Barakar and Talchir formations respectively.

K.J. Singh

Project 3: Vegetational patterns, Palaeogeography and Palaeoenvironmental analysis of Satpura-Wardha-Godavari and Gujarat-Rajasthan basins

Component 1: Palaeobotany, evolution, biostratigraphy and palaeoecology of Gondwana sediments of Wardha-Godavari Basin

Analysed systematically a rich assemblage comprising 9 genera and 13 species of megaspores from Barakar Formation of Umrer Coalfield. The assemblage comprises *Bokarosporites rotundus, Banksisporites utkalensis, Duosporites congoensis, Duosporites irregularis, Duosporites* sp,. *Talchirella trivedii, Barakarella pantii, Jhariatriletes baculosus, Biharisporites waigaonensis sp. nov., B. umrerensis , Lagenoisporites* sp. and *Setosporites hirsutus*. Two new species of the genus, viz. *B. waigaonensis B. umrerensis* along with *Lagenoisporites* and *Setosporites* characterize the present assemblage. A manuscript entitled Permian Gondwana megaspores of Wardha Basin, India has been finalised (with A. Rajanikanth and Neerja Jha).



New Glossopterid fructification from Kamthi Formation, Kamtee Coalfield, Wardha Basin

Identified plant fossils collected from Barakar Formation of Umrer Coalfield and Kamthi Formation of Bazargaon-Satnavri and Semda areas of Nagpur district. The assemblage from Barakar Formation comprises species of *Gangamopteris, Glossopteris, Noeggerathiopsis, Scutum* and equisetalean axes. The assemblage from Kamthi Formation comprises *Glossopteris angustifolia, G. indica, G. arberi, G. conspicua, G. communis, G. stenoneura, G. tenuifolia, G. feistmantelii, G. subtilis, G. intermittens, G. rhabdotaenioides, Neomariopteris hughesii, Schizoneura gondwanensis* and equisetalean axes. Systematic analysis is under progress. Photography of specimens from Kamthi Formation has been carried out.

Undertook a field trip to Nagpur, Chandrapur, Ballarpur, Kanhargaon and adjoining areas and collected fresh Permian plant megafossils and rock samples for megaspore investigations. The megafossil assemblage from the above areas comprises various species of the genera *Gangamopteris, Glossopteris, Noeggerathiopsis, Schizoneura*, equisetalean axes and a new fructification genus.

Rajni Tewari

Component 2: Palynology of Gondwana sediments of central and southern parts of Godavari Basin and its phytogeographic significance

Carried out quantitative analysis of samples from bore-hole SSP-141 and SSP-133 from Sattupalli area. In SSP-141, Early Permian (Lower Barakar) palynoassemblage demarcated at 145.50 m depth shows dominance of *Scheuringipollenites* and subdominance of striate disaccates, chiefly *Striatopodocarpites* and *Faunipollenites*. Presence of megaspores recorded at depth between 145.5 and 81.0 m. In bore-hole SSP-133, Late Permian palynoassemblage recorded at 309.0-179.0 m shows dominance of striate disaccates, chiefly Striatipodocarpites and Faunipollenites, and occurrence of *Guttulapollenites, Corisaccites, Chordasporites*, *Klausipollenites, Crescentipollenites, Osmundacidites, Falcisporites, Strotersporites*, etc. in very low (1-2%) frequency.

Compiled and finalized a manuscript on mega- and microfloral (from bore-hole 726) studies from Manuguru area. Processing of samples and scanning of slides have been carried out from Narvarigudem area. Also visited different areas of Kothagudem and Chintalpudi sub-basins for collection of bore core and surface samples for palynological studies.

Neerja Jha

Component 3: Biostratigraphy and palaeoenvironmental studies in Wardha and northern part of Godavari Valley Coalfield

Completed chemical processing of samples from bore-holes WEK-1 and 3 from Chandrapur district. Two distinct palynological assemblages have been identified. In WEK-1 (at 477-455 m depth) shows *Plicatipollenites* dominance and *Parasaccites* as subdominant and at 436-300 m palynoflora shows *Parasaccites* dominant along with *Plicatipollenites* as subdominant. Occurrence of non-striate disaccate pollen is less than striate disaccate. Striate disaccate pollen (*Striatopodocarpites, Faunipollenites*) have been identified in this assemblage along with Callumispora, which shows younger aspect of palynofloral succession. In WEK-3 (at 353 m depth), palynoflora shows dominance of *Parasaccites*. Striate disaccate dominant assemblage has been found at 105 m with *Guttulapollenites* and *Corisaccites*. *Densipollenites* is major monosaccate genus present in the assemblage. Radial monosaccate dominant assemblage is correlated with Talchir Formation. Sriate disaccate dominant assemblage is correlated with Upper Permian mioflora. Megaspores have also been recovered from samples at different depth. Also undertook field trip to Wardha Valley at Chikkni area in Chandrapur district and Austona area in Yeotmol district and collected fresh bore-hole samples for palyno-correlation.

A.P. Bhattacharyya

Component 4: Morphological and evolutionary significance of Satpura Gondwana flora and their bearing in stratigraphy, palaeoecology and palaeoenvironment

The morphological and structural studies of different types of glossopterid leaves suggest that morphologically identical leaves possess varied types of cuticular features. The data are being analyzed to evaluate the taxonomic significance of fossil cuticles and impact of climate on cuticular variations. The frond of *Botrychiopsis* and Rubidgea-leaf has been recovered for the first time in Satpura Gondwana Basin. Number of carbonized seed specimens recovered in the assemblage has been sorted out to investigate the structural features and taxonomic affiliation.

In addition, the palaeobiodiversity trend in the Gondwana fossil flora of India has been examined and development, extinction and diversification pattern at different time span have been discussed.

A.K. Srivastava

Component 5: Mesozoic terrestrial ecosystems of peninsular India

Evaluated plant fossils recovered from the Kota Formation (PG Valley) belonging to pteridophytes- *Gleichenia* and *Sphenopteris*, Coniferales- *Pagiophyllum* and *Coniferocaulon* for ecological inferences. Occurrence of fish fossils associated with other vertebrate fossils along with small plant parts suggests lacustrine deposition. Recovery of lower plant members of Hepaticae suggests prevalence of marshy conditions and near vicinity of provenance. Studies on elongated ribbon shaped leaves resembling Gnetales indicate continental fresh water deposition for the Gangapur Formation

A. Rajanikanth

Component 6: Palaeofloristics of the Jurassic-Cretaceous sequences of Gujarat and Rajasthan

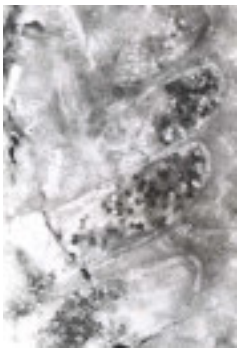
The study of megafossil assemblage from Tarnetar, Surendranagar district (Gujarat) reveals the presence of *Cladophlebis* sp., *C. kathiawarensis, Gleichenia nordenskioldii* (sterile form), *Matonidium* sp. (sterile and fertile forms), *Onychiopsis psilotoides* (sterile and fertile forms) and *Araucarites macropterus*, etc. This assemblage is dominated by pteridophytic remains and devoid of any cycadophytes. The occurrence of *G. nordenskioldii* and *O. psilotoides* undoubtedly supports the Lower Cretaceous (pre-Aptian) age for the present plant assemblage. The bulk maceration of samples collected from Trambau and Dharesi localities of Kachchh district did not yield any interesting mega- as well as microfossils.

Undertook a field trip (with J.P. Mandal) for fresh collection of megafossils and palynological samples from different Jurassic-Cretaceous localities of Rajasthan (4 localities- Habur, Sarnu, etc.) and Gujarat (8 localities- Trambau, Dharesi, Nangor, Kakadbhit, Mori Bet, etc. in Kachchh; Tarnetar and Than in Surendranagar districts). A fairly rich megafossil assemblages are collected from different areas, including in situ preserved continuous horizontal beds of algal as well as bryophytic remains from the *Isoetites*-rich locality near Than. It is interesting to note that these beds are successively overlying the *Isoetites* bearing bed.

B.N. Jana

Project 4: Floral evolution and Biostratigraphy of Rajmahal Basin

Component 1: Terrestrial megafloral change during Mesozoic in Rajmahal Basin



Circular-oval insect droppings on *Ptilophyllum* leaf

Carried out investigations on the megafloral assemblage from Early Cretaceous sequences of Rajmahal Basin. In addition, plant-insect interaction during the Period has also been studied. Three distinct types of evidences of insect-plant relation have been observed for the first time from the basin. Evidence of phytophagy is deciphered by the presence of various types of feeding traces, i.e. marginal and non-marginal, continuous and discontinuous, window type and mining traces on *Nipaniophyllum* and *Ptilophyllum* leaves. Besides these feeding traces indication of herbivory is also visualised by the presence of circular-oval insect droppings on *Ptilophyllum* leaf. Another evidence of insect plant interaction observed on frond of *Phyllopteroides*, where lamina was used for ovipositional site containing oval egg impressions occurring along veins in groups. Third evidence is the presence of insect galls on *Nipaniophyllum* leaf, where insect used leaf lamina for shelter has also been recognized.

Jayasri Banerji & A.K. Ghosh

Component 2: Biostratigraphy of Gondwana sediments in Rajmahal Basin

Carried out palynological dating of the rock sequences representing Dubrajpur and Barakar formations in bore-holes RJKS-1 (depth 107.05-145.50 m), RJKS-7 (201.50-13.50 m) and RJKS-8 (114.25-5.35 m) of Brahmani Coalfield. The palynofloras having *Aequitriradites* and *Ruffordiaspora* indicate Early Cretaceous age for upper part of the sequence. The Late Permian palynoflora is recovered from the underlying strata (below 56.10 m in RJKS-7, and 28.40 m in RJKS-8). Studied the distribution pattern of stratigraphically important taxa in the strata intersected in bore-holes RJKS-2, RJSJ-5, RJMC-4 and RJU-5. The results are being compiled.

Archana Tripathi

Thrust Area: BIOPETROLOGY OF COALS AND ITS RELEVANCE TO COAL BED METHANE

Project 5: Origin, Depositional environment and Economic potential of Indian Coal and Lignite deposits

Component 1: Biopetrological and geochemical characterization of Indian lignites

Processed samples collected from the Mine 1 and Mine 2 areas of the Neyveli lignite field. 120 lignite samples are crushed, sieved, and prepared pellets. Selective samples are polished and studied their maceral characteristics under normal and fluorescence modes. Study shows the richness of huminite group of macerals. Conspicuous occurrences of phlobaphinite, suberinite, sporinite, cutinite, alginite along with the mineral matter are recorded. Preliminary study of reflectance shows low rank in nature. Also visited CFRI and CMRI (Dhanbad), CMPDIL (Ranchi), GSI (Kolkata), Jadavpur, and MECL (Nagpur) in order to have the geochemical studies of the samples, besides the permissions for the bore core samples from the drilling sites. Undertook field trip to Barmer, Bikaner, Rajpardeeh, Vastan, Gogha, Kharsalia, Panandhro and adjoining areas for the collection of lignites and associated sediments.

Rakesh Saxena

Component 2: Biopetrological investigations on coals of Wardha-Godavari Valley coalfields in relation to coal bed methane

Carried out the maceral study on the coals from Makardhokada area (bore-hole MR-149) of Nagpur district, Maharashtra. On the basis of their constitution these coals are classified under vitric, fusic and mixed types. In addition to this, elemental analysis of the coals representing Telwasa Open Cast Mine has revealed the existence of 3.68% of sulphur in the middle part of the coal seam. Also undertook field trip to Godavari Valley for collection of fresh core coal samples.

O.S. Sarate

Component 3: Petrological evaluation of Rajmahal Basin coals in relation to economic potentiality and depositional history

Compiled maceral, microlithotype and vitrinite reflectance (rank) data of the coals representing seams-I-VIII from Chuperbhita Coalfield. The sub-bituminous A to high-volatile bituminous C stages (Ro max. 0.42-

0.56%) coals contains variable proportions of vitrinite with occasionally dominant inertinite and poor liptinites (up to 12%) associated with dispersed mineral matter. However, qualitative study and quantitative estimation of macerals under blue light excitation have shown appreciably high amount of hydrogen-rich macerals (liptinite and perhydrous vitrinite). The liptinite maceral group (7-66%) is chiefly constituted by sporinite (spores-pollen), alginite (algae- Botryococcus + lamalginite), and liptodetrinite (detritus). Cutinite (cuticles), fluorinite (essential oils), resinite (resin/wax), etc are in subordinate amount. Sporinite showed wide range of preservational stages from well-preserved to highly degraded and fragmented.

Alpana Singh & B.D. Singh

Component 4: Petrological investigation of coals from Jhilimili-Sonhat-Sohagpur coalfields (Son Basin) in relation to coal bed methane and carbonization properties

Completed preparation of coal pellets (30) and some selected coal blocks representing different lithotype bands from Kurja and Kapildhara underground mines of the Sohagpur Coalfield. Preliminary petrographic observation on the coal pellets indicates that these coals are moderately rich in macerals of vitrinite group, whereas liptinite macerals are common to frequent. The maceral sporinite (pollen-spores) appears to be the chief constituents of the liptinite group. The macerals of the inertinite group are apparently the second dominat fraction after the vitrinite. The coals also contain pyrite along with argillaceous mineral matter.

B.K. Misra, B.D. Singh & Alpana Singh

Component 5: Petrographic and cleat study of the Tertiary bright coals from Makum Coalfield, Assam in relation to CBM prospects

Since the maceral exsudatinite is generated secondarily during coalification, it is frequently wrongly recognized or misidentified. Therefore, a search on the Tertiary coals from Assam and Meghalaya was made to record the maceral on large number of coal pellets for their proper characterization and also to observe its influence on cleat cementing. It has been found that the maceral inherently tends to migrate and penetrate into the existing microcleats of varying widths. So far, in no instance the maceral has been found to widen the microcleats on its own. This observation suggests that the maceral exsudatinite, though present in these coals in minor amount (up to 2.4%), tends to cement the existing microcleats and fractures, etc., during the first coalification jump and bituminisation stage (between sub-bituminous and bituminous coal stages).

B.K. Misra

Thrust Area: PALAEOBIOLOGY OF PHANEROZOIC BASINS AND ITS BEARING ON HYDROCARBON POTENTIAL

Project 6: Palaeofloristics, Evolutionary trends and Palaeoenvironment of Late Cretaceous-Cenozoic basins

Component 1: Tertiary floristics of north-western peninsular India

Sectioned and studied about 50 fossil woods from Kachchh (Gujarat) and Bikaner (Rajasthan) areas. The Kachchh woods belong to Infra- and Intertrappean sediments. From the Late Cretaceous of western

Kachchh, a few gymnospermous woods have been identified. Similarly, from the eastern Kachchh, a few dicotyledonous and palm woods have been identified from the Intertrappeans of Anjar. Further work on these woods is in progress. Some of the identified wood samples from the Plio-Pleistocene sediments of Bikaner area belong to the taxa Lagerstroemia, Terminalia and Dipterocarpus. Also undertook a field trip to various fossiliferous localities of Rajasthan and Gujarat and collected a large number of megafossils.

J.S. Guleria

Component 2: Palynology, facies analysis, palaeoclimatic and palaeoenvironmental studies on Palaeocene-Eocene sediments in Rajasthan Basin

Continued the studies on recorded palynofossils from Akli Formation exposed in Giral lignite mine, Barmer Basin. Specific attention is paid towards the morphological diversity in angiospermic pollen present in the assemblage. Considerable variation is noticed in pollen grains having affinity with the family Arecaceae in general and Nypa in particular. The pollen, strikingly confined to this basin only, is represented by monosulcate, diporate and triporate forms and shares some common characters suggesting a link between them. It is concluded that plants of Nypa inhabited more variable ecological conditions than now which triggered a rapid evolution in morphograhic features. The range of morphological variation in these forms and their possible relationship is studied. Attempt is also made to decipher the evolution in apertural and exinal characters in chronological order. A comparative study of palynofloras from lignite mine and the bore-hole (MJ-4) drilled near Jalipa is also made and many palynotaxa of common occurrence are noticed.

Organic remains present in the macerated residue of the samples from Giral mine are also studied for palynofacies analysis. These studies will provide significant information about the parameters that controlled the fresh water and terrestrially derived palynological material in marine deposits. Based on nature of DOM, six groups are identified and data are generated with respect to the quantitative representation of each group.

S.K.M. Tripathi

Component 3: Tertiary floristics of peninsular India from Ratnagiri, Neyveli, Kerala, Bahur Basin (Pondicherry) and the adjoining areas

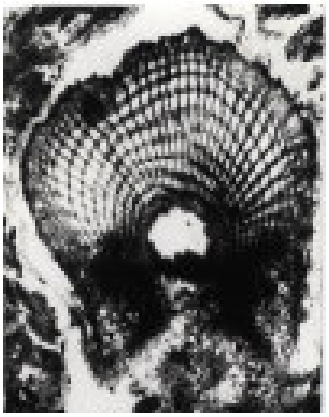
Carried out sectioning and investigation of 35 carbonised woods from Ratnagiri, Maharashtra and Kerala. Studied fossil fruits and leaves from Ratnagiri Beds and Neyveli Lignite and finalized the results. SEM study of fossil leaves and seeds/fruits is in progress. Further study on fossil leaves from Neyveli Lignite (Tamil Nadu) is also in progress.

Undertook a field trip for the collection of plant megafossils (fruit, leaves, carbonised and petrified woods) from Kerala (Varkala, Cannanore, Payangadi, Kundra, Quilon), Tamil Nadu (Neyveli), Pondicherry and adjoining areas. Sorting and documentation of fresh materials from South India has been done. Finalized a paper entitled "A carbonised fossil seed Terminalia chebula sp. nov. from Kalviwadi, Sindhudurg District, Maharashtra, India"

Anil Agarwal

Component 4: Palaeofloristics of sedimentary sequences associated with Deccan Traps

A few fossil circular to subcircular ascocarps made up of many closely placed hyphae forming radial and transverse strands in thin sections of chert collected from the village Mohgaon Kalan were recorded for the first



Polyhyphaethyrites giganticus from the village Mohgaon Kalan

time. Besides, finalized two papers, one dealing with a fossil fruit showing affinity with Boehmeria (Urticaceae) from Mohgaon Kalan, Chhindwara district (MP), and another dealing with a fossil wood of Lannea from Deccan Intertrappean sediments of Betul district (MP).

Rashmi Srivastava

Component 5: Palynology of the Deccan Intertrappean sediments: Implication and correlation

Processed rock samples collected from the Deccan Intertrappean exposed in newly dug-well about 200 m north of the classically studied well section at Padwar village, Jabalpur. The assemblage recovered is marked by Maastrichtian markers taxa, viz. *Ariadnaesporites, Azolla cretacea, Triporiletes* and *Gabonisporites*. In general, the assemblage is dominated by pteridophytic spores (*Cyathidites* and *Dictiophyllidites*), which together contribute about 53%. Algal spores and filaments are frequently present. Angiospermic pollen are rare and are represented by tricolpate and triporate forms. Gymnosperms are not yet observed in the assemblage. The assemblage suggests that the sediments were deposited in small pond. Samples from sections in Mohgaonkalan, Chhindwara district are also collected and processed. The palynoassemblage recovered is very poor and only few Maastrichtian forms are recovered, however the sediments contain full of silicified megafossils. Apart from these many thin intertrappean sections exposed around Jabalpur and Chhindwara are also studied, but they did not yield any organic remains. These samples are being reprocessed using various chemical treatments. Collected rock samples from marine Late Cretaceous sequences from Pynursla, Ranikor and Cherrapunjee, Khasi Hills (Meghalaya).

R.S. Singh

Component 6: Evolution and diversification of the flowering plants in the Assam-Arakan Basin during Tertiary

Investigated cuticular fragments/dispersed cuticles recovered from the plant fossils of Dilli-Jeypore and Makum coalfields, Assam and finalized a manuscript on this aspect. The investigation of the leaf impressions from the Disang sediments of Manipur is under progress.

R.C. Mehrotra

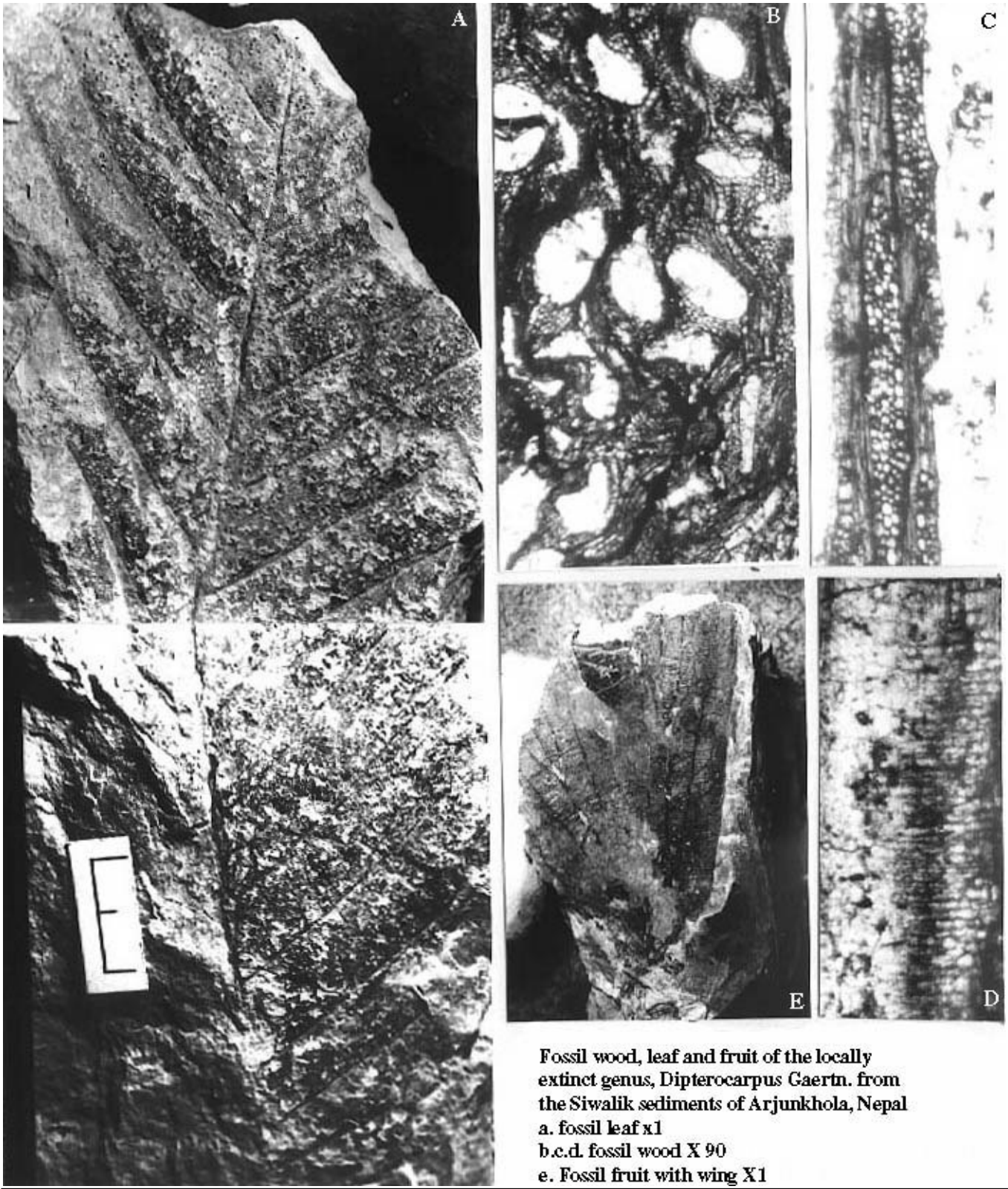
Component 7: Study on Tertiary plant megafossils of north-west Himalayas

Leaf remains from Dharamsala sediments of Himachal Pradesh were studied. The identified leaves belong to family Fabaceae, Rubiaceae and Combretaceae. A manuscript on some identified leaves from Kasauli has been finalized.

J.S. Guleria & Rashmi Srivastava

Component 8: Siwalik foreland basin: Floristics, evolutionary pattern and climate

Studied plant fossils from Siwalik sediments of Kathgodam (Uttranchal), Bilaspur and Jawalamukhi (HP), and Suraikhola and Arjunkhola (Nepal). Finalized a manuscript incorporating leaf and fruit impressions from



Fossil wood, leaf and fruit of the locally extinct genus, Dipterocarpus Gaertn. from the Siwalik sediments of Arjunkhola, Nepal
a. fossil leaf x1
b.c.d. fossil wood X 90
e. Fossil fruit with wing X1

Lower Siwalik sediments of Bilaspur. Plant fossils (27 species) from Kathgodam area belong to both monocot and dicot families. On the basis of nearest living relatives, the floral assemblages consist of 3 major types of elements- evergreen (50%), evergreen and moist deciduous (24%), and moist deciduous (22%). Thus, the evergreen floral elements dominated the area during Miocene Period, in contrast to mixed deciduous elements that exist today. The present habit and habitat of the recorded taxa show that they occur mostly in tropical evergreen and moist deciduous forest of northeast India, Bangladesh, Burma, Malaya and adjoining areas, which receive higher rainfall. It is therefore surmised that warm and humid climate prevailed in the Kathgodam area at the time of deposition in contrast to relatively dry climate at present day.

Plant megafossils from Arjunkhola reveal the presence of wood, leaf and fruit of the extant taxa *Dipterocarpus* and *Chrysophyllum* of the family Dipterocarpaceae and Sapotaceae respectively. Fruit of *Dipterocarpus* is reported for the first time from Tertiary sediments.

Identification of some more leaf impressions collected from various Siwalik sediments has been carried out at CNH, Howrah. The modern comparable taxa are- Commifera camelata (Burseraceae), Xanthophyllum glaucum, Zanthoxylum alatum (Rutaceae), Olax wightiana (Olacaceae), Paramignia monophylla (Meliaceae), Millettia inermis, M. atropurpurea (Fabaceae), Choenemorpha monophylla (Apocynaceae), Gerniera thomssonii, Bridellia retusa (Euphorbiaceae), etc. Also visited Siwalik localities around Oodlabari and nearby areas in Darjeeling District (WB) and collected a lot of well preserved leaf impressions and some carbonised woods from Sevok Road, Ramthi, Ghish, and Lish River sections.

Mahesh Prasad

Component 9: Neogene of sub-Himalayas of Arunachal Pradesh: Palynostratigraphy, floristic pattern and climate

Studied palaeopalynology of Dafla Formation exposed on Likabali-Along Road, West Siang district. The recovered assemblage is mainly composed of fungal forms, pteridophytic spores and angiospermous pollen grains. The important palynofossils are- Cyathidites, Todisporites, Osmundacidites, Lygodiumsporites, Striatriletes, Proxapertites, Palmaepollenites, Pluricellaesporites, Frasnacritetrus, Rhizomaspora, Gondisporites, Monosaccites. Palynoflora have been compared to those with the extant members of the families, viz. Cyatheaceae, Osmundaceae, Schizeaceae, Parkeriaceae, Aracaceae, etc. The distribution of families indicates that the area enjoyed tropical to subtropical, warm-humid climate at the time of deposition of Dafla sediments. The basin had connections with fresh water swamps with ponding conditions near by. Presence of reworked Gondwana palynofossils indicates that the Gondwana sediments were exposed near by and may be the source rocks for the younger Tertiary sediments. Also undertook field work and collected fresh rock samples from Upper Tertiary localities, viz. Kimin-Ziro Road Section (Papumpare district), and Pasighat-Rengging Road and Pasighat-Ledum Road sections (East Siang District).

G.K. Trivedi

Project 7: Palynostratigraphy and Palaeoenvironment of Cenozoic basins of peninsular India

Component 1: Palynological investigation of the Eocene sediments of Shillong Plateau

Recorded a rich and diverse palynoassemblage from the Kopili Formation (Late Eocene) exposed along Umrongso-Haflong Road, North Cachar Hills, Assam. The assemblage includes fungal remains, pteridophytic spores, gymnospermous and angiospermous pollen and reworked palynofossils. The important palynotaxa of the

assemblage are- *Lygodiumsporites eocenicus, Cyathidites australis, Foveosporites triangulus, Striatriletes susannae, S. multicostatus, S. paucicostatus, Intrapunctisporis intrapunctis, Monolites mawkmaensis, Polypodiaceaesporites indicus, Polypodiisporites mawkmaensis, P. speciosus, Podocarpidites ellipticus, Inaperturopollenites punctatus, Spinizonocolpites echinatus, Proxapertites assamicus, Tricolpites minutus, Densiverrupollenites eocenicus, Pellicieroipollis langenheimii, Tricolporopollis matanomadhensis, Palmidites plicatus, Palmaepollenites nadhamunii, Margocolporites sahnii, M. complexum, Verrucolporites verrucus, Tricolporopilites robustus, Dermatobrevicolporites dermatus, Triporopollenites* sp., etc. Reworked palynofossils are represented by *Strotersporites*, *Klausipollenites* and *Callialasporites*. The palynoflora indicates a tropical-subtropical, warm-humid climate with heavy precipitation during the sedimentation of the Kopili Formation. The environment of deposition has been interpreted as coastal with ponding conditions nearby. The source area of the reworked Permian palynofossils may be Lower Gondwana exposures in Singrimiri, Garo Hills (Meghalaya). The present assemblage is identical to the Kopili assemblage recorded from the neighbouring Jaintia Hills and is Late Eocene in age.

R.K. Saxena & G.K. Trivedi

Component 2: Palynological study of Tertiary sedimentaries and its bearing on the evolution of palynoflora of Kachchh Basin

Palynological assemblage from the Chasara Formation exposed at Khari Nadi shows low generic diversity but high abundance. The assemblage is recovered from the basal Claystone Member of the section, while the upper Siltstone Member is devoid of palynofossils. Striatriletes is the dominant taxon and the subdominant genera are *Palaeomalvaceaepollis, Malvacearumpollis, Caprifoliipites, ?Hibisceaepollenites* and *Warkallipollenites*. Other pteridophytic spores are rare. A type of fungal body, possibly chlamydospores/conidia is well represented. The palynomorphs support the early Miocene (Burdigalian) age, which is based on lithological and paleontological evidences. The poor preservation of spores, pollen and cuticles suggests that: i) they were carried to the deposition site from a distance, and ii) possibly deposited in oxidizing and alkaline conditions. Abundance of *Striatriletes* indicates swampy condition in nearby flood/ delta plain. Water channels carried palynofossils to the place of deposition. *Warkallipollenites*, a mangrove element suggests deposition in delta mouth under brackish-shallow marine condition. Also undertook field work (with B.N. Jana) in areas of Kachchh and Rajasthan and collected palynological samples from different measured sections.

J.P. Mandal

Component 3: Tertiary palynostratigraphy and palaeoecology of east coast of India

Carried out chemical processing of rock samples from Thondamanattam and Saderpeta localities of Pondicherry area, and Niniyur, Kallamedu, Cholankurichi and China Anandavadi of Ariyalur area (Cauvery Basin). Scanning and photodocumentation of selected taxa have been done. Morphotaxonomy and identification of spore-pollen recovered are taken up and continued. Completed processing of bore-hole samples of Sellur (ME-603 provided by MECL, Nagpur), Tiruvaur District (TN). Scanning and photodocumentation of the selected taxa and identification have also been completed. The assemblage is mainly consists of fungal remains, pteridophytic spores and angiosperm pollen. The important genera are- *Lygodiumsporites, Crassoretitriletes, Polypodiaceaesporites, Polypodiisporites, Palmaepollenites, Palmidites, Lakiapollis, Warkallipollenites, Stephanocolpites, Meliapollis* and *Graminidites*.

Undertook a field trip to East-Coast of India to study and collect various rock samples from Upper

Cretaceous-Tertiary sediments exposed at Ariyalur and adjoining areas (Tamil Nadu), Pondicherry and adjoining areas, and Rajahmundry and adjoining areas (Andhra Pradesh). Collected about 80 samples from 8 sections in Cauvery (5) and KG basins (3) for palynological investigation. Thickness, lithology and fossil contacts of the formations are studied and located their contacts with the adjacent formations.

M.R. Rao

Component 4: Palynostratigraphy and palynofacies analysis of Tertiary sediments of Upper Assam Basin

Studied samples (depth 4487.5-2100 m) of Bihpuria Well-A provided by OIL, Duliajan to characterize organic matters and palynoflora. Bihpuria is situated at north bank of River Brahmputra in the North Lakhimpur district. The well encountered sediments of Sylhet (4484-4371 m - Late Palaeocene), Kopili (3290-2460 m - Late Eocene), Tipam (4099-3290 m - Late Miocene), Namsong (3290-2460 m - Pliocene) and Dekhiajuli (Plio-Pleistocene) + Alluvium (2460-1550 m + 1550 m - surface). Sylhet and Kopili deposits exhibit marginal marine shelf, while other overlying sequences show fluvi-lacustrine and alluvial settings. The basal sequence (depth 4444-4100 m) comprising rich spore-pollen, dinoflagellate cysts, biodegraded and amorphous organic matters. The amorphous OM shows formation of pyrite framboids (solitary and polyframboid clusters). A detailed morphological study of these framboids (based on SEM/ BSE images) and its element analyses (based on EDAX spectrum) have been attempted (with Usha Bajpai) to decipher environment of deposition. The composition and frequency of various elements, e.g. S, Fe, C, N, Ca, Mn, O, Si, etc. involved during genesis of framboid is explained. The study suggests: i) establishment of redox level and sulphidic water column in margin shelf deposit (Sylhet Formation), ii) frequency, size and clustering of framboids are directly proportionate to reducing condition of the sequence which is higher at bottom of the section, and iii) closely packed pyrite framboids occur in fracture and cavities of OMs indicate enhanced microbial decay and supply of iron from external sources.

Carried out palynofloral analysis of 6.1 m thick river cutting section exposed along Bara Langpher River, north of Lumding, District Karbi Anglong. The taxa recorded are- *Dictyophillidites kyrtomatus*, *Striatriletes* spp., *Operculosculptites* sp., *Clavaperiporites jacobii, Compositoipollenites cenicus, Polyadopollenites miocenicus, Tricolporopollis rubra*, fungal fruiting bodies of *Phragmothrites* and *Pluricellaesporites* and some recycled Permian grains of *Alisporites*, *Verticipollenites, Rhizomospora*, etc. This assemblage indicates Late Miocene age for the sequence and shows similarity with other contemporaneous subsurface deposits of the basin, e.g. Cachar Hills, Jowai-Badarpur Road, Tripura, etc. The occurrence of rich *Operculosculptites* sp., *Striatriletes* complex, polypodiaceous and pteridaceous spores suggests continental fluvial depositional environment under subtropical condition.

Madhav Kumar

Component 5: Palynological investigation of Miocene sediments of Tripura and Mizoram

Collected and processed samples from the sediments exposed in Bungtlang area. Early Middle Miocene age marks the palynoassemblage recovered, comprises *Crassoretitriletes, Osmundacidites, Alsophyllidites, Pteridacidites, Todisporites, Dictyophyllidites, Cyathidites, Trisyncolpites, Compositoipollenites, Malvaceaerumpollis, Hibisceaepollenites, Graminidites, Spinizonocolpites* etc. In general, the assemblage is dominated by angiospermic pollen followed by pteridophytic spores and fungal remains. Dinoflagellate cysts and algal filaments are frequently represented. Gymnospermic pollen are rare and are represented by *Pinuspollenites, Podocarpidites* and *Cedripites* forms. The composition of assemblages is indicated by the existence of brackish water swamps and prograding delta complex with fresh water influx. The presence of back

mangrove *Malvaceaerumpollis* and *Spinizonocolpites* referable to coastal element like *Nypa* indicates near shore environment of deposition.

The outcrops (thickness 800-1200 m) are also observed along the course of Tripura and Mizoram hills. Due to the structural complexity and rapid variation in thickness, altogether 450 samples are collected. Different sections of the litholog have been made on the basis of lithological characters. Lithologically the Bhuban Formation is dominated by massive claystones, dark grey to black splintery shales and sandstones.

B.D. Mandaokar

Project 8: Marine micropalaeontology of Mesozoic-Cenozoic basins: Implications on Palaeoenvironment and Sea Level changes

Component 1: Jurassic nannofossils from western Indian continental shelves and their palaeobiogeographic implications

A carbonaceous shale sample displaying profuse ichnofossils (Thalassinoides) burrows bearing abundant fossil leaf impressions belonging to upper part of Umia Formation exposed along Bhuj-Nakhatrana Road opposite Jakh temple (ca. 5m thick succession) has yielded about 30 nannofossil species of low diversity and moderate preservation. The taxa are- *Braarudosphaera cf. B. africana, Cyclagelosphaera argoensis, C. Margerelli, C. rotaclypeata, Cylandralithus nudus, Diazmatolithus lehmanni, Eprolithus* sp., *Gartnerago nanum, Hayesites irregularis, Laguncula* spp., *Prediscosphaera columnata, Quadrum intermedium, Reticapsa angustiforata, Rucinolithus hayi, Rucinolithus* sp., *Tranolithus orionatus, Thoracosphaera saxea, Watznaeuria barnesae, W. Britannica, W. ovata*, etc. The assemblage is dated early Middle Albian of Lower Cretaceous age. The assemblage belongs to CC8 *Prediscosphaera columnata* zone of Perch-Nielsen, 1985 and corresponding with NC8 *Tranolithus orionatus* total range zone straddling B/C subzone (tenable both in Tethyan and boreal provinces) which falls well within Tethyan ammonite dentatus zone.

The DOM studies of same sample showed high degree of biodegradation (amorphous OM) with very little charred grains indicating quieter sedimentation in the basin. Also undertook a field work in the Mesozoic succession of Kutch, and collected samples of various members of Chari, Katrol and Umia formations from Jara and Keera Domes. Lignite samples of Matanomadh Formation are also collected from fresh excavated Matanomadh mine.

Jyotsana Rai

Component 2: Micropalaeontology of fossil algae from Late Cretaceous-Early Palaeocene sequence of Cauvery Basin

Studied morphotaxonomy of calcareous algae from the Palaeocene sequence of Cauvery Basin. Palaeoenvironmental implications of the algal assemblages have been highlighted. Algal flora of the well-known Ninniyur Formation of Ariyalur district (TN) has also been studied in detail. In addition, a rich assemblage comprising 16 species of calcareous algae have been recorded from the Karasur Formation (Palaeocene) of Pondicherry area. This algal assemblage is represented by Disocladella sp., *Indopolia* sp., 4 species of *Sporolithon*, 2 species of *Lithothamnion*; *Mesophyllum* sp., 2 species of *Lithophyllum*; *Tenarea* (*Distichoplax*) sp., 2 species of *Corallina*, and 2 species of *Amphiroa*.

Species diversity of calcareous algae, viz. corallinaceans, sporolithaceans, geniculate corallines, dasyclads and other forms from the Palaeocene sequence of Cauvery Basin has been analysed. The overall composition of algal flora of the Ninniyur Formation

indicates a middle-shelf, low energy environment. On the other hand, the algal assemblage of the Karasur Formation broadly indicates shallow, shelf environment with slightly medium energy condition.

A.K. Ghosh

Component 3: Dinoflagellate cysts and palynofacies study of the Upper Cretaceous-Palaeocene succession of the south Shillong Plateau: Implications to palaeoenvironment and relative sea level changes

Documentation and study of calcareous nannofossils from a continuous Danian-Selandian sequence (Langpar-Therria formations) from Um Sohryngkew section revealed a succession of nannofossil events (FAD & LAD) closely comparable with the low latitude global nannofossil zonation. Several zonal markers of NTp1, NTp2, NTp3, NTp5 and NTp7 Zones of Varol (1998) have been recorded, covering almost the entire Danian interval, and suggesting a strong potential for demarcation of the Danian-Selandian boundary in the area.

Rahul Garg

Study of dinoflagellate cysts and palynofacies from the upper part of the Tura Formation and the Siju Formation exposed along the Tura-Dalu road and Dilni River section (Garo Hills), shows significant changes in the dinocyst distribution in the Lower-Middle Eocene (Ypresian-Bartonian) succsession. A low diversity dinocyst assemblage (represented mainly by *Cordosphaeridiun* and *Glaphyrocysta*) occurs in the Tura Formation (Ypresian) is replaced by a rich and well-diversified assemblage in the larger foram bearing Siju Limestone (Lutetin-Bartonian), containing several marker taxa, viz. *Aerosphaeridium diktyoplokus, Damassadinium impages, Enneadocysta arcuata, Melitasphaeridium asterium, Turbiosphaera symmetrica*). The variations in dinocyst/palynofacies distribution pattern are indicative of a sudden change from marginal/ coastal marine conditions to more stabilized, shallow inner shelf normal marine depositional environment.

Finalized a manuscript on the late Palaeocene dinoflagellate cysts from the coal bearing Lakadong Sandstone exposed at the Jathang Hill, Mawsynram area, Khasi Hills section. Revised another manuscript entitled "Significant dinocyst biohorizons in the Upper Cretaceous- Palaeocene succession of the Khasi Hills, Meghalaya".

Rahul Garg, Khowaja Ateequzzaman & Vandana Prasad

Undertook a field work in the Mawsynram area (Khasi Hills) to study and sample the Upper Cretaceous-Palaeocene succession. Detailed sampling for phytoplankton and palynofacies study has been done from the Jathang Hill, Latmawksing Hill, Rangsanobo-Mawsymram, and Ranikor-Barsora Road sections.

Rahul Garg & Vandana Prasad

Blooms of the warm-water heterotrophic dinoflagellate Apectodinium, recorded from the coal-bearing Lakadong Sandstone (Cherrapunji-Mawsynram Plateau) and their intricate association with rich terrestrial organic matter, palynomorphs and desmid algae, have been assessed with relation to the PETM (Palaeocene-Eocene Thermal Maxima) global warming Event. Due to the low paleo-latitude position of the South Shillong Plateau, the study provides a significant insight into the impact of PETM related palaeoenvironmental and climatic changes on the biotic turnover in a marginal marine setting across the Palaeocene-Eocene boundary in equatorial region. It is envisaged that warm and humid climate with enhanced precipitation and coastal runoff resulted in a high input of organic detritus and lowered salinity, which raised surface water productivity in a restricted marginal marine setting that proved advantageous to sudden blooming of these heterotrophic dinoflagellates. Finalized two manuscripts related to this theme- "Predominance of *Apectodinium* dinoflagellate cysts in the Late Thanetian of northeastern India: Biotic response to the PETM Event in a low latitude marginal sea" and "Earliest record of fossil desmid algae from the coal-bearing Lakadong Sandstone, Mawsynram area,

Khasi Hills, Meghalaya".

Vandana Prasad, Rahul Garg & Khowaja Ateequzzaman

Studied palynofloral distribution in the Late Thanetian-Late Ypresian sequences of the South Shillong Plateau. It comprises palynofloral composition of 4 stratigraphic sections of Lakadong Sandstone (Late Thanetian) from Mawsynram and Cherrapunji Plateau, Khasi Hills and one stratigraphic section from the upper part of Tura Formation (Late Ypresian), western Garo Hills. The palynofloral assemblage of Late Palaeocene (Lakadong Sandstone) is mainly represented by *Dandotiaspora, Spinizonocolpites, Palmidites, Proxapertites, Bombaccacidites, Arecipites* and *Couperipollis* showing predominance of back mangrove and deciduous rain forest elements. *Spinizonocolpites* accounts upto 30% of the palynoflora and is associated with *Apectodinium* rich dinocyst assemblages suggesting that *Nypa*-like vegetation existed along the low lying marginal marine regions of studied areas during Late Palaeocene. The palynoflora of Tura Formation is characterized by absence of brackish swamp elements and dominance of more diversified deciduous coastal forest elements represented by *Lanagiopollis, Tricolporopilites*, *Margocolporites* and *Palaeocesalpiniaceaepites*. Thus, a definite pattern of palynofloral change is reflected by replacement of brackish swamp vegetation of Late Thanetian to more diversified and well established low land deciduous flora during Late Ypresian.

Vandana Prasad & Rahul Garg

Component 4: Palynostratigraphy and palaeoenvironment analysis of the Lower Tertiary rocks, N-W Himalayas: Implication to palaeoclimate and foreland basin evolution

Carried out palynostratigraphical study of the Lower Tertiary sediments of Dharmsala and its adjoining areas of Himachal Pradesh. Various productive horizons have been located from Kunihara and Bandla areas. Assemblage recovered from the Eocene sediments exposed along Manji Khad (near Kunihara) contains well-preserved dinoflagellate cysts, spores and pollen grains. Morphotaxonomic study of the recovered palynotaxa is being carried out. Recovered a rich palynoflora mainly consisting of algal zygospores, fungal spores and conidia, gymnospermous and angiospermous pollen grains from the 450 m thick section of the Dharmsala Formation exposed along Gaj Khad near the village Ghera, Kangra district. *Striatriletes, Polypodiaceasporites, Polypodiisporites, Acacia-pollenites, Malvacearumpollis, Pinuspollenites,* etc represent the palynofloral assemblage. Quantitatively, bisaccate pollen grains are the most dominant element in the assemblage. The distributional pattern of taxa has been analyzed and interpreted throwing light on its dating potential and environment of deposition.

Carried out chemical processing of 20 samples from Subathu sequence of Kalianpur, Arki district (HP). All the samples are unproductive. Processing of the remaining samples is in progress. Also undertook a field trip for systematic collection of palynological samples as well as for field observations of Dharmsala and Subathu formations of Dharmsala and its adjoining areas. Collected 316 samples from 18 measured stratigraphic sections. Reconnaissance survey is also carried at several other localities to find out their lateral extensions.

Samir Sarkar

As a part of the modern analogue study, the palynofacies characteristics in an estuarine setting have been studied in a two-meter profile of Late Holocene sediments of lower Narmada valley. The palynofacies study is performed on 6 soil samples from 2.0 m deep sedimentary profile near Bharuch, Main-land Gujarat. The sediments have been collected mainly from silty clay and organic rich clay horizon. Ten palynofacies parameters have been taken into considerations- ratio of various type of terrestrial debris, amorphous debris, pollen, spore, ratio of gonaulacoids and peridinioid dinoflagellate cysts, and acritarchs. The palynofacies data favors estuarine setting in which the dominance of terrestrial debris and brackish water planktons indicate

regular supply of fresh water/continental influx. On the basis of palynofacies study the depositional site must be a proximal transitional part of estuary where mixing of fresh water and saline marine water takes place.

Vandana Prasad

Project 9: Palaeofloristics and Palaeoclimate of Andaman and Nicobar Basin

Component 1: Neogene microfloristics of Andaman and Nicobar Islands and their stratigraphic sequence

Studied quantitative abundance fluctuations of siliceous microfossil groups and selected diatom species in the Late Neogene deposits from Neill (East Coast and Nipple Hill Sections- Sawai Bay Formation) and Havelock (Melville Point and Meetha Nala Sections- Long Formation) Islands. On the basis of diatoms and silicoflagellates, biostratigraphical studies of Late Neogene deposits from Neill and Havelock Islands are carried out.

Anil Chandra

Component 2: Palaeomangroves and palaeoclimate in Andaman and Nicobar Islands during Quaternary period

Interpretation of pollen diagram of a section from R.K. Puram, Little Andaman (BS-1595; 36,550 ±870 yrs BP) and its correlation with other two profiles, one from Netaji Nagar, Little Andaman and another (supplied by GSI) from South Andaman (BS-965; 20,890 ±1,360 yrs. BP) is in progress. The 3 major palynological zones (RK-2: 31,500-27,500; RK-6: 18,000-13,500; RK-8: 4,500-1,000) identified in profile exhibited stable sea levels required for the formation of mangrove swamp forest. The occurrence of dense mangrove forests have been recorded only intermittently through the late Pleistocene and Holocene. The upper part of all pollen diagrams show vegetation change over the last ca. 2,000 yrs. BP exhibiting marsh wetland together with dry land endemic forest species before colonization of South and Little Andamans. Late Quaternary pollen data recording mangrove evolution in Andamans show similarity with the dataset obtained from Asia-Pacific, eastern Indonesia and northern Australia. The use of remote sensing data for mangrove ecosystems would offer excellent potential as a tool for monitoring coastal change.

Asha Khandelwal

Thrust Area: QUATERNARY VEGETATION, EUSTATIC SEA LEVEL CHANGES, GLOBAL CLIMATE CHANGE AND ANTHROPOGENIC IMPACT

Project 10: Quaternary vegetation, Palaeoclimate and Palaeoseismisity

Component 2: Studies on palaeovegetational and palaeoclimatic changes in Madhya Pradesh using pollen proxy records

Completed pollen analysis of a 2.0 m deep sediment core from Padauna Swamp II, Shahdol district. Three

phases of vegetation succession and corresponding climatic changes have been recognized in the region, based on representation of major arboreals and non-arboreals. Phase I- during this early phase open savannahs mainly constituted of grasses, *Artemisia*, Caryophyllaceae, Asteraceae, Cheno/Am, etc. together with scattered trees of *Aegle marmelos, Schrebera, Sterculia* and thickets of Oleaceae and Fabaceae occurred in the region under cool and dry climatic condition. Phase II- subsequently, the open mixed deciduous forests got established in the region with the invasion of several trees, viz. *Madhuca indica, Lagerstroemia, Emblica officinalis, Holoptelea, Shorea robusta*, etc. This change in the vegetation pattern reflects the onset of warm and moist climate in the region. Phase III- this top phase is marked by the formation of modern tropical deciduous sal forests, as indicated by the consistent occurrence of *Shorea robusta* and good representation of its associates. The improvement in the forests floristics envisages that the climate changed to warm and more moist owing to increased precipitation.

Carried out pollen analysis of 15 samples from a 1.3 m deep core from Jalda, Shahdol district. The assemblage obtained has shown the good representation of both arboreals and non-arboreals. *Shorea robusta, Madhuca indica, Emblica officinalis, Lagerstroemia, Aegle marmelos, Acacia, Holoptelea*, etc. are the major forest constituents. The profuse herbaceous vegetation includes mainly grasses, sedges, Cheno/Am, Asteraceae, *Eriocaulon*, etc. The overall composition denotes the presence of tropical deciduous sal forests in the region.

M.S. Chauhan

Component 3: Studies on Quaternary vegetation and climate of western Himalayas

Pollen analysed about 2-dozen samples of profile ST-I from Sukha Tal in Nainital district, Kumaun Himalaya and prepared pollen diagram for interpretation of past vegetation and corresponding climate of the region since Early Holocene. In the beginning of sequence the area had predominance of non-arboreals, whereas arboreals were represented by poor presence of *Pinus* pollen. Shrubby vegetation exhibited by families Rubiaceae, Rutaceae and Anacardiaceae. Ground cover had dominance of Poaceae and Cheno/Ams. Spores were absent in the beginning but appeared later on. Whole scenario reflects that open type of vegetation existed at the region during that tenure. Subsequently, arboreal vegetation showed marked enhancement. *Quercus* and *Pinus* were chief elements while *Ericaceae, Ulmus, Carpinus, Betula* and *Celtis* the associates trees. Shrubs, grasses and sedges became reduced in relation to earlier. Spores increased but aquatic vegetation remained devoid of. The change in vegetation pattern indicates establishment of mixed oak forest with warm and humid climate. Thereafter (during Middle Holocene) broad-leaved arboreals became considerably declined but Pinus represented more than double in relation to earlier. Shrubby constituents and herbs showed higher values. Spores became considerably reduced but aquatics

Planispiral Gastropods—Sarea Tal, Kumaun, Himalaya

appeared at upper part of the zone. The floristic change reflects that mixed oak forest became loose in relation to preceding zone- reflecting deterioration in climate. Near onset of Late Holocene broad-leaved arboreals again showed considerable increase but *Pinus* became reduced. Nonarboreals followed declining trend but culture taxa enhanced. Spores became increased and aquatics acquired the summit. Such change reflects the restoration of mixed oak forest at the region with warm and humid conditions. Carried out photography of selective Molluscan shells recovered from sedimentary profiles from Saria Tal, Kumaun Himalaya.

Asha Gupta

Component 4: Palaeoclimatic studies in Schirmacher Oasis, east Antarctica using palynological as well as chronological parameters

Pollen analytical study of 5 moss peat samples and 5 foliose lichen soil collected from 3 km SW of Trishul hill of Schirmacher oasis reflects poor occurrence of exotic plants pollen taxa including grass, however moss spores, diatom and dinocysts are indicative of local origin. Pollen analysis of 5 ice samples of 1.0 m deep ice core from the snout of Dakshin Gangotri glacier in the oasis depicts the occurrence of air borne pollen, fungal spores, diatom and other algal elements in low profile. The maiden study indicates that a continental ice sheet would also incorporate palynodebris that would be transported by ice flow until released by ice melt during glacier retreat. A two fold climatic oscillations, i.e. cold and humid to warm and humid has been recorded from Long lake sediment core near ice shelf NW of Schirmacher Oasis dated back to 2000 yrs BP.

S.K. Bera

Project 11: Proxy climatic signals from Marine and Coastal sediments during Late Quaternary

Component 1: Dinoflagellate cysts from marine sediments as proxy indicators of palaeoenvironmental changes along the western shelf of India during Late Quaternary

An attempt has been made to study the distribution pattern of calcareous and organic-walled dinoflagellate cysts, zooplanktic palynomorphs (copepod egg envelopes and appendages, scolecodonts, tintinnid loricae, foraminiferal lining) and terrestrial organic matter in relation to the oxygen minimum zone from the surface sediment samples from Arabian Sea off the Karwar coast. Zooplanktic palynomorphs predominate over dinocysts within the OMZ, amorphous organic matter abounds in the shallower region (<100m) while well preserved terrestrial organic matter is found to occur in greater depths (~ 3000m).

Rahul Garg & Khowaja Ateequzzaman

Component 2: Algal evidence for Late Quaternary palaeoenvironment changes in the Bengal Basin

Analysed two sediment cores from Ramnagar near Digha, East Midnapur district for algal remains to trace environmental changes. Profile-1 has not yielded any algal remains, however samples of the profile-2 are very rich in diatoms. Brackish-marine plankton diatoms dominate the entire core, represented by various species of *Biddulphia, Cyclotella, Thalassiosira, Pinnularia* and *Gramatophora*. Distribution pattern of diatoms clearly shows that the major biostatigraphic change takes place at a depth of about 65 cm. Partially carried out morphotaxonomic study of the recovered diatoms from surface samples of Ramnagar barrage towards Mohana. Chemical processing of surface (30) and remaining samples of the soil profile is also carried out. Data interpretation is being done. Also undertook a field trip to Digha and Sarsanka areas and collected 4 sediment cores from Sarsanka Lake. Besides, 45 surface samples from different environmental setup are also collected to know the modern algal distribution pattern in the region.

Samir Sarkar

Component 3: Quaternary mangrove vegetation, environment, climate, ecology and sea level changes in south-east coast of India

Carried out palynological study in six sedimentary soil profiles from Kolleru Lake (AP) and adjoining areas. The radiocarbon dates of shells (at 2.8 m depth) from Kaikaluru sand barrier reveal palaeoshoreline in Kaikaluru (11 km west from the present shoreline) around 7490 +/- 110 yrs BP. A gradual fall in sea level is evident from dates of marine shells (3100 yrs BP) in the east of Kaikaluru. No mangroves are observed. It was an open intertidal zone. The Kolleru lake sediment (1.2-1.5 m depth) reveals radiocarbon dates ranging from 1560 to 2600+/- 140 yrs BP. Palynological results indicate lacustrine depositional environment. No mangroves or marine palynomorphs are observed except in the northeastern flank of the lake, where it joins the sea through Upputeru river. Mangroves are recorded here in subsurface sediments.

Carried out palynological study and physico-chemical properties of two sedimentary soil profiles from Iskapalli lagoon (Penner delta, AP). Palynological and radiocarbon dates of the soil sediments show that the northern part of palaeo-Penner river delta has evolved into Iskapalli lagoon in the middle of Late Holocene (2090 +/- 170 yrs BP). Older sand barriers are landlocked and new sand barrier spits with its NW-SE progradation coupled with anthropogenic pressure has reduced the mangrove cover since the last millennium.

Anjum Farooqui

Project 12: Palaeoethnobotanical investigations of Archaeological sites

Component 1: Palaeoethnobotany: Ancient man, plants and environment in north and north-western India- Studies of botanical remains from the ancient sites at Waina and Khairadih in District Ballia, UP

Carried out investigations on the carbonised remains recovered through archaeological excavations during 1995 at Waina. The evidence generated from a wide range of deposits at different depths in the cultural occupation at the site, datable from about 1500-600 BC, revealed the cultivation of rice, two forms of wheat (*Triticum aestivum* and *Triticum sphaerococcum*), jowar-millet, ragi-millet, Italian-millet, lentil, field-pea, chick-pea, green-gram, horse-gram, grass-pea, Indian-mustard, linseed, safflower, cotton, and onion. Associated with these crop plants, the remains of the seeds and fruits of a number of weeds and other taxa have also been identified as belonging to bahera, chiraunji, karonda, anwala, karanj, jujube, jharberi, bhang, foxtail-grass, anjan-grass, indigo, spikebrush, kharanti, broom-segde, dayflower, kulfa, a sedge (*Fimbristylis* sp.), two species of vetch (*Vicia sativa, V. hirsuta*), senwal, jangali-palak, knotweed, nightshade, sawan-millet, and crowfoot-grass. A large number of wood charcoals are also processed for section cutting. Quite a good number revealed anatomical features, up to mark for anatomical studies. The taxa on anatomical grounds of wood charcoals could be identified as belonging to the shrubs and trees of khair/ babul, adusa, bamboo, sheesham, anwala, chilbil, tendu, karanj, mahua, arni, mango, and jamun. Some of the charcoals, having poorly preserved anatomical features, could not be identified.

Khairadih on the bank of Ghaghra is another site, which on being excavated long back in 1984 revealed considerably massive deposits of ancient cultures. A rich collection of carbonised material was collected. A few remains of herbal drug-yielding plants were reported earlier. A rigorous analysis of the cumbersome carbonised material during the current year, have brought out considerable information on agricultural economy and other botanical remains, during 700/600-200 BC. From Khairadih, almost all the crops reported above from Waina are common. However, sesame, moth and cow-pea have incidentally turned up to be new additions. Use of spices and condiments by the ancients is also evident, by the incidental inclusion of coriander and ajwain of Central Asian and Mediterranean region, in our

collection. Senna or sanai (*Cassia angustifolia*), native of Tropical Africa, is of added importance for having been used in native medicines. Presence of another African tree of baobab (*Adansonia digitata*) has been evident by a large number of seeds in uncarbonised state. Introduction of this exotic tree in Indian subcontinent at significant magnitude was done during Greek invasion in 327 BC and later in 15th century AD by Portuguese. Remains of weeds and other wild taxa include the seeds and fruits belonging to jharberi, kulfa, spikerush, anjan-grass, basil, karhar, catchfly, pit-papra, sedges belonging to the species of *Fimbristylis* and *Cyperus*, goosefoot, chilbil, common vetch, anwala, dayflower, kateli, senwal, phalsa, job's tear, jangali-palak, yellow-vetchling, johnsongrass, etc. Several species are under the process of identification. Wood charcoals sectioned and studied, led to the identification of sal, mahua, heens/jhiri, siris, bel, maharukh, mango, mulberry, wood-appl, tamarind, akol, neem, teak, chilbil, bamboo, adusa, jhau, palash, paniala, sheesham, khair/babul, deodar, etc. A few more charcoals are yet to be sectioned.

K.S.Saraswat (till December 2003)
& A.K. Pokharia

Component 2: Palaeoethnobotany: Ancient man, plants and environment in north and north-western India- Studies of botanical remains from ancient sites in UP

Undertook field trip to ancient sites at Saunphari (tehsil Khutar) and Madnapur (tehsil Puwayan), district Shahjahanpur (UP), where excavations were carried out under the UGC Project- 'Archaeology of Ganga Plain'. Collected archaeobotanical materials in fairly good amount from cultural deposits of Early phase of Painted Grey Ware (PGW) and its Late phase in association with Northern Black Polished Ware (NBPW) up to Kushana Period; the latter site situated at a distance of approx. 25 km had single culture deposit of PGW only. Carried out morphological investigation of seed and fruit remains in 36 samples from above ancient sites in cultural horizon of PGW and NBPW to Kushana Period (1000 BC-300 AD) to build up plant economy practiced by the ancient settlers and the regional ecological conditions in the past. The finds belong to cereals- barley, rice, bread wheat; ragi millet, pulses-lentil, khesari/grass-pea, field pea, green gram, black gram, horse-gram/kulthi, aconite/ moth bean, seeds of oil yielding plant-field brassica, jujube, gooler fruits; *Crotalaria* sp. which has a large number of species distributed in the region, the most important is *C. juncea*, commonly cultivated for its fibre-the Sunn-Hemp of commerce and for green manure. Both the sites exhibit similar ancient plant economy but preservation of pulses is less recorded at Madnapur.

Amongst the weeds and wild taxa recovered: are wild grasses- blue stem grass, wild oat, crow-foot grass, barnyard grass- sawan, goose grass, panicum grass, blue or meadow grass; and sedges- flat sedge, spikerush sedge, *Fimbristylis* sedge, bulrush. Other finds are of indigo, hairy indigo, sweet clover- safed senjhi, common vetch, pigweed, white goose-foot (bathua), day-flower faint, lalsabuni, country mallow, morning glory, night-shade, and *Polygonum barbatum, Rumex dentatus* (labbibi, khat-palak), *Silene anthirrhima* (sleepy catchfly) which grows as a field weed. *Dactyloctenium aegyptium* (crow-foot grass) and all the sedges, *Commelina benghalensis* (day-flower faint), *Trianthema portulacastrum* (lalsabuni) may have been the weeds in summer group crops like rice; where as *Indigofera hirsuta* (hairy indigo), *Melilotus alba* (sweet clover, safed senjhi), *Vicia sativa* (common vetch), *Amaranthus* sp. (pigweed), *Chenopodium album* (white goose-foot, bathua) represent the weed components in winter crops like wheat and barley in the ancient agriculture at the site. Amongst the other finds are gooler with edible fruits, Mexican thistle- bharbanda- an American genus used as a medicinal plant, *Verbascum thapsus* (Mullein) is occasional member along water channels, whereas *Polygonum barbatum* and *Rumex dentatus* representing moist and swampy localities in the surrounding of habitational deposits..

Chanchala Srivastava

Project 13: High resolution Climate variability based on Dendrochronological study

Component 1: Development of high-resolution proxy climate records for the western Himalaya

Processed core samples (30) of Himalayan cedar collected from Bhaironghati area in Uttarkashi for crossdating. The presence of very good crossmatching in ring-width patterns helped in preparing one chronology extending 700 yrs (AD 1287-2002). The chronology showed significant relationship with previously prepared ring-width chronologies from Malari and other sites in Garhwal region indicating its utility in the reconstruction of climate variables representative of regional scale features.

Studied cedar from 16 distantly located homogeneous sites in western Himalaya to obtain low frequency variations in temperature long series (exceeding 500 yrs). Selected 60 radii from 45 trees under this process to develop the mean chronology. Premonsoon summer temperature is reconstructed using the calibration model (1960-2000), which captured 44% of the variance in instrumental data also showed stronger verification statistics. The reconstruction showed strong interdecadal scale variations superimposed over the interannual variations. Absence of centennial scale variations in the reconstruction even after using the most conservative standardization options endorses earlier findings that such long-term variations are not preserved in moisture stressed tree-ring records. The reconstruction, as measured by standard deviation, shows high variability in premonsoon summer temperature since 16th century as compared to the early part of the series (AD 1226-1500) reflecting unstable climate during the Little Ice Age Period (LIA). The 1944-1953 recorded the warmest 10-year mean anomaly in whole span of our reconstruction and thereafter temperatures cooled. The cooling recorded during the later part of the 20th century is well in agreement with the instrumental records.

R.R. Yadav

Completed pollen analysis of a 1.0 m deep sediment profile from Naychhudwari bog, Kullu District (H.P.). The study has revealed that between 1300-780 yrs BP, this region had alpine steppe vegetation comprising grasses, sedges, *Artemisia, Impatiens*, Cheno/Am, etc. together with broad-leaved taxa, viz. *Betula, Salix, Quercus, Rhododendron*, etc. under a regime of warm and moist climatic condition. Since 780 yrs BP onwards, the steppe continued to grow in the region, however the increase in the Juniperus and corresponding decline in the broad-leaved elements suggest that the climate changed to cold and dry. The high frequencies of the temperate conifers such as *Pinus, Cedrus, Abies* and *Picea* denote the transportation of their pollen from the lower elevations by upthermic winds.

Carried out pollen analysis of 20 samples from a 2.0 m deep trench profile from Parashar Lake, Mandi District. The pollen assemblage has shown good representation of both arboreals and non-arboreals. *Pinus, Cedrus, Picea, Alnus, Quercus, Betula* and *Juglans* are the major arboreal taxa. The rich ground flora is chiefly composed of grasses followed by sedges, Caryophyllaceae, *Artemisia*, Asteraceae, etc. Fern spores are encountered in excessively high values. The pollen analysis of rest of the core samples is in progress.

M.S. Chauhan

Component 2: Analysis of climatic changes based on multi-proxy data during last 1000 years from peninsular and Himalayan regions

Dated and measured tree-ring samples of several conifers, viz. *Abies pindrow, Juniperus macropoda, Picea smithiana, Pinus roxburghii, Pinus wallichiana,* etc. collected from Kinnaur and adjoining areas. The longest chronologies prepared from these trees are 342 yrs (1661-2002 AD), 135 yrs (1868-2002 AD), 227 yrs (1776-2002 AD), 143 yrs (1860-2002 AD) and 301yrs (1702-2002 AD) respectively. Dating and

measurements of tree core samples of *Cedrus deodara* are in progress.

Undertook a field trip to Gangotri glacier and adjoining areas, Uttarkashi along with Vandana Chaudhary and S.K. Shah, and collected tree-ring samples from various conifer taxa growing in the different parts (902 cores from 477 trees). Besides, a sediment profile of 70 cm deep is also collected from the right bank of the Bhagirathi River and is approx. 500 km downstream from the present day snout position of the Gangotri glacier. Undertook another field trip around Nilambur and adjoining region, Kerala along with Supriya Chakraborty. Tree ring samples (discs) from left over stumps of Teak and also cores from growing teak trees at Nilambur are collected each. Besides, two small sediment profiles one each from Chetuwa mangrove and Kanjani are also collected for palynological analysis.

Amalava Bhattacharyya

Project 14: Special Activities

Component 1: Accretionary evolution, tectonics and palaeoclimate in Lahaul-Spiti, Ladakh and eastern Karakoram regions: Study based on tectonics, geochemistry, sedimentology, petrography, magnetostratigraphy and Palaeobotanical evidences

Recovered the palynofossils of Middle to Late Jurassic age from the well-dated Hettangian *Psiloceras planorbis* (Lower Jurassic ammonitina bed) of the Lamayuru Complex, near Saraks locality (~300-400 m, NW of Khangral Village), in the Indus-Suture Zone. The fine-grained sandstone, siltstone, carbonaceous shale, slate and limestone of turbiditic origin have yielded the dominance of monosaccate pollen- *Callialasporites dampieri followed by Podocarpidites grandis, Alisporites grandis, Murospora florida, Microcachryiditecs antarcticus* and *Podosporites tripakshi*. The assemblage has been correlated with the known Jurassic palynoassemblage of India and Murospora florida Zone of Australia.

The Early Miocene palynofossils have been recorded from the Chiktan Nala Section (near Dachi Village) of the Indus Suture Zone. The assemblage revealed the dominance of *Pinuspollenites crestus, Abiespollenites cognatus Piceapollenites excellensus* and *Podocarpidites densicorpus.* Besides, fungal hyphae, spores and *Microthyriaceous ascostromata* (*Phragmothyrites eocaenicus, Notothyrites setiferus*) in association with reworked Permian palynomorphs (*Virkkipollenites, Striatipodocarpidites, Verticipollenites*) have also been recorded. A new fossil palm-*Amesoneuron hemisiensis* has been identified from the Hemis conglomerate, Ladakh Himalaya. Finalized the paper on the Nindam Formation.

The samples were physically processed at the Institute and Geology Department of Lucknow University for various mineralogical and geochemical analyses. Thin section slides of rock samples were prepared for petrographic studies. Few important samples were sent to Tuebingen, Germany, for geochemical analysis. Clay minerals were separated out from the bulk soil/regolith/ sediment samples for weathering studies. X-ray diffraction study was made for bulk and clay mineral studies. Based on the results, weathering status of the region was ascertained. The data received from Germany were plotted for different studies viz. petrogenesis, weathering etc. The work is in progress to interpret data on volcanic and plutonic rocks of Shyok suture zone and adjoining areas. Contacting various institutes/universities for geochemical analysis on collaboration or payment basis.

Quaternary palaeolake samples from two localities, viz. Spituk-Leh and Khalsar (Ladakh) were studied. Pilot samples from two sections were macerated for pollen studies and analysed but both the sections were found palynologically barren. Lithologically, the >30 m thick Leh section is composed of sand, silt and clay layers and encompasses a time span from ~45,000-25,000 yrs BP. Three dates were obtained from the above mentioned section. The statistical analysis of the magnetic data has also been done. 15 samples of Leh-Spituk section were separated for clay and analysed at the Geology Department of Lucknow University. The samples were high in illite values. Detailed mapping of the Quaternary sediments of the Nubra-Shyok Valley and Indus Valley

(between 77-790 longitude and 32-360 latitude) has been done. Maps have been prepared. Environmental magnetic parameters for palaeoclimate interpretation of the Late Quaternary times in Ladakh have been completed. Four levels containing palaeoseismic structures have been recognized along the Karakoram fault in the Nubra-Shyok valley. Maps, lithologs, sketches have been digitized for presentation and publication.

Ram Awatar, Anupam Sharma, Rajeev Upadhyay & Binita Phartiyal

Component 3: Growth ring studies in fossil woods and their significance in palaeoclimate

Collected relevant data on the occurrence of growth rings in Indian fossil woods. Further work is in progress.

J.S. Guleria

Compiled relevant data on Indian Mesozoic woods for growth ring studies. Carried out xylotomic studies on woods collected from the Kota Formation.

A. Rajanikanth

Component 4: Floral diversity and ecology of Mahuadanr beds, Chachhari Valley, Palamu

Carried out tentative identification of leaf impressions belonging to families Anacardiaceae, Euphorbiaceae, Lauraceae, Leguminaceae, Malvaceae, Meliaceae, Moraceae and Sapindaceae. Samples collected from another section of the valley have been processed and study is under progress. Also undertook field work (with S.K. Singh) and collected fresh samples of shale and petrified woods from the valley.

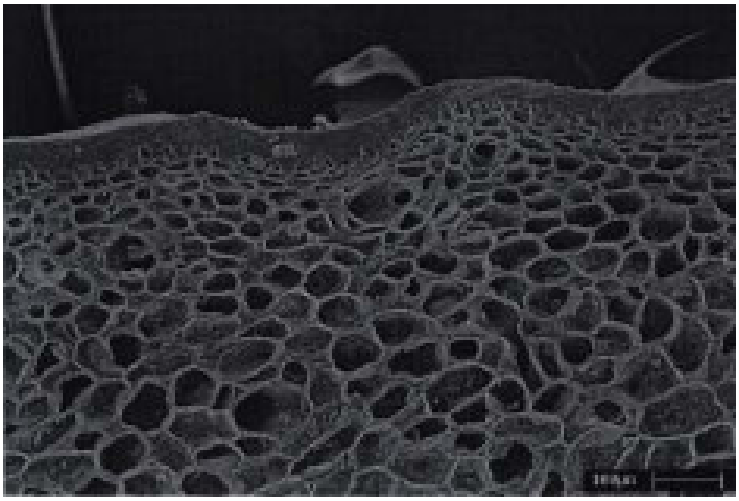
G.P. Srivastava

Component 5: Cryptic morphology of seeds/fruits of the flora of Karnataka (western Ghats) using SEM/TEM techniques and bearing on ecology

Carried out LM/SEM studies of pericarp of *Calophyllum inophyllum* L., *Calophyllum* sp. and *Garcenia xanthochymus* of the family Clusiaceae. SEM investigation has shown the composition of mechanical tissue and pattern of distribution in the fruit wall, which are important characters of taxonomic importance for the identification of fruits. Characteristic features are visible only at very high magnifications. In both the species of *Calophyllum*, each fruit has a thick massive seed. The seed completely occupies the locule. The testa is highly multiplicative and sclerotic. The thin and soft tissue of the endocarp was crushed by the development of seed because the cells of the endocarp are not lignified. The epicarp is composed of multiple layers of thin-walled cells with irregularly arranged vascular bundles. The mesocarp of the fruit is strengthened by lignified, perpendicularly elongated variously curved compactly arranged rows of pitted cells, very specialized of *C. inophyllum* and spiral thickening in C. sp. This woody nature of mesocarp is an important character of the pericarp, which was described as the endocarp. The composition of these mechanical tissues and the pattern of distribution in the fruit wall are characters of taxonomic importance. SEM studies have shown that the delicate unspecialized cells of the endocarp get crushed in the mature fruit by the development of the seed. The cells of the epicarp are highly specialised and with cutin in *Garcenia xanthochymus*. The epidermal cells of the epicarp are showing the continuous canal in the thin sections. The mesocarp is thin-walled with a network of cortical vascular bundles and well-organised secretory canals. The endocarp is a thin-layer, which does not contain secretory canals.

Study of the pericarp of young fruit of *Terminalia*

arjuna under TEM shows numerous rounded plastids. The lamellae of the chloroplasts are compactly arranged and are full of starch grains. In the mature fruit the chloroplasts are typical spindle-shaped with well-developed thylakoid forming grana. In the stacked organization the grana are connected with fret-channels. The ground matrix stroma contains variety of particles, osmiophilic granules, ribosomes, etc. and few starch grains. In the mature fruit the transformation of chloroplast into the chromoplast takes place, the general compartments lose their 'stacked' organisation and appear to slide partially apart at the partitions and remain lined up with overlapping margins. The dark deposits appear to be areas where the membranes may have been separating. The chromoplast varies in shape, with somewhat rounded swollen margins. The thylakoid is sometimes swollen. Blebs were present along the inner membrane of the choromoplasts envelope. The organization of the plastids in the pericarp is expressed as a function of stage of fruit ripeness. Various stages of transformation and observation of new plastids provide a basis for judging the typical structural features of the plastids at progressive stages of ripeness. The cells in young green fruits, apart from the plastids have organelles without vacuolation, which becomes highly vacuolated in mature stages. At ultrastructural level, the change in the colour of the plastids may be explained due to the break down of individual compartments and the initial membrane.



Garcenia xanthochymus—Fine thin section showing secretory canals forming network in exocarp.

Usha Bajpai

Component 6: Aerobiology in relation to pollen production, dispersal and preservation of pollen grains

Reorientation of data of 'An atlas of air-borne pollen grains of Lucknow plants and their allergenic significance' is in progress so as to prepare the text. The whole work is divided into Preface, Contents and Arrangement, Introduction, Glossory of morphological terms of pollen, Aeropalynology at different parts of the country in general and Lucknow in particular, Pollination periods (regular, late, early), Allergy and its significance. The information about hundred allergenically significant plants growing in Lucknow city and around has been compiled with photograph, name, distribution, habit and habitat, pollen incidence and peak in the air of Lucknow, pollen morphology and allergenic impact on human being. The work on pollen production/anther of allergenic anemophilous and entomophilous plants is under process.

Asha Khandelwal

Component 7: Floristic and ethnobotanical studies of Bastar (Chhattisgarh) and Shahdol (MP) districts and automation of herbarium using software

Surveyed North Shahdol Forest Division consisting of Sohagpur, Jaisingh Nagar and Beohari tehsils of Shahdol district. The area comprises plain, undulatory and hilly topography. The rivers- Son, Johilla, Chotti-

Mahanadi, Bonas, Odari, Chanda and Goand are intersecting the area along with numerous nallas. Sal and miscellaneous forests are found in almost entire area. The Sal forest is in the climax stage of the plant succession. The miscellaneous forests are in preclimax stage. The medium bomboo forests are also found in several parts of the area. Collected about 1250 plant specimens, 230 samples of polleniferous materials, 15 samples of wood block and 180 samples of fruits and seeds, as reference material for herbarium as well as for floristic studies. Studied all the plant specimens and identified about 435 species belonging to 312 genera and 110 families. All the plant materials were processed and poisoned with insecticide and fungicides.

Different tribal (Gond and Panika) areas are also surveyed to document various uses of plants being utilized by these tribals and other rural people for their daily needs. It has been observed that they are mainly dependant on the forest resources. They collect small timber, fuel wood, bamboo, minor forest produce, tender leaves of different species, flowers of *Madhua indica* (Mahua), seeds of *Shorea robusta* (Sal), fruits of *Terminalia chebula* (Harra) and *Emblica officinalis* (Aonla) and mature leaves of *Phanera vahlii* (Mohain) wild fruits, flowers bulbs, grasses and fodder. Medicinal uses of about 192 plant species are recorded along with 34 plants as food, 9 plants as fibre, 8 plant as medicinal and edible oil, 38 plant as fuel wood, 10 plants as timber, and minor forest produce of about 16 plant species.

Museum samples of about 25 plant species used as medicine and food are also collected and preserved in specimen bottles and displayed in Herbarium show cases. Some live samples (10 plant species) of medicinal plants including ferns are collected for Institute's Garden. One plant species of *Chenopodium schraderanium* Roem. & Schult is reported as new record for India. Different data of living and fossil plants (10 plant species) are collected for herbarium data-base from various published literatures. The photodocumentation and computer scanning of about 160 extant plant and 75 related specimens of fossils and archaeobotanical samples are also done.

D.C. Saini

Component 8: An isotope and geochronometry based approach to decipher palaeoclimate records in Indian lake sediments and its synthesis with pollen based information

Completed the study of trench samples from Loktak lake Imphal, Manipur (up to 73 cm depth), and initiated on 50 cm profile of Motiyadol, Shahdol (MP). They are analysed for carbon, nitrogen, pollen-spores and various other elements revealing the variation in vegetation and climate of the regions in the recent past. The Loktak samples indicated a change to drier conditions around 500 yrs ago as indicated by a decrease in the abundance of aquatic, marshy taxa and ferns and fungal spores. This accompanies increase in extra-regional taxa of Pinus and Alnus, attributed to transport, but decrease in regional taxa like Sapotacae and shrubs. Early dominance of aquatic vegetation is indicated in lower C/N ratios and lower carbon values in the deeper samples compared to the younger. The 20-24 cm deep sample yielded a radiocarbon age of 498 (+23, -175) yrs making the deepest sample about 1650 yr old on linear extrapolation. The grains from Loktak samples are also studied using SEM/EDAX (using backscattered X-ray for elemental analyses) and revealed presence of Fe, Mg, Cu, Ca and other elements in addition to the dominating Si, O, Al. The samples from Motiyadol, in contrast, reveal presence of tropical deciduous forest. Grasses followed by sedges and Asteraceae dominate the rich ground vegetation. The carbon to nitrogen ratios in the samples show decreases with time but is dominated by aquatic, nevertheless. The Motiyadol lake samples indicate good monsoon during deposition of the sediments.

C.M. Nautiyal & M.S. Chauhan

Component 9: Radiocarbon dating of deposits relating to Quaternary geological and archaeobotanical investigations and chemical analysis of sediments for palaeoenvironmental and palaeoclimatic studies

Processed a total of 140 samples in the laboratory during this year. Apart from regular samples several backgrounds and NBS Oxalic acid standards are also run. The benzene extraction portion of the glass system has been modified that has helped improving the SQP of the samples. Both the counters, the Quantulus and the Rackbeta are being used for counting purposes. The Rackbeta, however is used only for counting relatively younger samples.

Developed a Fortran program that calculates the Radiocarbon age of a sample from the counting data of both the counters. In addition to the C-14 age of a sample, this program also calculates 14C and its error, which were previously not possible for some samples by the built-in program provided with the Quantulus counter.

Supriya Chakraborty

Component 10 : Stable isotope mass spectrometry laboratory for palaeoenvironmental studies

Proposal on the use of IRMS has been revised in respect of the research proposal 'Vision 2020'. Enquiries have been made with the different IRMS manufacturers and informal quotations have been received from PDZ Europa Limited, The Chromline Equipment (I) Pvt. Ltd and The GV Instruments, UK. Formal request for procuring the mass spectrometer has been indented.

Supriya Chakraborty

Component 11 : Establishment of Palaeobotanical-Geochemical laboratory

The draft proposal for laboratory establishment has been modified under the guidance of Dr. K.N. Mathur, Sr. Dy. DG, GSI (Lucknow). A layout plan has also been prepared and further modified in consultation with Dr. Subhash Chandra, Sr. Director (Geochemistry), GSI. Detailed information including expertise and manpower availability, preliminary work carried out in the institute, importance of proposed work, etc has been provided to KDMIPE, Dehradun on their comments to our proposal on laboratory establishment.

Anupam Sharma

Component 12 : National centre for Global Geosphere-Biosphere Change research

Finalised the project proposal and submitted to Research Advisory Council of the Institute for onward submission to Department of Science and Technology, Govt. of India for funding through Governing Body.

Chhaya Sharma

Emeritus Scientist Project

Project : Lake sediment pollen analytical studies in Rajasthan to reconstruct the vegetational history and climatic changes since Last Glacial Maximum (LGM).

Keoladeo National Park (Ghana), Bharatpur- Completed pollen analysis of surface samples (soils and spider-webs) collected from different areas of desiccated wetland of this world known bird sanctuary and finalized a paper on the aspect. It is noteworthy that in the paper an attempt has been made for the first time to evaluate the pollen rain in a region comparing pollen analysis of surface samples and the pollen extracted from the spider-webs. This has projected a very dependable picture of pollen/spores deposition in the region.

Completed pollen analysis of 44 samples of a 4.40 m deep trench from Ghana. Most of the samples are palynologically productive and revealed rich pollen and spores assemblage. Important recovered taxa are members of Poaceae, Cyperaceae, Urticaceae, Asteraceae (Tubuliflorae), Polygonaceae, Typha, Oleaceae along with algal filaments, fungal hyphae, bryophytic spores, etc. The studies revealed the vegetation history of more than 20,000 yrs ago (14C date of 15,600 ±300 yrs BP at 2.60 m depth), demonstrating that Lake or at least the Ghana wetland conditions very much existed since very long time, i.e. >20,000 yrs BP. Studies are likely to decipher the past history and the commencement of wetland conditions in the Bird Sanctuary. Since, lower sediments could not be 14C dated because of paucity of carbon content, another field trip was undertaken to collect soil samples again for 14C dates as well as OSL dating. Samples have sent for Tl dating to Prof. AK Singhvi, PRL Ahmedabad.

Sambhar Lake, Jaipur- Analysis of 6 samples from sedimentary core have revealed the dominance of Poaceae and Cyperaceae followed by *Artemisia*, Cheno/Ams, *Polygala, Prosopis*, Fabaceae, Oleaceae, *Holoptelea, Ephedra*, Urticaceae, Capparidaceae, Moraceae, Tiliaceae, Solanaceae, Palmae, Myrtaceae, etc. Exotic taxa such as *Pinus, Abies* etc. are also recovered. Further studies are in progress.

Buda Pushkar and Foy Sagar, Ajmer- Completed chemical processing of 13 profile and 3 surface samples from Buda Pushkar, and 14 profile and 2 surface samples from Foy Sagar. Pollen analysis has revealed these samples to be productive.

Senthal Sagar, Ramgarh Jheel and Chhaparwara Sagar, Jaipur- Completed chemical processing of 21 profile and 6 surface samples from Senthal Sagar, 3 surface samples from Ramgarh Jheel, and 6 profile and 3 surface samples from Chhaparwara Sagar. Pollen analysis of these samples is under study.

Undertook a field trip to Bharatpur and collected 35 surface samples and spider web samples from surrounding areas to study the modern pollen/vegetation relationship in the region. Also collected two sedimentary profiles- one each from Keoladeo National Park lake (2.6 m) and Moti Jheel (3.3 m). Besides, samples for 14C dating and OSL dating were also collected.

Chhaya Sharma & Navita Budhraja (RA)

Contribution other than Project Work

Finalized the paper on new taxa *Orissiella* recovered from the palynological preparations from Upper Permian coal-bearing horizons of Talcher Coalfield (Orissa). This taxon shows morphological similarity with the coelenterates.

Archana Tripathi

Associated with the work on revised and updated biogeographic analysis of Jurassic-Early Cretaceous wood assemblages from Gondwana (A multiauthored electronic exercise culminating in to a database on global fossil woods).

A. Rajanikanth

Revised and updated Indian Gondwana wood data for palaeoclimatic interpretation.

A. Rajanikanth & Rajni Tewari

Studied a diversified assemblage of dispersed cuticles from Oligocene sediments of North-East India.

Rajni Tewari, B.D. Mandaokar & R.C. Mehrotra

The palynological dating of Gondwana sequence in bore-holes SSM-1 (depth 716.15-152.56 m) and SSM-2 (542.00-261.75 m) from Mahuli-Mahersop area, Singrauli Coalfield (southern extension), Surguja District has been done. It indicates presence of sediments pertaining to Late Triassic age (Carnian, Norian and Rhaetic) for the sequence. In SSM-2, an Early Triassic age (542-514 m depth) has been inferred. Twice visited Coal Wing of Geological Survey of India, Kolkata to discuss the palynological reports with the concern officers.

Archana Tripathi & Vijaya

A new species of *Podocarpoxylon* has been studied from the Cretaceous of Cauvery Basin.

Anil Agarwal & A. Rajanikanth

Computer-scanned about 400 coloured and black and white photomicrographs of macerals of Indian coals (Gondwana and Tertiary) and lignites (Tertiary), besides associated mineral matter in order to compile them in the form of a 'Petrographic Atlas'.

B.K. Misra

Finalized a paper entitled "A fossil fruit resembling Terminalia belerica (Gaertn.) Roxb. from Sesawng, Bhuban Formation (Lower Miocene), Aizawl District, Mizoram.

Anil Agarwal & B.D. Mandaokar

A catalogue, including all records of spores and pollen from the Indian Tertiary sediments published after 1988 up to 2002, has been prepared and is being finalized for publication. This will update the earlier catalogue on Indian Tertiary spores and pollen (Saxena 1991), which includes spore-pollen records published up to 1988.

R.K. Saxena & G.K. Trivedi

Recovered a rich palynoassemblage from the undifferentiated Tertiary sediments (120-90 m) of borecore BGG-3 drilled near the village Digalgram in Birbhum District, West Bengal. The palynoassemblage is overwhelmingly dominated by *Proxapertites*. Other important taxa are *Lycopodiumsporites, Arengapollenites, Incrotonipollis, Spinizonocolpites, Paravuripollis, Tricolpites, Palmaepollenites, Margocolporites, Lakiapollis, Grevilloideaepites, Sapotaceoidaepollenites* and *Polycolpites*. The assemblage suggests an early Eocene age of the sediments.

J.P. Mandal & Vijaya

Finalized a manuscript entitled "Evaluation of earliest Permian flora and fauna of India and its equivalent in other Gondwana continents".

K.J. Singh, Anil Chandra & (Shaila Chandra)

Fungal spores, conidia, ascostromata and other fungal remains recorded from the sediments of Shimla Hills, as well as new data from the palynological investigation at Dharmsala and its adjoining areas have been analysed critically in order to understand morphological variations as well as the ecological factors which influence their distribution in the Palaeogene sediments of Himachal Pradesh. An attempt has also been made to throw light on their dating potential and also the role that they play in the identification of various stratigraphic units. A manuscript entitled "Fossil fungal remains from the Palaeogene sediments of Himachal

Pradesh, India: Palaeoecological and stratigraphic implications" is prepared.

Samir Sarkar

Revised two manuscripts entitled "*Callosphaeridium scabratum* sp. nov.- a new dinoflagellate cyst species from the Early Turonian of Cauvery basin, India" and "Re-interpretation of archaeopyle type in *Leberidocysta? scabrata* (Jain & Tougardeau-Lantz) Stover & Evitt 1978" as per referee's suggestions.

Khowaja Ateequzzaman & Rahul Garg

Processed 35 samples from the Siju Limestone Formation exposed in the Dilni river section, Garo Hills, Meghalaya to check nannofossil productivity. A low diversity assemblage is recovered. Occurrence of cosmopolitan markers viz. *Reticulofenestra reticulata* and *R. umbilica* indicates potential for demarcation of Lutetian-Bartonian boundary in the area.

Jyotsana Rai & Rahul Garg

Finalized a manuscript indicating discovery of Bathonian-Callovian (~164 - 154 Ma) nannoflora from ammonite and bivalve bearing grey yellow calcareous mudstone, packstone and occasional red chert nodules of marine sedimentary sequence of the remote and poorly known eastern Karakoram block in northern India. The nonnofossils though poorly preserved displaying low diversity contain datable marker taxa, viz. *Ansulasphaera helvetica, Discorhabdus* sp., *Watznaeuria bipota, W. barnesae, W. Britannica, W. ovata, W. manivitae, Cyclagelosphaera margerelli*. The nannofossil assemblage from eastern Karakoram Block is dated in the time bracket of Bathonian-Callovian.

Jyotsana Rai

Work on a petrified wood of Podocarpaceae collected from the Bansa beds, Jabalpur Formation has been completed and a manuscript has been communicated (with A. Rajanikanth).

Neeru Prakash

Prepared a Project proposal entitled "Reconstruction of Late Quaternary environments of Saurashtra and Mainland Gujarat: A study based on playnofacies analysis" for financial support under SERC Programme of DST.

Vandana Prasad

Pollen analysis of 10 moss sediments from around Dilli-Jeypore Colliery of Assam indicated the existence of tropical forests as depicted by the accumulation of good amount of pollen-spores. Presence of degraded palynodebris indicates biodegradation of microbiota in sediments. Finalized a paper entitled 'Modern pollen spectra in and around Dilli-Jeypore Colliery, Assam'.

S.K. Bera

Prepared an article dealing with fungi and biodeterioration of different materials.

Asha Gupta

Jammu and Kashmir Circle of ASI gifted the carbonised material recovered through the excavations during 1999 at Kanishpur, district Baramulla. Studies carried out brought to the light the components of Neolithic plant economy in the Kashmir Valley, dated to 2600-2000 BC. Barley belonging to hulled and naked forms, bread wheat, emmer wheat, lentil, field-pea and grass-pea were among the crops grown by the ancient settlers. The shell pieces of walnut and almond suggest the role of these fruits also in the dietary of Neolithic people. Remains of common vetch, sweet-clover, morning-glory, poppy and flatsedge have been identifiable in the associated carbonised material. Undertook two field trips to a Neolithic site in Vindhyan hills at Tokwa, district Mirzapur and Jhusi on the bank of the river Ganga in district Allahabad, U.P. and collected a rich carbonised remains from these sites during the course of archaeological excavations.

K.S. Saraswat & A.K. Pokharia

Finalized the thesis of Mrs. Anjali Trivedi (SRF) entitled "Vegetational history and inferred climate in Jammu region through lake sediment palynological studies" which was submitted for the Ph.D. degree at Lucknow University, Lucknow in January 2004.

Chhaya Sharma

Completed pollen analysis of a profile from Spituk Lake, Ladakh. All the investigated samples turned out to be palynologically unproductive.

Chhaya Sharma, (A.K. Sinha), Binita Phartiyal & Anjali Trivedi

Collaborative Work

Buxa dolomite, Arunachal Pradesh- The Buxa dolomite is well exposed in Kameng district as windows or linear belts from west to east. The dolomite is characterized by cherty dolomite, oolites, stromatolites and interaclasts. A diversified assemblage of microbiota has been recovered in petrographic thin sections of lenses and bedded chert belonging to the Buxa dolomite exposed near Igo Bridge, Daring-Baser road in West Siang distict. The recovered assemblage is comprised of 6 genera (*Myxoccocoides, Paratetraphycus, Eosyncoccus, Obruchevella, Eomycetopsis* and *Siphonophycus*) of cyanobacterial belongs to family Chroococcaceae and Oscillatoriaceae and 4 genera of acritarchs (*Leiosphaeridia, Margominuscula, Micrhystridium* and *Baltisphaeridium*) belonging to sphaeromorphida and sphaerohystrichomorphida groups. These forms in general are of small in size mostly ranging from 15-20 m. The present biota compares well with the known Vendian microfossils records from the other part of the world. The overall analysis of the recovered assemblage indicates Vendian age for the Buxa dolomites exposed in Arunachal Pradesh.

Manoj Shukla & Rupendra Babu [& V.C. Tewari (WIHG, Dehradun)]

Chert Member, Nigalidhar Syncline, Sirmaur district, Himachal Pradesh- Recorded for the first time fossil euendolithic algae, viz. *Eohyella comphellii; Eohyella rectoclada* and *Oscillatoriopsis media* from the ooids in the petrographic thin sections of black bedded chert of Chert Member belonging to Deo-Ka Tibba Formation (Lower Tal) of Tal in the southern limb of Nigalidhar Syncline. The present micro-organisms show their involvement in the mechanical destruction of the carbonate (ooids that were subsequently silicified), which may have been made possible through their physiological activities. The observation and critical analysis of the recovered euendolithic fossils indicate formation of ooids in sub aerial to supra tidal environment and subsequent deposition of these ooids in sub-tidal environment, which is conducive for the growth of these euendolithic microorganisms.

Infra-Krol Formation, Korgai, Nigalidhar and Kamlidhar Syncline, Sirmur district, Himachal Lesser Himalaya- The black carbonaceous of the Infra-Krol Formation, Baliana Group exposed in 4 localities- two in the Nigalidhar and one each in the Korgai and Kamlidhar synclines of Sirmur district, yielded 13 genera of organic-walled microfossils (OWM) consisting of cyanobacterial remains belonging to Chroococaceae and Oscillatoriaceae and acritarchs genera sphaeromorphida and Sphaerohystrichomorphida groups. The acritarchs are *Leiosphaeridia, Gorgonisphaeridium, Margominuscula. Granomarginata, Baltisphaeridium*, *Satka* and *Micrhystridium*. The cyanobacterial remains are *Huroniospora myxococcoides*. *Paleoanacystis*, *Oscillatoriopsis* and *Siphanophycus* as well as unnamed sheath. The present assemblage is being reported for the first time from this district The recovered diversified microbiotic assemblage compares well with the known late Neoproterozoic sediments especially from the Infra-Krol Formation exposed in Nainital Syncline in the extreme southeast of Krol Belt and in the Krol and Pachmunda synclines in the extreme northwest of Krol Belt. A critical analysis of the recovered microbiotic assemblage of this formation suggests a tidal flat environment during deposition of these sediments.

Manoj Shukla & Rupendra Babu [& V.K. Mathur & D.K. Srivastava (GSI, Northern Region, Lucknow)]

Initiated work on the mega floristics as well as sedimentological and palaeontological facies analysis of the Carboniferous sediments exposed in Banihal and Yenner localities in the Pahalgam area of Jammu and Kashmir State. The mega fossils were processed, cleared and photographed. The morphotaxonomic studies of the flora are in progress.

K.J. Singh [& Rajendra Singh (Jammu Univ.) & Shaila Chandra (Lucknow)]

Carried out petrographic investigations (macerals and microlithotypes) on coals of Ib- River Coalfield, Son-Mahanadi Basin. (Dr. Singh was here under INSA Visiting Fellowship program for three months during July-September, 2003).

B.K. Misra [& K.N. Singh (Vikram University, Ujjain)]

A paper on two fossil woods from the Tertiary of northwestern India is revised.

J.S. Guleria & Rashmi Srivastava [& A.C. Nanda & R.K. Sehgal (WIHG, Dehradun)]

Finalized and revised a report based on identification of a wood sample of a ship excavated from Thaikkal, Alappuzha District, Kerala.

J.S. Guleria & B. Sekar [& M.V. Nair (SIAAHCM, Ernakulum)]

Finalized results on experimental studies carried out on pollen grains of *Cycas rumphii* and a manuscript entitled "Effect of the C60 fulleren/benzol solution to the ultrastructure of the wall of Cycas rumphii pollen grains" is communicated for publication. Studies revealed biopolymer systems in partially degraded pollen exine.

S.K.M. Tripathi & Madhav Kumar [& M. Kedves (Hungary)]

Studied and finalized a paper on a living fungi Linzites.

Anil Agarwal & R. Kar [& N. Sharma & U. Kant (Lucknow Univ.)]

Studied in detail the fossil materials from the Mio-Pliocene sediments of Kameng District, Arunachal Pradesh.

R.C. Mehrotra [& Ashutosh Joshi (GSI)]

Investigated a variety of well-preserved leaf impressions from Siwalik sequences of western Nepal. About 30 leaf impressions have been identified with extant taxa belonging to different families of monocot, dicot and a Pteridophyte. An analysis of present day distribution modern comparable taxa of fossil floral assemblage reveals the prevalence of warm and humid climate in the region during deposition of the sediments. The fossil assemblage also indicates that tropical evergreen forests with few moist deciduous plants were flourishing aroud Suraikhola area during Miocene period.

Mahesh Prasad [& S.M. Pandey (M.L.K. P.G. College, Balrampur)]

International Project- Palaeobotanical study on the fossil woods from Java Island, Indonesia- Fossil woods (provided by Japanese counterparts) are identified as *Dellinea* (Delliniaceae), *Polyalthia* (Annonaceae), *Terminalia* (Combretaceae), and *Anisoptera*, *Dipterocarpus, Dryobalanops, Shorea* (Dipterocarpaceae), *Cynometra* (Fabaceae), *Croton* (Euphorbiaceae), etc. Further work is in progress.

Rashmi Srivastava [& Noriko Kagemori & Kazuo Terada (Japan) & Yance Mandang & Sapri Hadiwisastra (Indonesia)]

Search for hominid fossils and lithics in the Siwaliks and Narmada valley of India (National Geographic Society Grant # 7386-02) - Undertook a filed work to Quaternary deposits of Narmada Valley of India exposed at Hathnora (MP) to understand the general stratigraphy and search for potential sites. Collected rock samples from Dhansi, Surajh kand and Baneta formations exposed at the banks of Narmada river for palynological study. Completed laboratory processing of samples. The preliminary study has been made and the palynoflora consists of fungal remains, pteridophytic spores and angiosperm pollen. Angiosperm pollen are the main constituents of the assemblage. The identification of pollen and their analysis have been taken up and continued.

M.R. Rao [& Rajeev Patnaik & Ashok Sahni (Panjab Univ., Chandigarh)]

Finalized work on the Palynostratigraphical investigation of the Siwalik sediments of Arjun Khola and its adjoining areas of Central Nepal.

Samir Sarkar (& G. Corvinus (Nepal Research Center, Kathmandu, Nepal)]

Continued finalization of palynological work on the Eocene rocks exposed in the Punch and its adjoining areas of Jammu and Kashmir.

Samir Sarkar [& G.M. Bhatt (Jammu University, Jammu)]

Collected subsurface samples of Janauri Well-2 from Core lab of ONGC in connection with project entitled "Palynostratigraphy and source rocks potential studies of Siwalik and Subathu sediments of Himachal Pradesh and their correlation with subsurface Tertiary sequence of Punjab Plains". Chemical Processing of 14 samples in between 4200 to 4290 m depth levels were carried out. The samples are very poor in palynofossils. Processing of the remaining samples are in progress.

Samir Sarkar [& N.C. Mehrotra (ONGC, Dehradun)]

Finalized a manuscript entitled "Early Campanian nannofossils from Chakrud: Possible age constraint for the dinosaurian egg-nest bearing Infratrappean Succession of Bagh area, Cenral India".

Jyotsana Rai, Rahul Garg [& Surendra Kumar (Lucknow University)]

Studies on siliceous microfossil groups from the Late Neogene deposits of Neill and Havelock Islands (Andaman and Nicobar) were continued.

Anil Chandra [with BGR (Germany)]

International project Holocene evolution of Chilka Lake, anthropogenic impact and pollution problems- The deepest core CH1 9 (N 19º 45' 56.5"; E 85º 22' 38.1") from Chilka Lake measuring 7.80m with three radiocarbon dates at different depths (HV 24827; 7150 ±105 yrs. BP at 3.19-3.40 cm; HV 24825; 7795 ±85 yrs. BP at 6.53-6.65 cm and HV 24826; 11245 ±180 yrs. BP at 7.58-7.74 cm) was selected for palynological investigations. It was procured at water depth of 1.5 m at 30.1ºC temperatures. Eight intervening samples (24-25 cm, 68-69 cm, 150-151 cm, 238-239 cm, 355-356 cm, 457-458 cm, 555-556 cm, 666-667 cm, 730-731 cm) were pollen analysed for fine resolution palynostratigraphical details. The work clarified mangrove habitat dynamics during early, middle and late Holocene. Mangrove colonized in response to marine transgression in early and upper middle part of Holocene and established as *Rhizophora*-dominated mangrove. The other core and peripheral mangrove taxa were represented by *Sonneratia, Avicennia, Excoecina, Heritiera, Acanthus, Acrostichium, Lumnitzera, Barringtonia, Pandanus, Cocus, Borassus, Phoenix, Fabaceae, Terminalia, Meliaceae*, etc. The brief returns of terrestrial conditions were also noticed at certain depths. The present mangrove ecosystem, though more restricted, is fairly stable with maintenance of mangrove forests in protected prograding bays in Mahanadi delta and in estuaries kept open by adequate river flows. However, siltation, eutrophication and industrial development are major threatening factors affecting upon the sensitivity of lake, its shrinkage and total disappearance of surrounding vegetation.

Asha Khandelwal [& Burkhard Scharf (UFZ Centre for Environment Research, Germany)]

A joint Indo-Russian collaborative project (ILTP, DST, New Delhi) entitled 'Palynostratigraphical and Chronological studies on lake sediments, Schirmacher Oasis, East Antarctica' is upgraded and accepted for implimentation.

S.K. Bera [with NCAOR (Goa)]

Pollen analysed 20 samples from a 2.8 m deep trench profile from the ancient Lahuradeva Lake, Sant Kabir Nagar (UP). The study has demonstrated the presence of open vegetation chiefly constituted of grasses, sedges, Asteraceae, Polygonum, etc. together with sparsely distributed trees, such as *Aegle marmelos, Madhuca indica, Syzygium, Acacia, Terminalia, Emblica officinalis, Bombax,* Sapotaceae, etc., since 7000 yrs BP. The presence of good numbers of deciduous trees implies the tropical monsoon climate in the region. The recovery of Cerealia together with other culture pollen taxa, viz. Urticaceae (*cf. Cannabis*), Brassicaceae, Cheno/Am and Caryophyllaceae suggests that this region was under agricultural practice. Interestingly, the consistent occurrence of *Trapa* (singhara) between 1.5-1.9 m depths, tentatively dated to 6000-3200 yrs BP implies that the lake was big in expanse and perpetually extending to the vicinity of human settlement. The singhara fruits would have exploited by the ancient settlers for subsistence during this period.

Under took a field excursion to Lahuradeva archaeological site and collected 8 samples for pollen analysis and 3 radiocarbon dating samples between 2.0-2.8 m depths from a trench dug out on the dried margin of ancient lake. This was in continuation to the earlier 2.0 m deep profile collected from the same trench in order to pick up further deeper and older sediments for pollen analysis.

M.S. Chauhan & A.K. Pokharia [& R. Tiwari (U.P. State Archaeology) & I.B. Singh (Lucnow University)]

Work carried out mainly to accesses the suitability of mean vessel area (MVA) of the early wood of tree-ring parameter in Teak (*Tectona grandis*) a tropical tree for the ecological studies. This study is undertaken through Image analysis at the Institute of Wood Biology. The initial analysis shows a direct relationship between MVA and prior winter precipitation. This study indicates the significance of soil moisture regime in the initiation of

cambial activity in the ensuing growing season. Detailed analyses are in progress.

A. Bhattacharyya [& Prof. D. Eckstein (Hamburg, Germany)]

Pollen counting from a large number of sub surface sediments collected from Garbyang Quaternary section (30º 5' 30" N : 80º 50' 20" E) is in progress

A. Bhattacharyya [& B.S. Kotlia (Nainital)]

Completed a report of palynological analysis of 12.0 m deep profile of lacustrine sub-surface sample of Naradu Glacier valley, Kinnaur.

A. Bhattacharyya [& R.K. Ganjoo (Jammu)]

Micro- and macro-morphological studies of 10 species of *Rhododendron* belonging to the family Ericaceae showed that the testa and the endosperm dimensions, and especially the ornamentation pattern on the outer periclinal walls of some species are distinct. Seeds of rhododendrons are clearly distinguished from their outer micro- and micro-morphological variability from species to species. They are dull with rough spermoderm surface.

Usha Bajpai [& Sandeep Kumar (G.B. Pant Institute, Gangtok)]

Cuticular membrane of the leaves of the genus *Citrus* of family Rutaceae was investigated to see the variation in the morphological features.

Usha Bajpai [& C.L. Verma (Lucknow University)]

Finalized and submitted a project proposal entitled "Quaternary sedimentary records of Mahi River Basin, Mainland Gujarat: A multidisciplinary approach" for funding under the Shallow Subsurface Studies Programme of DST.

A. Sharma, S. Chakraborty, V. Prasad, B. Phartiyal [& Vivek Prasad (Lucknow University)]

Carried out isotopic analysis of lake sediments from Kinnar Lake, Himachal Pradesh. The chronology has been established by means of radiocarbon dating, which reveals the paleoenvironmental condition during the Holocene. The range of the 13C variability is about 2‰ (-23-25‰), which probably reflects the varying lake level during its lifetime. Palynological work of the lake sediments is in progress.

S. Chakraborty & P.S. Ranhotra [& S.K. Bhattacharya (PRL, Ahmedabad)]

Some archaeological samples were radiocarbon dated that were collected from the deltaic Bengal basin (Bankura district). The study revealed that the evolution of the early village farming community took place about 3320-2080 yrs before present.

S. Chakraborty [& Manju Banerjee (Kolkata)]

Completed chemical processing of the profile from Chando Tal, Basti collected jointly in April 2002. Studies have revealed that the profile is palynologically unproductive. Also completed chemical processing of the profile from Bakhira Tal, Kabirnagar. Investigated few samples have revealed good pollen assemblage. Study is in progress.

Chhaya Sharma [& P.N. Shah (NRSA, Lucknow)]

Completed pollen analysis of the samples from Burfu lake, Milam. Out of 45 samples investigated from this alpine lake, only 3 were found to be palynologically productive. Pollen analysed another profile from the same lake (35 samples) and studies have revealed only 9 samples palynologically productive.

Chhaya Sharma [& B.S. Kotlia (Kumaun University, Nainital)]

Carried out chemical processing of 23 lichens/moss cushions from Antarctica. Pollen analysis of few samples has revealed that the samples are palynologically productive. Further study is in progress.

Chhaya Sharma [& D.K. Upreti (NBRI, Lucknow)]

Investigated 7 surface samples (4 spider webs and 3 soil) collected from the premises of Taj Mahal, Agra, which are found highly productive. Finalized a manuscript entitled "Pollen Rain in the environs of Taj Mahal".

Chhaya Sharma [& Tara Sharma (IHCL, Agra)]

Finalised the palynological investigations of Basaha Jheel site of Ganga basin. Finalization of data from the profile from Misa Tal (MT) is in progress.

Chhaya Sharma & M.S. Chauhan [& I.B. Singh (Lucknow)]

Completed pollen analysis of another profile from Misa Tal (MT) and constructed the pollen diagram. Prepared the draft of the paper.

Chhaya Sharma & M.S. Chauhan [& I.B. Singh (Lucknow), R. Wasson (Canberra, Australia) & A.K. Singhvi (PRL, Ahmedabad)]

Finalized a paper entitled "Studies on Holocene climatic changes from Priyadarshini lake sediments, Eastern Antarctica based on palynological evidence".

Chhaya Sharma & M.S. Chauhan [& Rajiv Sinha (IIT, Kanpur)]

Sponsored Projects

Project—Analysis of Climatic changes and glacial fluctuations using pollen and tree-ring data, in Gangotri Glacial area, Garhwal Himalayas. (Sponsored by DST, New Delhi, No. ES/91/018/97)

Interpretation of data towards climatic reconstruction during Post Glacial period around Gangotri glacier based on analyses of multi proxy data, viz. pollen, tree-ring and isotope (13C), magnetic susceptibility from sediment profile have been made and the final report of this project is under preparation.

A. Bhattacharyya & P.S. Ranhotra [& I.B. Singh (Lucknow) & N. Basvaiah (Mumbai)]

Project—Analysis of climate changes in Eastern Himalayan region using tree ring data. (Sponsored by DST, New Delhi, No. ESS/44/01/98)

Finalised the interpretation of multi proxy data for the completion of the project and submitted the final report.

A. Bhattacharyya, Vandana Chaudhary & S.K. Shah

Project—Cretaceous megafloral and coprolitic-derived plant assemblage from the Deccan Trap associated sedimentary sequences in the Dongargaon, Pisdura area Maharashtra. (Sponsored by DST, New Delhi, No. ESS/23/VES/114/ 2000 dated July 05,2001)

Collected a large number of coprolites from Pisdura-Dongargaon area and studied them using LM and SEM techniques. Different morphotypes of coprolites, categorized under type A, B, Ba and C are separately studied for residual contents and it is noticed that the large size coprolites (type-A), mostly permineralised, revealed presence of palynomorphs and plant tissue fragments. Evidence of leaf cuticle, small seeds, pieces of woody elements including tracheids and aquatic plants are recorded. Sporocarps of aquatic fern (Azolla) are also noticed in polished sections. The palynoassemblage comprising *Azolla cretacea, Gabonisporites vigourouxii, Araucaricites indicus* and Cycadopites from the main components as an Upper Cretaceous marker taxa of Late Maastrichtian age. Presence of fresh water diatoms (Aulacoseira) from types A and B coprolites along with some striated pinnate ones and other blue green type alga is also noticed. Sponge spicules, bits of animal (fish) scale and aurcaroid tracheids are recovered from Ba and C types. Remains of bacterial colonies, fungal spores, thalloid bodies belonging to mycrothyraeae and insect body parts indicate a post void phenomenon.

The result suggests that the producers were mainly herbivorous animals and also verified by the carbon and nitrogen isotopic composition of the organic matter preserved in (Type-A) coprolites. It was established that these animals thrived on herbivorous diet along with water-surrounded areas like ponds and lakes and evidently the dinosaurs mostly consumed softer plant parts as nutrient. Based on the studies of associated fossils would be helpful to reveal the potential sources of food exploited by dinosaurs and evolutionary events during the Upper Cretaceous time and shall also help to visualize the palaeoecology and dinosaurian extinction in closer view.

Two fossil angiospermous woods showing resemblance with *Euphoria* and xylotomically allied genera (Sapindaceae) and *Barringtonia* (Lecythidaceae) have been reported for the first time from Lameta Formation (Maastrichtian), Maharashtra. The manuscript on the aspect has been finalized.

K. Ambwani, Rashmi Srivastava & Debi Dutta [& R.K. Kar]

Project—Tree-line dynamics in highland Himalayas, Himachal Pradesh (Sponsored by DST, New Delhi, No. 65/SERC/99 dated 15/3/99)

Studied sampling recruitment pattern of *Juniperus macropoda* (Boiss.) and *Betula utilis* (D. Don) at tree line sites around Kullu and Rohtang Pass. Ten core samples and 29 stem cross sections of both the species are collected from the above sites to work out the migration rate. All tree core samples and stem discs are polished and dated using standard dendrochronological methods. Both the species have shifted to upper elevations at different rates. *Juniperus macropoda* migrated from 3859 m altitude to 4172 m and Betula utilis from 3818 to 3858 m during the 20th century.

R.R. Yadav & Bhasha Dubey

Project—Palynological, biopetrological and dispersed organic matter (DOM) study of Deccan Intertrappean sediments with reference to Cretaceous-Tertiary (K-T) transition. (Sponsored by DST No. SR/FTP/ES-51/2000)

Finalized studies on the Intertrappean sediments of Naskal (Andhra Pradesh) and Gurumatkal (Karnataka). Both the sections are comparable and have yielded typical Maastrichtian flora characterized by *Mulleripollis bolpurensis, Gabonisporites vigourouxii, Ariadaesporites* sp., *Azolla cretacea*. Carried out detailed palynological studies from a dug-well at Padwar, MP. The lower part of the section has yielded a Maastrichtian flora while the upper part is lacking in marker fossils. A number of new genera and species have been recorded. Studies on the Deccan Intertrappean sediments around Shahpura, Dindori, Raniputr and Lameta areas in MP are continuing. The sections so far studied have yielded algal and fungal filaments, cuticles and other organic matter, however marker fossils have not yet been observed.

Ratan Kar

Project—Long-term climate change in the western Himalaya using high-resolution tree-ring data (Sponsored by DST, New Delhi, No. ES/48/ICRP/005/ 2001 dated March 23, 2002)

Prepared ring-width chronology of Abies spectabilis back to AD 1739 using 40 cores from 19 trees from Budhavan, Himachal Pradesh. Response function analyses indicated that tree-growth has indirect relationship with April-May temperature. The tree-core samples of Abies pindrow (25 core/17 trees) collected from Badrinath are also cross-dated and ring-width measured. Further analyses are in progress. Collected 62 tree-core samples of *Cedrus deodara* from several moisture stressed sites in Gangotri region, Uttaranchal. The tree-core samples for dendroclimatic study are mounted on wooden slot and processed. Out of these, around 50 tree-core samples have been dated and ring-width measured. The ring-width chronology of Cedrus deodara has been extended back to AD 805. This is the longest ring-width choronology reported so far from the Indian region using living trees. The tree-growth and climate analyses showed that March-April-May temperature have significant negative relationship, whereas precipitation has positive relationship with the growth of *Cedrus deodara*.

R.R. Yadav, Jayendra Singh & Rajesh Chaturvedi

Project—Studies of dust mites in the houses of asthmatic patients in Lucknow city and adjoining areas (CST, UP No. CST/SERPD/D-3415/2002).

Tiny 8-legged microscopic scavengers known as house dust mite (HDM) play significant role for health hazards, such as respiratory allergy, nasobronchial, nasal and skin allergy in sensitive individuals. HDM of families Pyroglyphidae, Acaridae and Glycyphagidae are hardy creatures, live well and multiply easily in warm, humid places. *Acarpsis* sp., *Caloglyphus* sp. (fowl mite), *Dermatophagoides farinae* (floor mite), *D. pteronyssinus* (bed mite), *Mycoptes* sp., *Psoroptes* sp., *Tyrophagus* sp. (mold mite), etc. are a few among the identified ones. *Dermatophagoides pteronyssinus* and *D. farinae* were most commonly encountered species, which were present in almost in all the positive samples and are the common cause of perennial allergic rhinitis. 50 samples were collected and processed through different techniques in order to procure the maximum quantity and types of HDM. Out of which 9 samples, had high frequency of HDM, 7 samples had moderate, 4 samples had very few or rare occurrence and rest of the samples had none. Certain samples exhibited abundant fungal spores belonging to *Curvularia, Periconia, Pithomyces, Chaetomium, Cladosporium, Epicoccum, Alternaria, Helminthosporium, Diplodia, Bispora, Tetraploa, Aspergillus,* etc. The miscellaneous matters include pollen grains, hyphae/filaments, setae, insect body parts, fibers, plant hairs, cells, insect scales, etc. Petri-plate method is also adopted for specific identification of recorded fungi.

A questionnaire concerning airway symptoms, social and working conditions, family history, worst season, allergic factors, severity and duration of attack of each patients was filled in OPD of Balrampur Hospital and KGMU, Lucknow for statistical analysis. In the search of potential indoor allergen sources the house dust samples were procured from the house of asthmatic patients of different areas of Lucknow city. Broadly, the ratio of number of patients classified on the basis of seasonal and perennial attacks of Bronchial asthma or and Allergic rhinitis was 1:1. The critical analysis revealed that the patients residing in open areas suffered more from seasonal attacks and those living in congested areas suffered from perennial attacks.

Episodic breathlessness, throat infection, body and headache, running nose, wheezing, etc., were the long lasting symptoms of perennial attacks. It was also observed that:

- the people who allow pets like dogs, cats in their bedrooms or keep close contact with them are more prone to house dust allergy.
- the people who lived in places close to cow-sheds, stables, butcheries, tanneries, etc., are at higher risk of coming in contact with animal dander (dry and dead skin of animals) on which mites love to feed.
- that patients living nearby granaries, flour mills, threshers, or in villages show severe seasonal allergy as they are more closely exposed to various grain dust, wheat dust, rice dust, cotton dust, etc. which harbor different kinds of mites.

Morphological details of HDM and their precise identification, isolation, cleaning, mounting and microphotography, seasonal and annual calendars of dust mite population, are in process. Allergy and its relevance to clinical data of patients, prominent role of immunotherapy in the management of allergy and methods used in minimizing mite load, are also some of the parameters to be properly understood. It is envisaged that HDM alone or in combination with other biocomponent of indoor air play an important role in manifestation of respiratory allergy, and thus, it is important to determine the "right" domestic allergen.

Asha Khandelwal, Nisha Chandra & Suchit Swaroop (up to 15.10.2003) [& Rajendra Prasad]

Project—Analysis of climate changes in north-east India during last several thousand years using pollen and tree-ring data. (Sponsored by DST, New Delhi, No. SR/S4/ES-15/2002)

Tree rings from cores collected from 55 trees of Tsuga dumosa growing at Talle wild life sanctuary closed to Zero valley, Subansiri District, Arunachal Pradesh have been counted and dating of these rings to calendar years of their formation through skeleton plot technique are in progress.

A. Bhattacharyya & S.K. Shah

Project—An attempt to look for the palaeoseismic signatures within the conifers of Northwestern Himalayas: A Dendrochronological approach (Sponsored by DST, New Delhi, No. SR/FTP/ESA-04/2002)

The project is initiated on May 26, 2003 and continued up till October 20, 2003. During the period, undertook a field trip to Uttarkashi and adjoining areas and collected tree ring samples from several conifers. Completed processing of the samples for tree-ring analysis.

Vandana Chaudhary

Project—Reconstruction of Late Quaternary environments of Saurashtra and Mainland Gujarat: A study based on palynofacies analysis (Sponsored by DST, New Delhi, No. SR/S4/ES-49/2003)

Analysis of available samples is carried out for preliminary palynofacies study involving identification of different types of organic matter, pollen and spores, dinoflagellate cysts and other algal remains. A database on the Quaternary geology and palaeoenvironment on the Saurashtra Peninsula is prepared.

Vandana Prasad

Recognition

Chhaya Sharma

Chaired a Technical Session of the XIX Indian Colloquium on Micropaleontology and Stratigraphy & Symposium on Recent Developments in Indian Ocean Paleoceanography and Paleoclimate held at Banaras Hindu University, Varanasi during October 2003.

Anil Chandra

Elected as the President of The Palaeobotanical Society of India, Lucknow (w.e.f. 31.12.2003).

B.K. Misra & B.D. Singh

Invited by World Confederation of Productivity Science (India Chapter) to handle a scientific session on "Petrographical character of Coal and Lignite of India and their CBM potentiality" in the National Seminar on Coal Bed Methane: its Present Status and Future Prospects in India held at New Delhi in May 2003.

R.R. Yadav

Elected Fellow of The Palaeobotanical Society of India, Lucknow.

R.C. Mehrotra

Awarded "P.N. Srivastava Medal-2003" for the best piece of research work done during the last two years (2001-2002, Scientist- D category).

Alpana Singh

Awarded "H.S. Pareek Award" by the Geological Society of India (Bangalore) for the best research paper published in the Journal of the Society on the subject Coal Science during 2003.

Jyotsana Rai & Ratan Kar

Co-chaired a scientific session(s) at XIX Colloquium on Micropaleontology and Stratigraphy & Symposium on Indian Ocean Paleoceanography and Paleoclimate held at Banaras Hindu University, Varanasi during October 2003.

A.K. Ghosh

Acted as Rapporteur in a session on Plant Diversity, Evolution and Systematics in the National Conference on Plants, Microbes and Environment: Issues and Challenges held at Department of Botany, University of Burdwan, Burdwan during March 2004.

Professor J.S. Singh, Chairman Governing Body presenting Iyengar-Sahni Medal to Professor James A. Doyle, University of California, USA.

Representation in Committees/Boards

Jayasri Banerji

- Vice President, The Palaeobotanical Society, Lucknow.
- Member, Editorial Advisory Committee, The Palaeobotanist.

Chhaya Sharma

- Vice-President, International Council of Biodeterioration of Cultural Property.
- Member, Advisory Committee, Journal of Bengal Natural History Society.
- Councillor, Executive Council, The Palaeobotanical Society (till 31.12.2003).

Rahul Garg

- Member, Executive Committee, The Palaeontological Society of India.
- Member, Editorial Board, Journal of the Palaeontological Society of India.
- Editor, Geophytology.

J.S. Guleria

- Editor, Geophytology (till 31.12.2003).
- Member, Executive Council LUBDAA, Lucknow.
- Judge, Science Fiction Writing Event, International Computer Fair and Seminar (COFAS International) held at Lucknow (on August 22).

R.K. Saxena

- Secretary, The Palaeobotanical Society, Lucknow.
- Member, Editorial Board, Geophytology.
- Secretary and Member Editorial Board, Indian Society of Geoscientists.

Manoj Shukla

- Treasurer, The Palaeobotanical Society, Lucknow.
- Corresponding Member IGCP Project- 493, The Rise and Fall of the Vendian Biota.
- Judge, 11th National Children's Science Congress-2003, Lucknow.

A.K. Srivastava

- Chief Editor, Geophytology, The Palaeobotanical Society, Lucknow.
- Member, Editorial Board and Treasurer, Indian Society of Geoscientists.
- Member, National Working Group, IGCP Project-411.

G.P. Srivastava

- Member, Organising Committee, National Conference on Biodiversity and Applied Biology of Plants, Lucknow.

Archana Tripathi

- Member, Jurassic Microfossil Group, International Subcommission on Jurassic Stratigraphy.
- Member, Spore Pollen Working Group, CIMP.
- Member, Acritarch Subcommission, Commission Internationale de Microflora du Palaeozoique.
- Member, Subject Expert Committee on Earth and Atmospheric Sciences for WOS-A, DST.
- Editor, Quarterly Journal of Geological Association and Research Centre.

Vijaya

- Corresponding Member, Committee for Quantitative Stratigraphy.
- Voting Member, International Commission on Triassic Stratigraphy.
- Member, National Working Group IGCP Project-434.

Usha Bajpai

- Member, Executive Committee, Electron Microscope Society of India.
- Member, Managing Council, Indian Association of

Palynostratigraphers.
- Member, Technical Advisory Committee of U.P. Environmental Concern.
- Judge, Computer Science Fiction.

Asha Khandelwal

- Member, Editorial Board, Indian Journal of Aerobiology.

B.K. Misra

- Member, Bureau of Indian Standards, Solid Mineral Fuel Sectional Committee-PCD-7.
- Joint Secretary, Indian Society of Geoscientists.

C.M. Nautiyal

- Convenor, National Children's Science Congress 2003.
- General Secretary, National Children's Science Congress-UP.
- Member, UP State Committee for Year of Scientific Awareness-2004.

Ram Awatar

- Councillor, Executive Council, The Palaeobotanical Society, Lucknow.

M.R. Rao

- Joint Secretary, The Palaeobotanical Society, Lucknow.
- Judge (Telugu), Child-scientist's Presentation, Children Science Congress, Lucknow.

B.N. Jana

- Member, Executive Council, The Palaeobotanical Society, Lucknow.

A. Rajanikanth

- Assistant Editor, The Palaeobotanist.
- Editor, BSIP Newsletter.
- Member, National Working Group 434.

Rakesh Saxena

- Member, Co-ordination Committee, National Children Science Festival-2003, Lucknow.

Mukund Sharma

- Assistant Editor, Palaeobotanist.

Rajni Tewari

- Member, National Working Group, IGCP Project-411.

Asha Gupta

- Member, Board of Editors, Flora and Fauna.
- Executive Member Society for Plant Research (2002-2005).

Jyotsana Rai

- Members, Jury, 11th District, State and National levels of Children Science Congress.

Anjum Farooqui

- Executive Member, International Society of Environmental Botanist, NBRI, Lucknow.

A.K. Ghosh

- Judge, Child-scientist's Presentations, National Children Science Congress-2003, Lucknow.

P.S. Katiyar

- Judge, CREATEK event of Computer Seminar and Fair (COFAS), CMS, Lucknow (August 21st).

Y.P. Singh

- Judge, Cynosure's 'On the Spot' event of WIZCOMP 2K4, HBTI, Kanpur (March 21st).

Lectures Delivered

By Institute's scientists outside:

G.P. Srivastava

- Angiosperm Taxonomy- a series of 12 lectures for the M.Sc. Plant Science students of Lucknow University, Lucknow (April-June 2003).
- Basics of Palaeobotany to the teachers of Refresher Course at Department of Botany conducted by Academic Staff College of Lucknow University (March 26, 2004).

C.M. Nautiyal

- *Hindi mein Vigyan Lekhan: Dasha aur Disha* in the Inaugural Session at Vigyan Parishad, Allahabad (November 7, 2003)
- *Kshetriya Bhashaon mein Vigyan Lekhan ka Badalta Swaroop* at the symposium organised by Central Institute of Indian Languages, Mysore & Vigyan Parishad, Prayag (March 20, 2004)
- *Mangal Grah mein Jeevan ki Sambhavna* (radio talk) at AIR Lucknow (February 17, 2004).

R.R. Yadav

- Temperature variability in Western Himalayas in context of past several Centuries at Korea Meteorology Institute, Seoul (February 24, 2004).

Rakesh Saxena

- Energy a basic need of the country (Plenary Lecture) at National Children Science Festival, Lucknow (August 11, 2003).

A. Rajanikanth

- Palaeobioresource- An appraisal at National Botanical Research Institute, Lucknow (May 2003).
- Applications of Historical Geobotany at Department of Applied Botany, Mangalore University, Mangalore (July 2003).
- Eco Resorts-A Marketing Strategy, IEM, RUBA, Lucknow (September 2003).

Mukund Sharma

- *Hindi Mein Vigyan Lekhan: Dasha aur Disayein-Bhu-Garbha Sastriya Ayam* at Vigyan Parishad, Allahabad (November 8, 2003).

Supriya Chakraborty

- Radiocarbon and Ocean circulation at Department of Marine Geology, Cochin University, Cochin (February 29, 2004).

Jyotsana Rai

- *Jal hi jeevan hai* (radio talk) at All India Radio Lucknow (July 4, 2003).

Rajeev Upadhyay

- Geology of Ladakh and Eastern Karakoram at Geodynamics Group, University of Tuebingen, Germany (May 27, 2003)

A.K. Ghosh

- Relevance of Eco-friendly Resorts and Amusement Parks in present day Indian Society, Rai Umanath Bali Auditorium, Lucknow (September 28, 2003).

B. Sekar

- Isotopic dating methods at Department of Marine Geology, Mangalore University, Mangalore (April 21, 2003).

By outside scientists in the Institute:

Dr. B.S. Rawat
Ex-Director, Geological Survey of India

- Remote Sensing in the service of common man (National Technology Day Lecture; May 12, 2003).

Dr. James Alan Doyle

Dr. James Alan Doyle
Professor of Botany, Section of Evolution and Ecology,
University of California, USA

- Ecology of the first Angiosperms: Evidence from Molecular, Phylogenetics, Ecophysiology and Palaeobotany (November 15, 2003)

Deputation/Training/Study/Visit Abroad/in Country

Rajeev Upadhyay

Visited Germany during February 2003 to March 2004 to avail Alexander von Humboldt Foundation Fellowship.

B.K. Misra & B.D. Singh

Visited Central Mining Research Institute (CMRI) and Indian School of Mines (ISM) at Dhanbad during April 2003. Had discussions with scientists engaged in studies related to coal petrography and coal bed methane aspects. Explore the possibility for collaborative research with scientists of CMRI.

B.D. Singh & Alpana Singh

Visited offices of the Directorate General of Hydrocarbons and the Director (Exploration) ONGC at New Delhi in May 2003 and had discussions with authorities regarding the Institute's proposal for coal and lignite petrographic studies in relevance to coal bed methane prospects in Indian fields.

C.M. Nautiyal

Participated in the National Consultation Meeting on 'Year of Scientific Awareness-2004' organized by VICAS/NCSTC (DST) at CMS, Lucknow during May 28-30, 2003. Also participated in Consultative Workshop on State Environment-UP on August 27th at Taj Hotel, Lucknow organised by Administrative Staff College of India (Hyderabad) with sponsorship of World Bank.

Archana Tripathi

Participated in the meeting on Earth and Atmospheric Sciences held at the Indian Institute of Tropical Meteorology, Pune during May 30-31, 2003.

A. Rajanikanth

Attended Vacation Training Programme on Bioresources for School Children held at National Botanical Research Institute, Lucknow in May 2003. Also attended the *Kshetriya Sangoshthi: Proudhyogik hastantaran vartaman Paridrishya avam naye Awasar* held at CIMAP, Lucknow on September 13, 2003.

A.K. Srivastava

Participated in the Project Formulation Meeting as per MOU signed between ONGC and BSIP and held at KDMIPE, Dehradun from June 4-5, 2003. Also participated in the meeting of Vigilance Officer DST aided Institutions held at New Delhi on June 30, 2003.

Vijaya

Participated in the 2nd meeting of the National Working Group of IGCP - 434 held at GSI (Northern Region), Lucknow on July 15, 2003.

Rakesh Saxena

Participated in the National Children Science Festival held at LPC (Jankipuram), Lucknow during August 11-12, 2003.

A. Bhattacharyya

Under INSA-DFG Bilateral Exchange of Scientists Programme visited for three months (September 4-December 12, 2003) Institute of Wood Biology, University of Hamburg; Institute of Geography, University of Stuttgart and Department of Geophysics, University of Tubingen in Germany.

A. Rajanikanth & S.C. Bajpai

Attended the National Seminar on Emerging Trends in Copy Right and other Neighbouring Rights sponsored by Ministry of Human Resource Development, New Delhi, Govt. of India and organized by Faculty of Law, Lucknow University at Lucknow from September 20-21, 2003.

Usha Bajpai

Attended In-house Training on Sample Preparation for Electron Microscopy held at Icon Analytical Equipment Private Ltd., Mumbai from September 22-October 03, 2003.

Vandana Prasad

Visited Centre of Earth Science Studies, Trivandrum during September 25-26, 2003 for presentation of the Project proposal before the Project Advisory Committee of DST.

Supriya Chakraborty

Visited Physical Research Laboratory, Ahmedabad during October 2003 for carrying out the isotopic analysis of lake sediments.

C.M. Nautiyal, Mukund Sharma & R.L. Mehra

Attended Rashtriya Karyashala in Hindi organized by Vigyan Parishad, Prayag and Commission for Scientific and Technical Terminology, New Delhi and held at Allahabad from November 7-8, 2003. Nautiyal also attended Rashtriya Karyashala- *Bhartiya Bhashaon ke paripreksha me Vigyan tatha Praudhyogiki Lekhan ka Badalata Swaroop* organized by Vigyan Parisad and held at same venue from March 19-20, 2004.

Sharma participated in the 50th, while Nautiyal & Mehra participated in the 51st half yearly meetings of Nagar Rajbhasha Karyanvayan Samiti held at CDRI, Lucknow on August 27, 2003 and on February 13, 2004 respectively.

R.R. Yadav

Visited Chungbuk National University, Cheongju, Republic of Korea for three months (December 2003-February 2004) under Indian National Science Academic Bilateral Exchange of Scientists Program.

Anupam Sharma

Attended Shallow Subsurface Study Workshop, sponsored by DST and organised at Physical Research Laboratory, Ahmedabad on December 29, 2003, and presented a project proposal entitled "Quaternary sedimentary records of Mahi River Basin, Mainland Gujarat: A multidisciplinary approach".

G.P. Srivastava

Attended the Annual All India Conference of the Museum Association of India held at Delhi from February 13-15, 2004.

S.M. Vethanayagam

Participated in the National Workshop on Herbarium Techniques (NWHT) held at NISCAIR, New Delhi from May 5-14, 2003.

S.K. Singh

Attended the Orientation Course in Museology and Conservation held at Allahabad Museum, Allahabad from December 12, 2003-March 12, 2004.

S.C. Bajpai

Attended the Convention 2003- Towards Good Governance- Identifying the Action Agenda organized by Lucknow Management Association in collaboration with All India management Association and held at Taj Hotel, Lucknow during July 25-26, 2003.

S.C. Bajpai, R.L. Mehra & Hari Lal

Attended the Hindi Karyashala held at Central Drug Research Institute, Lucknow during December 18-19, 2003.

R.L. Mehra

Participated in three months Translation Training Course held at New Delhi from April to June 2003.

Y.P. Singh

Attended the WIZCOMP 2K4 National Seminar on Recent Trends in Computing and Applications held at HBTI, Kanpur from March 20-21, 2004.

Deputation to Conferences/Symposia/Seminars/Workshops

Ram Awatar
- 18th Himalaya-Karakoram-Tibet Workshop held at Ascona, Switzerland from April 2-4, 2003.

B.K. Misra, Rakesh Saxena & B.D. Singh
- National Seminar on Coal Science and Technology - Vision-2020 (COAL 2003) held at Central Fuel Research Institute, Dhanbad from April 20-21, 2003.

A. Bhattacharyya
- Symposium on underwater Archaeology in perspective of Ancient Text held at Vikram University, Ujjain from April 28-30, 2003.

Alpana Singh & B.D. Singh
- National Seminar on Coal Bed Methane: Its Present Status and Future Prospects in India organized by World Confederation of Productivity Science (India Chapter) and held at New Delhi from May 29-30, 2003.

G.P. Srivastava
- Annual Conference of Museum Association of India held at Shillong from June 14-16, 2003.

S.K. Bera
- Workshop on Research Programmes of Indian Antarctic Expeditions: Retrospect and Prospects held at NCAOR, Goa from July 18-19, 2003.

A. Rajanikanth
- National Seminar on Coastal Dynamics and pre-Seminar Training Programme on Geo-information Systems: with reference to Indian Peninsula held at Mangalore University, Mangalore from July 22-25, 2003.

B. Sekar
- 18th International Radiocarbon Conference held at Wellington, New Zealand from September 1-5, 2003.
- Symposium OPLC- The High Efficiency Chromatography held at Hotel Clark Awadh, Lucknow on January 22, 2004.

R.R. Yadav
- 48th Geographical Congress held at Berne University, Berne, Switzerland from September 28-October 4, 2003.

A.K. Srivastava, G.P. Srivastava, J.S. Guleria, Samir Sarkar, Anil Agarwal, S.K. Bera, Mahesh Prasad, Asha Gupta, Anjum Farooqui, E.G. Khare, Navita Budhraja, Bhasha Dubey, Nisha Chandra & Suchit Swaroop
- National Conference on Biodiversity and Applied Biology of Plants held at Department of Botany, Lucknow University, Lucknow from October 8-10, 2003.

Chhaya Sharma, Manoj Shukla, M.R. Rao, Asha Khandelwal, S.K.M. Tripathi, Ram Awatar, Rupendra Babu, Jyotsana Rai, G.K. Trivedi, A.K. Ghosh & Ratan Kar
- XIX Indian Colloquium on Micropalaeontology and Stratigraphy & Symposium on Recent Development in Indian Ocean Palaeoceanography and Palaeoclimate held at Department of Geology, Banaras Hindu University, Varanasi from October 9-11, 2003.

A.K. Srivastava
- National Seminar on Impact of Increasing Human Population on Natural Resources held at Department of Botany, Banaras Hindu University, Varanasi from October 16-18, 2003.

Anupam Sharma
- 20th Convention of Indian Association of Sedimentologists held at Geology Department, HNB University, Srinagar, Garhwal from November 28-December 1, 2003.

Bhasha Dubey
- International Symposium on Ecology of Biological Invasions held at School of Environmental Studies, University of Delhi, Delhi from December 4-6, 2003.

Vijaya

- 5th Symposium of IGCP-434: Stratigraphic Correlation of Marine and Non-marine Cretaceous rocks in South and East Asia and adjacent areas held at Thailand from December 7-14, 2003.

Chanchala Srivastava

- Joint Annual Conference of ISPQS, IAS and IHCS and National Seminar on Anthropology, Archaeology, History and Cultural heritage of Peninsular India held at Sri Venkateshwara University, Tirupati from December 19-22, 2003.

Anjum Farooqui

- XXVI Annual Conference of Indian Botanical Society & National Symposium on Plant Biology and Biodiversity in Changing Environment held at Department of Botany, Jamia Hamdard, New Delhi from December 29-31, 2003.

Neerja Jha & S.K. Bera

- III Akhil Bhartiya Vigyan Sammelan held at National Physical Laboratory, New Delhi from February 19-21, 2004.

A. Bhattacharyya & Supriya Chakraborty

- International Workshop on Role of Indian Ocean in Climate Variability over India (INDOCLIM) held at Indian Institute of Tropical Meteorology, Pune from February 23-27, 2004.

Chanchala Srivastava, M.S. Chauhan & A.K. Pokharia

- Workshop on the Archaeology of the Middle Ganga Plain organized by the Directorate of Archaeology, U.P. and Institute of Advanced Studies, Shimla and held at Lucknow from March 13-14, 2004.

Mahesh Prasad & A.K. Ghosh

- National Conference on Plants, Microbes and Environmental Issues and Challenges held at Department of Botany, Burdwan University, Burdwan from March 20-21, 2004.

Papers presented at Conferences/Symposia/Meetings

Agarwal A—Floristics and diversity of the fossil leaf assemblages from early, middle and late depositions of the lignite seam of Neyveli Lignite, Tamil Nadu, India. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow, October 2003.

Babu R, Shukla M, Mathur VK & Srivastava DK—Organic-Walled Microfossils from the Infra-Krol Formation exposed in Sirmur District, Krol belt, Himachal Lesser Himalaya, India and their significance. XIX Colloq. Micropaleontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Palaeoclimate, Varanasi, October 2003.

Bera SK—Incidence of airborne palynodebris in various terrestrial deposits and lake sediments in and around Schirmacher Oasis, East Antarctica. Workshop Res. Progr. Indian Antarctic Expeditions: Retrospect and Prospects, Goa, July 2003.

Bera SK—Pollen analysis of Antarctic sediments: A palaeoclimatic approach. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow, October 2003.

Bera SK—*Antarctica Mahadweep: Duniya ki vishaltam khuli Vaigyanik Prayogshala. III Akhil Bhartiya Vigyan Sammelan*, New Delhi, February 2004.

Bhattacharyya A—Prospect of tree-ring data in reconstructing long records of drought of India. Nat. Sem. Underwater Archaeol. in the perspective of Ancient Text, Ujjain, April 2003.

Chakraborty S & Dutta K—Coral derived surface water radiocarbon activities in the northern Indian Ocean: implications to carbon cycling. INDOCLIM Workshop, Pune, February 2004.

Chauhan MS, Pokharia AK, Tiwari R & Singh IB—Preliminary pollen analytical investigation of Early Holocene sediments from Lahuradeva Lake, Sant Kabir Nagar District, U.P. Workshop Archaeology Middle Ganga Plain, Lucknow, March 2004.

Dubey B, Yadav RR, Singh J & Chaturvedi R—Altitudinal migration of plant species at its upper ecotonal zones in the western Himalaya, India. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow. October 2003.

Dubey B, Yadav RR, Singh J & Chaturvedi R—Migration of plant species to upper elevation in western Himalaya during past one century. Int. Symp. Ecology of Biological Invasions, Delhi, December 2003.

Farooqui A—Evolution of Pichavaram estuary (east coast of India) and mangroves during Holocene. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow, October 2003.

Farooqui A—Plant diversity in south-east coastal wetlands during Holocene. XXVI Ann. Conf. India. Bot. Soc. & Nat. Symp. Plant Biol. Biodiversity in Changing Environment, New Delhi, December 2003.

Ghosh AK—Palaeocene calcareous algae from Cauvery Basin and their implications on palaeoenvironment. XIX Colloq. Micropalaeontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Palaeoclimate, Varanasi, October 2003.

Ghosh AK—Heterogeneity of calcareous algae and their implications on palaeoenvironment from the Late Palaeocene sequence of South Shillong Plateau, NE India. Nat. Conf. Plants, Microbes and Environment: Issues and Challenges, Burdwan, March 2004.

Guleria JS—Tertiary vegetational history and palaeoclimate of Rajasthan. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow, October 2003.

Gupta A—Biodiversity in temperate zone of Kumaun Himalaya during Holocene- A palynological and palaeontological assay. Nat. Conf. Biodiversity & Applied Biol. Plant, Lucknow, October 2003

Khandelwal A—Chilka Lake: a threatened ecosystem. XIX Colloq. Micropalaeontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Palaeoclimate, Varanasi, October 2003.

Khandelwal A, Prasad R, Chandra N & Swaroop S—House dust and its bioallergic components. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow. October 2003.

Khare EG, Prasad M & Srivastava R—Some more

fossil leaf impressions from Deccan Intertrappean sediments of Madhya Pradesh, India and its implications. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow, October 2003.

Misra BK & Singh BD—Macerals of liptinite group in Indian coals and lignites. Nat. Sem. Coal Sci. Technol. Vision-2020, Dhanbad, April 2003.

Misra BK, Singh BD & Singh A—Future needs of fundamental research in coal and organic petrography. Nat. Sem. Coal Sci.Technol.- Vision-2020, Dhanbad, April 2003.

Om Prakash, Dogra NN & Sarkar S—Palynology of the Pinjor Formation exposed at Bikram Bagh in the Sirmaur district of Himachal Pradesh, India. Nat. Conf. Plants, Microbes and Environment: Issue and Challenges, Burdwan, March 2004.

Prasad M—Plant diversity and climate during Siwalik (Mio-Pliocene) in the Himalayan foot hills of Uttranchal, India. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow, October 2003.

Prasad M—Fossil wood and leaf of the genus *Chrysophyllum* Linn. from Churia (Siwalik) group of Himalayan foot hills of western Nepal and its significance. Nat. Conf. Plants, Microbes and Environment: Issue and Challenges, Burdwan, March 2004.

Prasad M, Tripathi PP & Pandey SM—Fossil flora from Siwalik sediments of Surai Khola in the Himalayan foot hills of western Nepal and its phytogeographical and palaeoclimatic implications. Nat. Conf. Plants, Microbes and Environment: Issue and Challenges, Burdwan, March 2004.

Rai J—Contrasting views with stressing clues in coastal milieu- Bhuj Formation. XIX Colloq. Micropalaeontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Palaeoclimate, Varanasi, October 2003.

Rajanikanth A—Status of East Coast Gondwana- A floristic perspective. Nat. Sem. Coastal Dynamics, Mangalore, July 2003.

Ram Awatar—Palynostratigraphy and depositional environment of Lower Gondwana sediments in Raigarh Basin, Chhatisgarh, India. XIX Colloq. Micropalaeontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Palaeoclimate, Varanasi, October 2003.

Ram Awatar, Upadhyay R, Kar RK, Sinha AK, Sharma A & Phartiyal B—Palynology, palaeoclimate and depositional environment of Nindam Forearc Basin, Indus-Suture Zone, Ladakh Himalaya, India. 18th Himalaya-Karakoram-Tibet Workshop, Ascona, Switzerland, April 2003.

Rao MR—Palaeoecological and stratigraphical significance of angiosperm pollen with special reference to Tertiary sediments of south India. XIX Colloq. Micropalaeontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Palaeoclimate, Varanasi, October 2003.

Sarkar S—Neogene environmental changes in the Sub-Himalayan Zone of Central Nepal: Evidence from palynofossils. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow, October 2003.

Saxena R—Oxidative changes in Indian resinites. Nat. Sem. Coal Sci.Technol.- Vision-2020, Dhanbad, April 2003.

Sekar B—Reconstruction of past climate changes of Indian subcontinent for the last 40ka on the basis of C-14 dating, chemical analysis and multiproxy data-a review. 18th Int. Radiocarbon Conf., Wellington, New Zealand, September 2003.

Sharma A, Phartiyal B, Upadhyay R, Ram Awatar & Sinha AK—Neotectonic: implications to soil formation processes in Ladakh and Cauvery river basins. 20th Conv. Indian Assoc. Sedimetol., Srinagar, Novemver-December 2003.

Sharma C—Palaeopalynology and its applications. (Invited talk). XIX Colloq. Micropaleontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Paleoclimate, Varanasi, October 2003.

Sharma C & Budhraja N—Pollen Rain at Keoladeo National Park (Ghana) Wetland, Bharatpur, Rajasthan. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow. October 2003.

Shukla M, Tewari VC & Babu R—Diversified Neoproterozoic Organic-Walled Microfossils from the Buxa Dolomite, West Siang District, Arunachal

Pradesh Lesser Himalaya, India. XIX Colloq. Micropaleontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Paleoclimate, Varanasi, October 2003.

Singh RS & Kar R—Microfloral remains from the Deccan Intertrappeans: Implications in K-T transition and palaeoecology. XIX Colloq. Micropalaeontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Palaeoclimate, Varanasi, October 2003.

Sinha AK, Jha N & Upadhyay R—*Karakoram Perigondwana Prant ka abhinn ang. III Akhil Bhartiya Vigyan Sammelan*, New Delhi, February 2004.

Srivastava AK—Palaeobotany, biosystematics and biodiversity. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow, October 2003.

Srivastava AK—Conservation, preservation and protection of fossiliferous sites in India. Nat. Sem. Impact of Increasing Human Population on Natural Resources, Varanasi, October 2003.

Srivastava C—Emerging trends of palaeo-ethnobotanical investigations at Ancient Saunphari and Madnapur, District Shahjahanpur, U.P. Joint Ann. Conf. ISPQS, IAS & IHCS, Tirupati, December 2003.

Srivastava GP & Sharma M—Role of research in science museums. Ann. Conf. Museum Assoc. India, Shillong, June 2003.

Srivastava GP & Singh SK—Biodiversity of Mahuadanr, Palamu, Jharkhand. Nat. Conf. Biodiversity & Applied Biol. Plants, Lucknow, October 2003.

Tripathi SKM—Palaeological significance of diverse Arecaceous pollen from Late Palaeocene and Early Eocene of Rajasthan Basin, India. XIX Colloq. Micropalaeontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Palaeoclimate, Varanasi, October 2003.

Trivedi GK—Late Eocene palynoflora from the Kopili Formation exposed along Jowai-Badarpur Road, Jaintia Hills District, Meghalaya, India: Palaeoecological and palaeogeographical interpretations. XIX Colloq. Micropalaeontol. Stratigr. & Symp. Rec. Devel. Indian Ocean Palaeoceanogr. Palaeoclimate, Varanasi, October 2003.

Vijaya—Palynofloral evolution during Early Cretaceous on Indian Peninsula. 5th Symp. IGCP-434, Thailand, December 2003.

Yadav RR—Climate variability in the western Himalayan region, India and its impact on tree growth at ecotonal limits: Evidences from tree rings. 48th Geograph. Congr., Berne, Switzerland, September, October 2003.

Consultancy/Technical Assistance rendered

Technical assistance and hands on training were provided (in June 2003) to Dr. De and Dr. Guha, Geological Survey of India, Kolkata in connection to the establishment of a new Radiocarbon Laboratory at the Geochronology Division of the GSI. Besides, three 2nd year students of the IMS Engineering College, Ghaziabad were also provided (in August) training on various aspects of Radiocarbon Dating.

In addition, the consultancy services were provided to the following Institutes/ Organisations for radiocarbon dating of a variety of samples:

Different Units of Geological Survey of India
Deccan College, Pune
National Institute of Oceanography, Goa
Agharkar Research Institute, Pune
Center for Earth Science Studies, Trivandrum
Anna University, Chennai
Different wings of Archaeological Survey of India
M.S. University of Baroda, Vadodara
University of Calcutta

SEM Unit has provided consultancy services in sample processing for ultrastructure, scanning electron microscopy and EDX analysis to the scientists/scholars of following Institutes and University Departments: (Consultancy fee earned approximately Rs. 48,600.00)

National Botanical Research Institute, Lucknow
Central Drug Research Institute, Lucknow
Pant Nagar University, Pant Nagar
King George Dental University, Lucknow
King George Medical University, Lucknow
Botany Department, Lucknow University
Zoology Department, Lucknow University
Physics Department, Lucknow University

Chhaya Sharma provided scientific assistance to Nidhi, M.Sc. student of Kumaun University, Nainital for her Project work.

Manoj Shuka & Rupendra Babu provided scientific assistance in taxonomy of microfossils to Research Scholar and Research Assistant of WIHG, Dehradun.

J.S. Guleria rendered scientific assistance to the Council of Science and Technology (UP), Lucknow in evaluating a Progress Report of a research scheme funded by the Council.

Neerja Jha provided scientific and technical assistance to a Ph.D. student of Osmania University, Hyderabad in Permian Palynology.

Rakesh Saxena imparted training during October 6-11, 2003 to Nayveli Lignite Corporation's officers on observation of coal and lignite under Leica DM RXP polarizing microscope with MPV Photometer.

Mukund Sharma provided scientific assistance in taxonomy of stromatolites of Indravati Basin to Dr. Rajeeva Guhey of Government Science College, Raipur, Chhattisgarh.

A. Bhattacharyya supervised the Post Graduate Diploma dissertation (of Indian Institute of Ecology and Environment, New Delhi) entitled "Temporal variation of the Himalayan forest in relation to climatic changes" of Mr. Sandeep Bisaria, Lab Assistant, DST sponsored project.

Units

Publication

Journal- *The Palaeobotanist*

Volume 52(1-3) of the Journal was published incorporating research papers on various topical aspects, maps and figures. Papers for the Volume 53 are being processed.

Newsletter

Newsletter 2003 was published with information on important activities of the Institute including participation in exhibitions, conferences, new additions to library, important research finds, science meet reports, and related information along with pertinent photographs. Hindi activities including reports, articles in Hindi, kavitain, Hindi Essay, Technical words in Hindi, etc were also incorporated in the Newsletter.

Annual Report

Bilingual (English/Hindi) Annual Report - 2002-2003 was published with a new design and with organized information dealing with Institute's activities like Research reports, Conference/Symposia participation, Awards, Research Papers published/accepted, Foundation/ Founder's Day celebrations, reports of different Units, Annual Accounts and related aspects with relevant graphics and photographs.

Hand-outs

Brief biographical profiles and themes of lecture of eminent speakers - Professor Ashok Sahni (CASG, Chandigarh), Professor I.B. Singh (Lucknow Univ.) and Professor C.G.K. Ramanujam (Osmania Univ., Hyderabad) delivered on the occasions of Foundation Day and Founder's Day were published.

Invitation & Greeting Cards

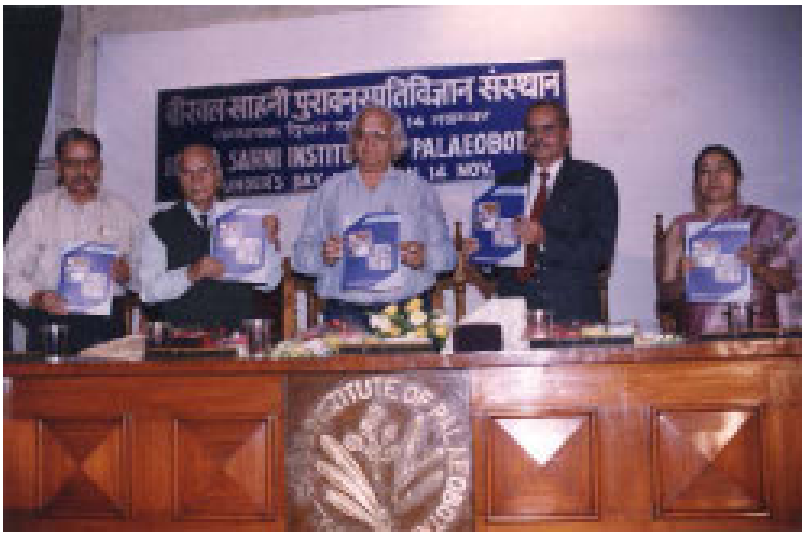
Invitation cards of the Foundation and Founders' Day celebrations were published. Greetings-2004 depicting a plant fossil of Isoetes janaianus from Bhuj Formation, Kachchh district, Gujarat was also printed.

Telephone Directory

Bilingual Telephone Directory was published detailing out BSIP employee addresses and telephone details.

Sale of Institute Publication

This year the publication of the Institute netted an income of Rs. 2,10,001.00.



A view of Release of Annual Report 2003 on Founder's Day Nov. 14th 2003

Library

Library services have been provided to its users efficiently. The contents of the new arrivals and current awareness service (CAS) are also made available on the Institute web site (http://www.bsip.res.in)

The current holdings of library are as under:

Particulars	Additions during 2002-03	Total
Books	28	5,497
Journals	440	12,251
Reprints	92	36,749
Reference Books	-	321
Hindi Books	80	277
Ph.D. Thesis	-	91
Reports	-	46
Maps & Atlases	-	61
Microfilm/ Fisches	-	294
CD	-	47

Currently the library is receiving 171 journals (97 through subscription and 74 in exchange). There are 158 registered card holders using the library facilities.

Exchange Unit

Journals received on exchange basis	74
Reprints of research papers purchased	24
Reprints sent out in exchange	1,091
Institutions on exchange list	68
Individuals on exchange list	181

Computer Aided Library

The library has a fully integrated multi-user LIBSYS 4 software package with addition of Web OPAC. The computerization of the literature is in progress. Most of the journals are also available on line to users.

Current Awareness Service

Current Awareness Service (CAS) has completed 4 years. Library is regularly sending bimonthly CAS bulletin to different institutions and scientists throughout India who are interested in Palaeobotany, Earth sciences and related fields.

Lamination and Xeroxing

Lamination and xeroxing of old and rare publications are done in view of preserving the literature. Xeroxing facility is provided to Institute scientists as well as to out side scientists and organizations on payment basis.

The following Institutions/Organizations availed the library facilities:

Departments of Botany and Geology, Lucknow University, Lucknow.
Department of Botany, Allahabad University, Allahabad.
School of Studies in Geology, Vikram University, Ujjain.
Department of History, University of Delhi, Delhi.
Geology and Palaeontology Group, Agharkar Research Institute, Pune.

Museum

Museum is playing an important role in popularizing and dissemination of palaeobotanical knowledge. The Institute displayed its activities at Lucknow Public College (Jankipuram) during Children Science Festival, which was held in August 2003. President of India H.E. Bharat Ratna Dr. A.P.J. Abul Kalam visited Institute stall and took keen interest in exhibits. Another exhibition was erected at City Montessory School Degree College (Kanpur Road) on the occasion of National Children Science Congress-2003. Institute also participated in Vigyan Club exhibition organized by District Science Club. Vigyan Rail was at Lucknow station during January 9-13, 2004. A team of Institute scientists and technical personnel were deputed for explaining the exhibits to the visitors. A part of exhibit gallery also had information about the Founder Professor Birbal Sahni, FRS and about the Institute. Institute scientist C.M. Nautiyal introduced the exhibition to listeners of All India Radio through FM band. National Technology Day (May 11, 2003) and Science Day (February 28, 2004) were celebrated and Institute observed open house.

Sets of plant fossil specimens were gifted to 13 educational institutions of the country. Routine cleaning of show cases and change of labels were carried out. A large number of visitors (both individual and institutional) visited the Institute and they were taken round the museum and different laboratories. The scientists of the Institute submitted samples and specimens collected from 137 localities of the country to the museum. Type and figured specimens and slides of finalized research papers were deposited to the museum's repository.

Holdings

Particulars Type	Addition during 2003-2004	Total
Type and figured specimens	168	6,387
Type and figured slides	60	12,457
Negatives of above	145	16,556

Specimens/samples were collected by the scientists from different localities of the country and deposited in the Museum for investigation as under:

Project	Specimens	Samples
Project- 1	-	72
Project- 2	270	726
Project- 3	879	54
Project- 6	264	-
Project- 7	-	788
Project- 8	-	723
Project- 12	-	56

Samples collected other than Institute Projects- DST sponsored Project No. ESS/23/VES/144/2000 (132 samples).

Samples received from other organization- 21 samples from MECL, Nagpur.

Specimens gifted within the country to the following centers:

Government Museum Egmore, Chennai.

V.V.M.S.G. Patil Arts, Science, Commerce College Sakri (Dhule), Maharashtra.

Swaminarayan Vidyapith, Anand (Gujarat).

Department of Geology, Govt. Science College, Raipur (Chhattisgarh).

Department of Geology, S.G.R.R. College, Dehradun (Uttaranchal).

Kalpana Chawla Science Club, Kamtaul, Darbhanga (Bihar).

Smt. Veeramma Gangasri College for Women, Gulbarga (Karnataka).

Department of Geology, Ranchi University, Ranchi (Jharkhand).

Department of Geology, Govt. Degree College, Lansdown, Pauri Garhwal (Uttaranchal).

Department of Geology, Bundelkhand University, Jhanshi (UP).

Mahila Maha Vidyalaya, B.H.U. Campus, Varanasi (UP).

Katwa College Burdwan, West Bengal.

Department of Life Sciences, B.R. Ambedkar University, Agra (UP)

Institutional Visitors

Department of Museology, University of Kolkata, 1- Reformatory Street, Kolkata.
Career Convent Girls College, Vikas Nagar, Lucknow.
St. Antony Inter College, Sector 'A' Kanpur Road, Lucknow.
St. Ann's Inter College, Sector 'F' L.D.A. Coloney, Kanpur Road, Lucknow.
Department of Botany, Jagannath Barooha College, Jorhat, Assam.
Department of Botany, M.S. University of Baroda, Vadodara, Gujarat.
Department of Botany, D.A.V. College, Kanpur.
Lucknow Public College, 'B' Block, Rajajipuram, Lucknow.
Forest Training Institute, Kidwai Nagar, Kanpur.
Surabhi Public College, Keshav Nagar, Sitapur Road, Lucknow.
I.T. College, Lucknow.
Department of Botany, Amrawati University, Amrawati, Maharashtra.
Department of Botany, D.B.S. College, Kanpur.
Teachers (of various Degree Colleges of UP) of Refresher Course Lucknow University, Lucknow.

Dr. Navneet Sehgal, Secretary S & T, UP, enquiring about petrified wood from the Deccan Intertrappean exhibited on BSIP stall in the exhibition at CST campus, Lucknow on 27th Feb, 2004.

Dr. (Ms) Jayasri Banerji, Scientist-Incharge, BSIP unveiling the bust of Prof. Birbal Sahni in the presence of Shri. Bachi Singh Rawat, then Union Minister of State (S & T) during 11th National Children's Science Congress.

Herbarium

Added about 1250 plant specimens, 230 samples of polleniferous materials, 15 samples of wood blocks and 180 samples of fruit and seeds from North Shahdol Forest Division to enhance the reference materials of Herbarium. All plant materials were processed, identified, registered and incorporated in their respective families and sub-sections. About 25 museum samples of herbal medicine were also collected from different tribals localities. All these specimens were preserved in specimen jars and displayed in show cases along with photographs of plants of the respective sample of medicine. Data feeding in computer for herbarium digitization is in progress.

Holdings

Particulars	Addition during 2003-2004	Total
Herbarium		
Plant specimens	1,250	21,271
Leaf specimens	200	973
Laminated mounts of venation pattern	6	66
Xylarium		
Wood blocks	15	4,140
Wood discs	-	66
Wood cores	1,329	4,629
Wood slides	11	4,169
Palm slides (stem, leaf, petiole, root.)	-	3,195
Sporothek		
Polleniferous materials	230	2,820
Pollen slides	23	12,237
Carpothek		
Fruits & seeds	180	4,201
Museum Samples		
Medicinal & food plant	25	75

Herbarium facilities provided to:

Sri V.P. Singh, Botanical Survey of India, Central Circle, Allahabad.

Sri D.D. Pandey, Department of Environmental Science, B.B.A. University, Lucknow.

Sri. Anand Kumar, Department of Botany, Din Dayal Upadhya Gorakhpur University, Gorakhpur.

Sri Sanjay Kumar, Department of Botany, D.S.N. College, Unnao.

Sri Sanjai Srivastava, Department of Chemistry, Lucknow University, Lucknow.

Visitors:

Dr. Susy Albert & Dr. Darshika Shah, Department of Botany, M.S. University, Baroda (Gujarat).

Dr. Major Kundal, College of Architecture, Indraprastha University, New Delhi.

Dr. O.P. Rai, Department of Botany, D.A.V. College, Gorakhpur (UP).

Dr. S.N. Srivastava, Department of Botany, D.A.V. College, Azamgarh (UP).

Dr. N. Punetha, Department of Botany, Government P.G. College, Pithoragarh (Uttranchal).

Students of M.S. University, Baroda, and D.A.V. College, Gorakhpur.

Students of Study Hall College, Janta Inter College, and Career Convent Girls College, Lucknow.

Students of Rosy School Mission Campus, Farukhabad (UP).

Teachers attending Refresher Course, Academic Staff College, Lucknow University.

Electronic Data Processing

64 Kbps Leased Line Internet connection provides 24 hours Internet facility to the Institute staff. At present 53 Pentium computers are connected with the LAN. For the back-up support of Leased Line, 500 hours ISDN and Dial-up accounts are purchased and successfully configured to maintain Internet connectivity whenever leased line is down. This year Institute has procured 2 Laptop computers and 8 Pentium-IV systems with all peripherals like UPS and Printer.

The Computer Section has undertaken a six months DOEACC B-Level Project. In this project Ms Rupali Saxena has developed BPMS (BSIP Personnel Management System) software for Establishment Section using Visual Basic as a front end with Oracle 8.0 RDBMS for data storage and security.

A menu driven user-friendly software package has been developed for Form-16, which extracts data from the pay, calculates the taxes and prints the Form as prescribed by the Govt. of India. Payroll and pension packages are also modified as per the requirements and also the annual account, budget and revised estimates are prepared. Besides, the section has provided the continuous technical support to the staff and has done the basic maintenance of hardware and software available in the Institute. A product demonstration of Apple Computers was held on March 11, 2004 by Reliance Info Solutions.

Section Cutting Unit

The unit is playing a significant role in providing the requisite sections, slices and slides of the fossil material/ rock samples to the scientists for detailed investigation of the materials. During the year more than 600 fossil/ rock samples were cut, 630 thin slices and 1,125 slides of fossil sections were prepared as per the requirement of the scientists. In addition, a few gift samples were cut and polished.

A number of scientists, teachers and students who visited the Institute also visited the Unit. The visitors were apprised about the process of sectioning of the material and preparation of slides.

Foundation Day and Founder's Day

Foundation Day Function, 10th September, 2003

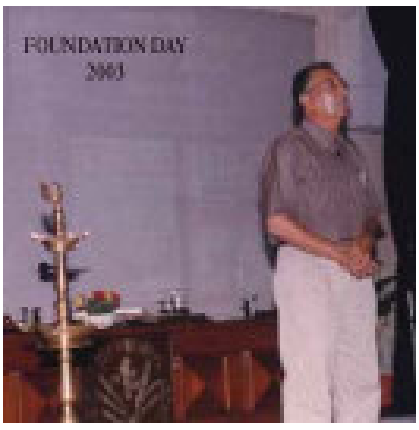
On September 10, 2003 the Institute celebrated its 57th Foundation Day. On this occasion Professor Ashok Sahni, FNA, Centre of Advanced Study in Geology, Panjab University, Chandigarh, delivered 'Seventh Jubilee Commemoration Lecture' on the topic "Dinosaurs of India: Dead but Alive". Professor J.S. Singh, FNA and Chairman, Governing Body of the Institute presided over the function. Many guests and scientists from outside the Institute attended the function.

On November 14, 2003- the Founder's Day, the Institute's staff and distinguished guests from other organizations offered Pushpanjali on the Samadhi of the Founder Professor Birbal Sahni, FRS in the campus. Same day in the evening two memorial lectures were organized.

Professor I.B. Singh, FNA, Department of Geology, Lucknow University, Lucknow delivered the '33rd Birbal Sahni Memorial Lecture' on the topic "Quaternary Climate Change and Human History in Ganga Plain".

Professor C.G.K. Ramanujam, Emeritus Professor, Department of Botany, P.G. College of Science, Osmania University, Saifabad, Hyderabad delivered the '49th Sir Albert Charles Seward Memorial Lecture' entitled "Palms through Ages in Southern India- A Reconnaissance".

Professor J.S. Singh, Chairman, Governing Body of the Institute presided over the function. Several guests and scientists from outside the Institute attended the occasion.



Professor Ashok Sahni, FNA, delivering 'Seventh Jubilee Commemoration Lecture' on "Dinosaurs of India: Dead but Alive" and a view of the audience.

National Science Day

National Science Day (February 28th) was celebrated in a befitting manner. A week long activity culminating on February 28, 2004 was organized in collaboration with Regional Science Center, Lucknow on the theme "Encouraging Scientific Awareness in the Community". A Painting Competition was held in the premises of the Institute. On this occasion students of 40 schools had participated. Other competitions and prize distribution ceremony was held at Regional Science Center. Electronic and print media gave a wide publicity to our event. Educational video film and slide shows were also shown on 28th and it was observed as an Open House.

A view of Painting Competition on the premises of the Institute on National Science Day, February 28th, 2004

Award winning students of the Painting Competition.

Distinguished Visitors

Dr. Giraud Foster, 917 Poplar Hill Road, Baltimore, Maryland, U.S.A.

Professor Ashok Sahni, Centre of Advanced Study in Geology, Panjab University, Chandigarh,

Professor C.G.K. Ramanujam, P.G. College of Science, Osmania University, Hyderabad

Prof. Devendra Sharma, Indira Nagar, Lucknow.

Dr. B.S. Rawat, Ex-Director, Geological Survey of India.

Sri R.H. Khowaja, CMD, Singareni Collieries Company Ltd., Heyderabad.

Dr. A.K. Singh, Central Mining Research Institute, Dhanbad

Professor A.A. Moiz, Osmania University, Hyderabad.

Dr. J.J. Rawal, President, The Indian Planetary Society, Mumbai.

Dr. K.N. Singh, INSA Visiting Fellow, School of Studies in Geology, Vikram University, Ujjain

Sri B.P. Thapa, Arunachal Pradesh. State Council for Science and Technology, Itanagar.

Professor M.M. Singh, North-Eastern Hills University, Bijni Campus, Shillong.

Sri. V.K. Joshi, Registrar, Vigyan Prasar, New Delhi.

Status of Official Language

Institute's efforts to promote the use of the official language and encourage those practicing it continued to flourish during this year also. As a Unit-6 Member, the Institute was regular in attending Lucknow city's Official Language Implementation Committee (NARAKAS) meetings and has also been holding its internal meetings regularly. This year 50th and 51st Half Yearly meetings were attended. During the 51st meeting, Instituted was presented a certificate of appreciation for publishing its Annual Report in Hindi. Work has been started on writing a popular book dealing with various aspects of Palaeobotany and chapters have been allotted to various persons. The required reports to DST and NARAKAS have also been sent every quarter/ bi-annually.

The practice of publishing Hindi abstracts of all the non-Hindi papers in the Institute's international journal 'The Palaeobotanist' has been continued and consequently volume 52(1-3) carried Hindi abstracts of all research papers. The Hindi version of the Annual Report 2002-2003 was prepared and published. The June-2003 issue of the Newsletter also carried a Hindi section. The scientists of the Institute continued to write on science in Hindi and disseminate through various print and electronic media. Several scientists attended workshops/ conferences on Hindi during this period and delivered talks.

Hindi Terminology

During the year, for the benefit of the staff, a number of Hindi equivalent terms for administrative terms were displayed on the notice board.

Hindi Fortnight

Following the tradition, this year also, Hindi fortnight was celebrated with enthusiasm during 16th to 30th September. With the Scientist-in-Charge Dr. Jayasri Banerji chairing, renowned academic Vigyan Bhaskar Prof. Devendra Sharma, FNASc, former Vice-Chancellor of Indore and Gorakhpur universities, graced the inaugural function as Chief Guest. His talk in Hindi was an excellent introduction to the life and work of Nobel Laureate Prof. C.V. Raman. His multimedia presentation brought out the simplicity of Raman who, as a most brilliant physicist of the world, did India proud by discovering the effect known after his name. Prof. Dinesh Kumar, Director, Institute for Mass Communication in S&T, and Professor of Botany at Lucknow University was a Guest of Honour on the occasion.

The fortnight saw organisation of a number of competitions for the staff. A 'debate competition' was organised on this day with Prof. Sharma, Prof. Kumar and Dr. Manoj Shukla as judges. The winners included Dr. K.S. Saraswat (I), Mr. P.K. Mishra (II) and Mrs.

Concluding Function of *Hindi Pakhwara*—2003


भारत सरकार,
राजभाषा विभाग, गृह मंत्रालय,
नगर राजभाषा कार्यान्वयन समिति,
केन्द्रीय औषधि अनुसंधान संस्थान, लखनऊ

प्रमाण-पत्र

प्रमाणित किया जाता है कि .... ने

/दिसम्बर 2003 की समाप्त छमाही अवधि में .... पर

सराहनीय कार्य किया है। राजभाषा कार्यान्वयन हेतु इस कार्यालय के अधिकारियों/कर्मचारियों का

यह प्रयास अत्यन्त प्रशंसनीय है।

(डॉ० विजय नारायण तिवारी)
सचिव
नगर राजभाषा कार्यान्वयन समिति,
एवं
हिन्दी अधिकारी
केन्द्रीय औषधि अनुसंधान संस्थान, लखनऊ

(डॉ० सी.एम. गुप्ता)
अध्यक्ष
नगर राजभाषा कार्यान्वयन समिति,
एवं
निदेशक
केन्द्रीय औषधि अनुसंधान संस्थान, लखनऊ

Rita Banerji (III). In the 'Hindi Essay competition' held on September 22nd and judged by Dr. Archana Tripathi and Dr. S.K.M. Tripathi, winners were Mr. T.K. Mandal (I), Dr. (Mrs) Navita Budhraja (II) and Mrs. Anjali Trivedi (III). On 23rd September, 'Hindi typing competition', judged by Dr. Mukund Sharma and Mrs. Nirmala, had Mr. Umesh Kumar, Mr. Hari Lal and Ms. Chitra Chatterji as I, II and III prize winners respectively. In the 'Spot the Error competition' held on September 24th, Dr. (Mrs) Navita Budhraja, Mr. T.K. Mandal and Dr. Mukund Sharma won I, II and III prizes respectively. In various competitions, participation and performance of even those belonging to non-Hindi speaking regions was a highlight.

Prof. H.L. Nigam, former Vice-Chancellor, APS University, Reewan delivered his speech as a Chief Guest during the Valedictory function on 30th September. The programme was chaired by Dr. Jayasri Banerji. His thoughts on 'Scope of Science Writing in Hindi' were very well received by the audience. This was followed by release of the bi-lingual Telephone Directory of the Institute. Registrar Mr. S.C. Bajpai proposed the Vote of Thanks.

Hindi Encouragement Prizes

Following the Official Language Rules, the Institute awards cash prizes to its employees for encouraging use of Hindi. This year Prof. J.S. Singh, Chairman, Governing Body, gave away these prizes on the occasion of Founders' Day function on November 14th. Dr K.S. Saraswat and Mr. S.C. Bajpai bagged cash prizes of Rs 1,000/- each. Two second prizes of Rs 600/- each were received by Dr. Mukund Sharma and Dr. (Mrs.) Rashmi Srivastava. Five persons, viz. Mr. R.L. Mehra, Mr. R.K. Tantua, Mr. Hari Lal, Mr. Avanish Kumar and Mr. Ajay K. Srivastava received third prizes of Rs 300/- each.

Miscellaneous

Several of the forms for office were made bi-lingual or translated in Hindi.

Reservations and Concessions

To provide adequate representation to Scheduled Castes (SC), Scheduled Tribes (ST) and Other Backward Classes (OBC) for posts meant for direct recruitment, the Institute has sincerely followed the General Reservation Orders of the Government of India as applicable to Autonomous Bodies and as amended from time to time. The Roster for reservation of SC and ST and OBC is maintained by post-based Roster as per the directives of the Government of India, Department of Personnel. The scientific posts from Scientist 'C' and onwards are exempted from the purview of the General Reservation Orders.

The Government of India orders issued from time to time for reservation in respect of blind, deaf and orthopaedically handicapped candidates were made applicable in Group "C" and Group "D" posts of the Institute.

A view of Independence Day Celebrations 2003

The Staff

Scientists

(The names are in alphabetical order according to 'surnames')

Officiating Director (w.e.f. 01.02.2004)
Dr (Ms) Jayasri Banerji, Scientist 'F'

Emeritus Scientist
Dr (Mrs) Chhaya Sharma

Scientist 'F'
Dr Anil Chandra

Scientist 'E'
Dr Rahul Garg
Dr Jaswant S. Guleria
Dr Jagannath P. Mandal
Dr Ramesh K. Saxena
Dr Manoj Shukla
Dr Ashwini K. Srivastava
Dr Gajendra P. Srivastava
Dr (Mrs) Archana Tripathi
Dr (Ms) Vijaya

Scientist 'D'
Dr Anil Agarwal
Dr (Mrs) Usha Bajpai
Dr Samir K. Bera
Dr Amalava Bhattacharyya
Dr Brijendra N. Jana
Dr (Mrs) Neerja Jha
Dr (Mrs) Asha Khandelwal
Dr Madhav Kumar
Dr Rakesh C. Mehrotra
Dr Basant K. Misra
Dr Chandra M. Nautiyal
Dr Mahesh Prasad
Dr Annamraju Rajanikanth
Dr Ram Awatar
Dr Mulagalapalli R. Rao
Dr Dinesh C. Saini
Dr Omprakash S. Sarate
Dr Samir Sarkar
Dr Rakesh Saxena
Dr Mukund Sharma
Dr Kamal J. Singh
Dr Rama S. Singh
Dr (Mrs) Chanchala Srivastava
Dr Shyam C. Srivastava
Dr S.K.M. Tripathi
Dr Ram R. Yadav

Scientist 'C'
Dr Rupendra Babu
Dr Anant P. Bhattacharyya
Dr Supria Chakraborty
Dr Mohan S. Chauhan
Dr (Ms) Asha Gupta
Dr Khowaja Ateequzzaman
Dr Bhagwan D. Mandaokar
Dr Kindu L. Meena
Dr (Mrs) Neeru Prakash
Dr (Mrs) Vandana Prasad
Dr (Mrs) Jyotsana Rai
Dr Anupam Sharma
Dr (Mrs) Alpana Singh
Dr Bhagwan D. Singh
Dr (Mrs) Rashmi Srivastava
Dr (Mrs) Rajni Tewari
Dr Gyanendra K. Trivedi
Dr Rajeev Upadhyay

Scientist 'A'
Dr (Mrs) Anjum Farooqui
Dr Amit K. Ghosh
Dr (Mrs) Binita Phartiyal
Dr Anil K. Pokharia

Birbal Sahni Research Scholar
Sri Himanshu D. Dwivedi
Ms Ruby Ghosh
Sri Bikash Gogoi
Ms Shruti Mishra
Sri Om Prakash
Ms Aradhana Singh
Dr. (Mrs) Navita Budhraja, Research Associate (under Emeritus Scientist)

Technical Personnel

Technical Officer 'D'
Dr B. Sekar

Technical Officer 'C'
Sri P.K. Bajpai
Mrs. Indra Goel

Technical Officer 'B'
Dr (Mrs) Madhabi Chakraborty
Mrs Asha Guleria
Sri P.S. Katiyar
Dr E.G. Khare
Sri T.K. Mandal
Sri Prem Prakash
Sri V.K. Singh
Sri Y.P. Singh

Technical Officer 'A'
Sri Madhukar Arvind
Mrs Reeta Banerjee
Mrs Sunita Khanna
Mrs Kavita Kumar
Sri Subodh Kumar
Sri R.C. Mishra
Sri Pradeep Mohan
Sri Chandra Pal
Sri V.P. Singh
Sri Avinesh K. Srivastava

Technical Assistant 'E'
Sri A.K. Ghosh
Sri R.L. Mehra
Sri V.K. Nigam
Sri V.S. Panwar
Sri Keshav Ram

Technical Assistant 'D'
Sri Syed Rashid Ali
Sri D.S. Bisht
Dr Shreerup Goswami
Sri D.K. Pal
Sri S. Suresh K. Pillai
Sri Dhirendra Sharma
Sri Madhavendra Singh
Sri S.K. Singh
Sri R.K. Tantua
Sri S.M. Vethanayagam

Technical Assistant 'C'
Sri Chandra Bali
Sri C.L. Verma
Sri S.R. Yadav

Technical Assistant 'B'
Sri Avanish Kumar
Sri M.S. Rana
Sri S.C. Singh
Sri Ajay K. Srivastava

Technical Assistant 'A'
Sri Pawan Kumar
Sri Saurabh Pradhan
Sri Om Prakash

Sponsored Project Personnel

Dr Ratan Kar, Project Investigator
Sri Jayendra Singh, Research Associate
Ms Debi Dutta, SRF
Sri Parminder S. Ranhotra, SRF
Sri Santosh K. Shah, SRF
Sri Rajesh Chaturvedi, JRF
Ms Bhasha Dubey, JRF
Mrs Babita Singh, JRF
Ms Nisha Chandra, Research Assistant
Sri Jagdish Prasad, Field Assistant

Administrative Personnel

Registrar
Sri Suresh C. Bajpai

Accounts Officer
Sri R.K. Takru

Private Secretary
Mrs M. Jagath Janani

Section Officer
Sri I.J.S. Bedi
Sri R.K. Kapoor (Officiating)
Sri I.J. Mehra
Mrs V. Nirmala

Maintenance Officer
Sri R.B. Kukreti

Accountant
Sri Dhoom Singh (Officiating)

Assistant
Mrs Ruchita Bose
Mrs Usha Chandra
Sri Hari Lal
Mrs Swapna Mazumdar (Officiating)
Sri K.P. Singh (Officiating)

Sri Koshy Thomas (Officiating)
Mrs P. Thomas

Stenographer
Sri M. Pillai

Upper Division Clerk
Ms Chitra Chatterjee (Officiating)
Sri Mishri Lal
Sri S.S. Panwar
Sri Rameshwar Prasad (Officiating)
Mrs Shail S. Rathore
Sri Gopal Singh
Sri Avinash K. Srivastava
Mrs Renu Srivastava
Sri N. Unnikannan

Lower Division Clerk
Sri Akhil Antal

Driver
Sri Nafees Ahmed ('III')
Sri D.K. Mishra ('II')
Sri M.M. Mishra ('II')
Sri V.P. Singh ('II')
Sri P.K. Mishra ('I')

Class 'D' Personnel

Attendant 'IV' (Technical)
Sri K.C. Chandola

Attendant 'III'
Sri Prem Chandra
Sri Ram Deen
Sri Ram Kishan
Sri Haradhan Mohanti
Sri Kesho Ram
Sri Ram Singh

Attendant 'II'
Mrs Maya Devi
Mrs Munni
Sri Kailash Nath
Sri Mani Lal Pal
Sri Shri Ram
Sri Mohammad Shakil
Sri Bam Singh
Sri Kedar NathYadav

Attendant 'I'
Sri R.K. Awasthi
Sri K.K. Bajpai
Mrs Beena
Sri Ram Dheeraj
Sri Vishwanath S. Gaikwad
Mrs Ram Kali
Sri Hari Kishan
Sri Deepak Kumar
Sri Inder Kumar
Sri Ramesh Kumar
Sri Dhan B. Kunwar
Sri Subhash C. Mishra
Ms Nandani
Sri Ram Ujagar

Mali
Sri Rameshwar Prasad Pal ('III')
Sri Ram Chander ('I')
Sri Ram Kewal ('I')
Sri Mathura Prasad ('I')

Appointments and Promotions

Appointments

Ms Ruby Ghosh, Birbal Sahni Research Scholar w.e.f. 02.12.2002 (at the Department of Botany, Calcutta University, Kolkata)

Mrs Babita Singh, CSIR, Junior Research Fellow (Sponsored Project) w.e.f. 20.06.2003.

Sri Santosh Kumar Shah, Senior Research Fellow (Sponsored Project) w.e.f. 22.08.2003.

Promotions

Mrs Swapna Mazumdar, Officiating Assistant w.e.f. 18.08.2003.

Sri K.P. Singh, Officiating Assistant w.e.f. 18.08.2003.

Ms Chitra Chatterjee, Officiating Upper Division Clerk w.e.f. 18.08.2003.

Ms Debi Dutta, Senior Research Fellow (Sponsored Project) w.e.f. 26.09.2003.

Retirements

Dr Kripa S. Saraswat, Scientist 'F' retired on 31.12.2003.

Sri Sundar Lal, Attendant 'III' retired on 31.12.2003.

Resignation

Dr Puneet Bisaria, Hindi Translator w.e.f. 19.08.2003.

Sri Umesh Kumar, Stenographer w.e.f. 30.10.2003.

Dr (Ms) Vandana Chaudhary, Project Investigator (Fast-Track Project) w.e.f. 20.10.2003.

Sri Suchit Swaroop, Research Assistant (Sponsored Project) tendered resignation on 15.10.2003.

Mrs Anjali Trivedi, Senior Reseach Fellow (Sponsored Project) tendered resignation on 13.02.2004.

Tenure ended

Mrs Sunita Tiwari, Junior Research Fellow w.e.f. 30.04.2003.

Sri Sandeep Bisaria, Lab Assistant w.e.f. 30.04.2003.

Sri Santosh K. Shah, Junior Research Fellow w.e.f. 30.06.2003.

Dr Kripa S. Saraswat

Sri Sundar Lal with his colleagues on the eve of his retirement

Research Papers published

Agarwal A 2003. A carbonised fossil seed viz. *Entada palaeoscandens* (Awasthi & Prasad) Antal & Awasthi from lignite deposits of Kalviwadi, Sindhudurg District, Maharashtra, India. Phytomorphology 53(2): 1-7.

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Bajpai U & Ambwani K 2003. Variation in the fruit morphology of some sp. of the genus *Cyperus*: SEM approach. EMSI Bulletin 3(2): 14-18.

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Bera SK 2003. Early Holocene pollen data from Mikir Hills, Assam. Palaeobotanist 52: 121-126.

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Chakraborty S & Chakraborty S 2003. Isotopic fractionation of the O3-nitric oxide reaction. Curr. Sci. 85: 1210-1212.

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Ghosh P, Bhattacharya SK, Sahni A, Kar RK, Mahabale DM & Ambwani K 2003. Dinosaur coprolites from the Late Cretaceous (Maastrichtian) Lameta Formation of India: Isotopic and other markers suggesting a C3 plant diet. Cretaceous Res. 24: 743-750.

Guleria JS 2003. On the occurrence of plant fossils in lignite bearing Tertiary formations of Gujarat. Publ. MEAI, Ahmedabad: 1-5.

Gupta HK, Srinivasan R, Rao RUM, Reddy GV, Roy GK, Jafri S, Dayal SH, Zachariah AM, Parthasarthy G, Rao GVSP, Gowda TN, Rao SVS, Dwiwedy KK, Banerjee DC, Mohanty R, Satvasradhi, Katt VJ, Prasad AR, Ramanujam CGK, Reddy PR & Shukla M 2003. Borehole investigations in the surface rupture zone of the 1993 Latur earthquake, Maharashtra, India: Overview of results. Mem. Geol. Soc. India. 54: 1-22

Jauhri AK, Mandaokar BD, Mehrotra RC, Tiwari RP & Singh AP 2003. Corals and foraminifera from the Miocene (Upper Bhuban Formation) of Mizoram, India. J. Palaeontol. Soc. India 48: 135-138.

Jha N & Tewari R 2003. Megaspores from Raniganj Formation of Mailaram Area, Godavari Graben, Andhra Pradesh, India. Phytomorphology 53(2): 141-156.

Joshi A, Mehrotra RC & De A 2003. A fossil wood from the Upper Siwalik sediments of West Kameng District, Arunachal Pradesh, India. Proc. 4th South Asia Geol. Congr. (GEOSAS - IV), GSI, Kolkata: 312-315.

Kar R 2003. Palynological recognition of Barren Measures sediments (Middle Permian) from Tatapani-Ramkola Coalfield, Chhattisgarh, India. Gondw. Geol. Mag. Spl. Vol. 6: 239-244.

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AUDIT REPORT

to the Governing Body of the Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow

We have audited the attached Balance Sheet of Birbal Sahni Institute of Palaeobotany, Lucknow, as at 31st March 2004 and also the Income & Expenditure account and Receipt & Payment account for the year ended on that date annexed thereto. These financial statements are the responsibility of the Institute's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with auditing standards generally accepted in India. Those Standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statement. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

Further to our comments in the Annexure "A" attached, we report that:

(i) We have obtained all the information and explanation, which to the best of our knowledge and belief were necessary for the purpose of our audit;
(ii) In our opinion, proper books of account as required by law have been kept by the Institute so far as appears from our examination of those books;
(iii) The Balance Sheet and Income & Expenditure account and Receipt & Payment account dealt with by this report are in agreement with the books of account;
(iv) In our opinion and to the best of our information and according to the explanations given to us, the said accounts give the information required, in the manner so required and give a true and fair view in conformity with the accounting principles generally accepted in India;

a) In case of the Balance Sheet, of the state of affairs of the Institute as at 31st March, 2004;
b) In the case of the Income & Expenditure account, of the surplus/deficit for the year ended on the date, and
c) In the case of Receipt & Payment account, of the receipts & payments of the Institute for the year ended on that date.

Date : 25.08.2004
Place : Lucknow

For **Singh Agarwal & Associates**
Chartered Accountants

Sd/-
Mukesh K. Agarwal
FCA, DISA(ICA)
(Partner)

ANNEXURE - 'A'

(Annexed to and forming part of the Audit Report for the year ended 31st march, 2004)

Comments/Audit observations on accounts of Birbal Sahni Institute of Palaeobotany- Lucknow for the year ended 31st March, 2004

Comments/Observations by the Chartered Accountants	Action taken by the Institute
ACCOUNTS	
1. The Institute is getting separate grants for Plan & Non-Plan expenses based on the budgets approved by the DST. During the year under report, the Institute has utilized Rs. 1,88,19,973.00 to Non Plan head, from Plan head budget. Approval of its Governing Body is yet to be obtained in this regard. It seems that DST grant does not commensurate with requirement of the Institute under Non-Plan.	The Chairman F&B Committee on behalf of F&B Committee and GB has given approval to incur Non Plan Expenditure to be met from Plan Funds. The matter was reported to the F&B Committee and GB meetings held on October 26, 2004.
2.Advances (capital head) unsettled and pending for recovery/adjustment as on 31.03.2004 under different heads, since long, are to be properly taken care of at the Institute level for early adjustment. Details of which are as under:	

PARTICULARS	YEAR	AMOUNT	
RESEARCH APPARATUS & EQUIPMENT	1996-1997 2002-2003	1820.00 210408.00	The advances pertaining to Research Apparatus and Equipment have been settled.
BOOKS & JOURNAL	1983-1984 2000-2001 2001-2002 2002-2003	878.00 1681.44 19086.60 185066.42	With regards to the advances for books and journals, out of Rs.19,086.60 and Rs.1,85,066.42 a sum of Rs.1,64,085/- has been settled leaving a balance of Rs.40,068 as unsettled.
C.N.R.-M/S Sumit Maithy & Anshu Mahajan	1997-1998	48300.00	The advances pertains to the CPWD and others for Auditorium Block. The CPWD has refunded the balance amount and the advances have been settled. The advances pending against M/s Sumit Maithy & Anshu Mahajan and M/s Universal Engg. Kanpur have also been settled.
C P W D	1999-2000	4064352.00	
M/S Universal Engg., Kanpur	2001-2002	700757.00	
C P W D	2002-2003	583648.00	
M/S Universal Engg., Kanpur	2002-2003	358998.00	
AIRCONDITIONING	1999-2000	17799.00	The settlement of advance is under process.

3. As reported earlier also, in addition to the above, there are advances outstanding since long shown in the ledger as unsettled. But these advances are not appearing in

Comments/Observations by the Chartered Accountants	Action taken by the Institute

the Final Accounts of the Institute. It was informed to us during the discussion that these advances were made against the revenue expenses and have already been booked under the respective heads of Expenditure. The system adopted by the Institute is against the normally accepted accounting policies. The details of such advances are as under, which are remained unsettled:

Date	Name	Amount	Nature
17.08.1990	Nandan Khudyadi	36000.00	Centenary
24.09.1991	-Do-	2000.00	Centenary

The action has been taken and CD of the film has been received by the Institute from the DST and deposited in the Institute Museum and the advance has been settled.

As explained that this is as per accounting policy of the Institute consistently being followed since long.

4.The Institute should adopt double entry system of accounting for more effective and meaningful maintenance of accounting records. It will also help proper accounting records comparable with standards applicable in India.

Noted. Necessary step will be taken from the next financial year.

LIBRARY

5. As per the Bye-laws/Rules of the Institute the Physical Verification of the Library is to be carried out at an intervals of 2 years. Verification for the year 2002-2003 has since been completed but discrepancies mentioned in the same are yet to be taken up for eventual rectification.

Action has been taken. Out of 162 missing books, 129 have been traced, leaving a balance of 33 books which are being searched and will be shown to next audit.

PUBLICATION

6. On scrutiny of records of the priced publication of the Institute, it has been observed that during last several years, the Institute had brought-out publication on different subjects with an objective to sell-out the same, in the market. The stock position of these priced publication as on 31.03.2004 was Rs.36.29 lacs apart from the reserved stock of Rs. 6.26 lacs. Thus the total stock of the publication stood at Rs.42.55 lacs at the close of the year, which seems to be on higher

The F&B Committee during its meeting held on October 26, 2004 recommended that the prized publications of the Institute published before the calendar year 2000 may be given to Intuitions for intuitional/ Library use free of cost on request. Further, the F&B Committee also recommended that a three member Committee may suggest these ways and means of reducing the stock of unsold publications of the Institute. The out come will be shown to the next audit.

Comments/Observations by the Chartered Accountants	Action taken by the Institute
side. A practical assessment has to be made for the quantity to be got printed together with its economics etc so that wastage and blockage of funds can be avoided. The Institute authorities are expected to make it certain that wasteful avoidable expenses on any account is avoided by effective assessment.	
STORES	
7. The Fixed Assets Register and Stores Register are being maintained properly. Physical verification was to be carried out during the year under audit. As per Inter-office Memorandum letter dated 05.09.2003, a Committee was constituted for the purpose but no progress in this regard has been noticed. It has been informed to us that the job of physical verification is continuing and will be completed soon. Effective and timely conduct of physical verification should be the prime concern of the said Committee to make exercise fruitful.	The physical verification of the stores is in progress and will be completed soon. The report will be shown to next audit.
RESERVE FUND AND PENSION FUND	
8. Reserve Fund and Pension Fund amounting to Rs.60.67 lacs and Rs.133.94 lacs do not represent investment of matching amounts. Shortfall of Rs.17.00 lacs and Rs. 46.92 lacs respectively have not been invested as on 31.03.2004.	The shortfall amounts of Reserve Fund and Pension Fund as mentioned were transferred on March 31, 2004 and will be invested during the current financial year.
EMPLOYEES PROVIDENT FUND	
9. As against the total reserves of Rs.339.90 lacs against the Employees Provident Fund as on 31.03.2004, a sum of Rs.172.50 lacs was invested with Nationalized Banks and other organizations as prescribed under the provisions of the Bye-Laws of the Institute. Interest on Rs.115.00 Lacs, invested as FD with IOB, Lucknow, has not been accounted for in the current year. Interest on investment in Bonds of M.P. Electricity Board amounting to Rs.20.00 lacs has neither been received nor accounted for on accrual basis. Only Rs.69814/- received in the year 2000-2001 has been accounted for. Incomes accrued on investments made	Due to non-availability of the Expert from Lucknow University, frequent meetings of the Investment Committee do not take place as and when required. The F&B Committee has requested the nominee of the Vice Chancellor to nominate some other expert on the Investment Committee of the Institute. The interest from MP Electricity Board has not been received so far due to bifurcation of the States of Madhya Pradesh and Chhattisgarh. The case is pending with the Hon'ble Supreme Court of India as per their letter.

Comments/Observations by the Chartered Accountants	Action taken by the Institute
with other Bodies are also not accounted for on accrual basis.	
OTHERS	
10. The Institute had given a portion of their building to Indian Overseas Bank for opening one Extension Counter over there during June, 1997 but till date no agreement has been entered into with them and no rent and other maintenance charges are being recovered. During the year Institute has invested a sum of Rs. 3,27,866/- on constructing new building for Bank's Extension Counter, Institute authorities are advised to take effective steps for early fixation of rent.	The F&B Committee during its meeting held on October 26, 2004 that the leased rent charges of the bank building may be fixed on the circle rate of the District Magistrate, Lucknow for rent of commercial buildings per sqm. Thus the rent of BSIP Extension Counter of IOB comes out to be Rs. 4435/- per month. The Institute has been directed to enter into an agreement with the bank for an initial period of three years w.e.f. September 01, 2003 for charging of leased rent charges and electricity charges based upon the actual charges being paid by the Institute. The agreement may be renewed on the mutual consent basis after expiry the initial agreement.

Date : 25.08.2004
Place : Lucknow

For **Singh Agarwal & Associates**
Chartered Accountants
Sd/-
Mukesh K. Agarwal
(Partner)

R.K. Takru
(Accounts Officer)

S.C. Bajpai
(Registrar)

Jayasri Banerji
(Officiating Director)

Birbal Sahni Institute of Palaeobotany, Lucknow

Balance Sheet as at March 31, 2004

Fig. in Rupees

CORPUS/CAPITAL FUND AND LIABILITIES	Schedule	Current Year	Previous Year
Corpus/Capital Fund	1	133345867.00	129073988.00
Reserves and Surplus	2	5883705.00	4183705.00
Earmarked/Endowment Funds	3	48273674.00	42030531.00
Secured Loans and Borrowings	4	0.00	0.00
Unsecured Loans and Borrowings	5	0.00	0.00
Deferred Credit Liabilities	6	0.00	0.00
Current Liabilities and Provisions	7	106352.00	173406.00
TOTAL		**187609598.00**	**175461630.00**
ASSETS			
Fixed Assets	8	105865179.00	102169414.00
Investments-from Earmarked/ Endowment Funds	9	47628452.00	38940309.00
Investments-others	10	6066910.00	3283705.00
Current Assets, Loans, Advances, etc.	11	28049057.00	31068202.00
Miscellandeous Expenditure (to the extent not written off or adjusted)		0.00	0.00
TOTAL		**187609598.00**	**175461630.00**
Significant Accounting Policies	24		
Contingent Liabilities and Notes On Accounts	25		

CERTIFICATE

Certified that the figures of Assets as shown in the Balance Sheet have been reconciled with the total figure of Assets shown in the relevant Registers of the Institute.

For **Singh Agarwal & Associates**
Chartered Accountants
Sd/-
Mukesh K. Agarwal
(Partner)

R.K. Takru
(Accounts Officer)

S.C. Bajpai
(Registrar)

J. Banerji
Jayasri Banerji
(Officiating Director)

Birbal Sahni Institute of Palaeobotany, Lucknow

Income and Expenditure Account for the year ending March 31, 2004

Fig. in Rupees

INCOME	Schedule	Current Year	Previous Year
Income from Sales/Services	12	345292.00	482644.00
Grants/subsidies (OB, Deposit A/C and Transfer from Cap. Fund)	13	61595000.00	73000000.00
Fees/Subscriptions	14	0.00	0.00
Income from Investments (Income on Invest. from Earmarked/Endow. Funds transferred to Funds)	15	183205.00	62801.00
Income from Royalty, Publication, etc.	16	210001.00	58361.00
Interest Earned	17	352972.00	593334.00
Other Income	18	122957.00	73499.00
Increase/(decrease) in stock of Finished goods and works-in-progress	19	0.00	0.00
TOTAL(A)		**62809427.00**	**74270639.00**
EXPENDITURE			
Establishment Expenses	20	39917868.00	39815194.00
Other Administrative Expenses, etc.	21	12259680.00	11515842.00
Expenditure on Grants, Subsidies, etc.	22	0.00	0.00
Interest	23	0.00	0.00
Depreciation (Net Total at the year-end-corresponding to Schedule 8)		0.00	0.00
TOTAL (B)		**52177548.00**	**51331036.00**
Balance being excess of Income over Expenditure (A-B)		10631879.00	22939603.00
Transfer to Special Reserve (sepecify each)		1700000.00	900000.00
Transfer to/from General Reserve to Pension Fund		4660000.00	2200000.00
BALANCE BEING SURPLUS/DEFICIT CARRIED TO CORPUS/CAPITAL FUND		**4271879.00**	**19839603.00**
Significant Accounting Policies	24	0.00	0.00
Contingent Liabilities and Notes On Accounts	25	0.00	0.00

For Singh Agarwal & Associates
Chartered Accountants
Sd/-
Mukesh K. Agarwal, *(Partner)*

R.K. Takru
(Accounts Officer)

S.C. Bajpai
(Registrar)

Jayasri Banerji
(Officiating Director)

Birbal Sahni Institute of Palaeobotany

Receipts and Payments Account for the year ended March 31, 2004

Fig. in Rupees

RECEIPT	Current Year	Previous Year
I. Opening Balances		
a) Cash in hand	32	88
b) Bank Balances		
i) In current accounts	15141645	227373
ii) In deposit accounts		0
iii) Endowment deposits		0
II. Grants Received		
a) From Government of India	61595000	73000000
b) From State Government		0
c) From other sources(details)		0
(Grant for capital & revenue exp. To be shown separately)		0
d)Deposit Account		0
III. Income on Investment from		
a) Earmarked/Endow. Funds	0	62801
b) Own Funds (Utilized)		0
IV. Interest Received	8733	
a) On Bank deposits	36986	351144
b) Loans, Advances etc.	307253	242190
V. Other Income (specify)		
i) Sale proceeds of Publications	210001	58361
ii) Miscellaneous Income	108378	73499
iii) Sale of Services (Consultancy)	345292	482644
VI. Ammount Borrowed		0
VII. Any other receipts (give details)		
(Pension Contribution)	14579	1020
I) Recovery of Advances (	1411718	1166103
ii) Earnest Money Deposit	31948	89600
iii) FDR Matured	0	151000
TOTAL	**79211565**	**75905823**

PAYMENTS	Current Year	Previous Year
1. Expenses		
a) Establishment Expenses(Corresponding to Schedule 20)	39917868	39815194
b) Administrative Expenses(Corresponding to Schedule 21)	12259680	11515842
II. Payments made against funds for various projects (Name of the fund or project should be shown along with the particulars of payments made for each project)		
III. Investments and deposits made		
a) Out of Earmarked/Endpwment funds		
b) Out of Own Funds (Investments-Others)	9705000	
IV. Expenditure on Fixed Assets & Capital Work-in-Progress		
a) Purchase of Fixed Assets	3695765	5628922
b) Expenditure on Capital Work-in-Progress		
V. Refund of surplus money/ Loans		
a) To the Government of India		
b) To the State Government		
c) To other providers of funds		
VI. Finance Charges (Interest)		
VII. Other Payments (Specify)		
i) Advances to Staff	1765146	3391242
ii) Earnest Money Refended	99002	74500
iii) Advances to Parties	2006687	338446
VIII.Closing Balances		
a) Cash in hand	258	32
b) Bank Balances		
i) In current accounts	9762159	15141645
ii) In deposit accounts		
iii) Saving account		
iv)Endowment deposit account		
v)Excess Expenditure		
TOTAL	**79211565**	**75905823**

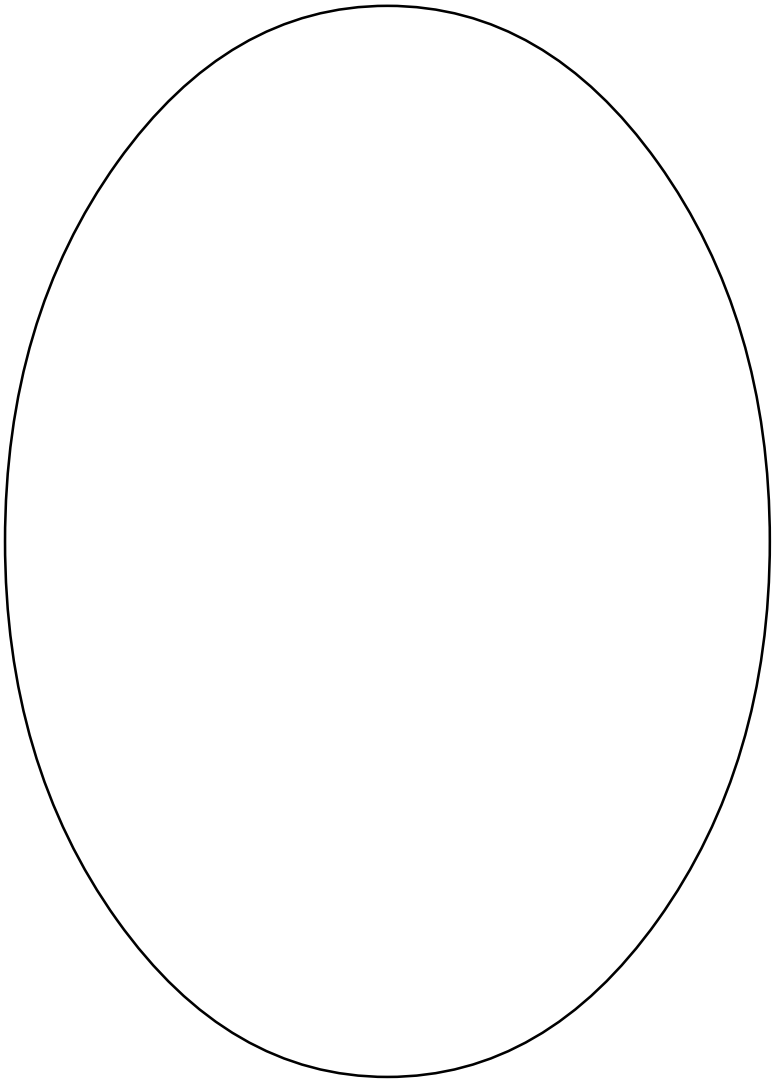
For Singh Agarwal & Associates
Chartered Accountants
Sd/-
Mukesh K. Agarwal
(Partner)

R.K. Takru
(Accounts Officer)

S.C. Bajpai
(Registrar)

Jayasri Banerji
(Officiating Director)

ANNUAL REPORT
2003-2004



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BIRBAL SAHNI INSTITUTE OF PALAEOBOTANY, LUCKNOW

(An Autonomous Institute under Department of Science and Technology, Government of India)

Annual Report
2003-2004

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November 2004

We are grateful to the Department of Science and Technology, Government of India, New Delhi, to the Governing Body and the Research Advisory Council of the Institute for continued support and guidance.

With
Best Compliments

Jayasri Banerji,
Officiating Director

Contents

Preface

The Birbal Sahni Institute of Palaeobotany is dedicated to the promotion of fundamental and applied aspects of plant fossil research. The Institute adopted multidisciplinary thrust area programmes in different disciplines of Palaeobotany during IX Five Year Plan. During this year the research activities of the institute were carried out to complete the project work of IX Five Year Plan. The targets defined under various projects / components have been met and the details of research work carried out in each project are incorporated in this report.

The research projects and programmes of the Institute identified for X Five Year Plan under following thrust area programmes:

- Precambrian biotic events
- Gondwana floristics, palaeoclimate and palaeoecology: relevance to breakup of Gondwanaland
- Biopetrology of coals and its relevance to coal bed methane
- Palaeobiology of Phanerozoic basins and its bearing on hydrocarbon potential
- Quaternary vegetation, eustatic sea level changes, global climate change and anthropogenic impact

During the period I have received constant support and guidance from Chairman and members of the Governing Body and Research Advisory Council of the Institute to accomplish target oriented tasks. I express my sincere thanks and gratitude to all of them. I would like to thank the members of Research Planning and Coordination Cell—Drs A.K. Srivastava, J.S. Guleria, B.D. Singh; A. Rajanikanth and Mukund Sharma of Publication Unit, technical and administrative staff of the institute for their help and cooperation.

J. Banerji

Jayasri Banerji
Officiating Director

Executive Summary

The research activities of the Birbal Sahni Institute of Palaeobotany were categorized under 14 projects, besides special activities. Research work was carried out under umbrella of five Thrust Area Programmes- 1) Precambrian biotic events, 2) Gondwana floristics, palaeoclimate and palaeoecology: relevance to breakup of Gondwanaland, 3) Biopetrology of coals and its relevance to coal bed methane, 4) Palaeobiology of Phanerozoic Basins and its bearing on hydrocarbon potential, and 5) Quaternary vegetation, eustatic sea level changes, global climate change and anthropogenic impact.

The academic activities of the Institute during 2003-04 include publication of 63 research papers, 68 scientific abstracts, and 22 reports/articles, besides 62 research papers, which are accepted for publication. Two scientists have been deputed abroad under inter-academy exchange programme of INSA, and another three scientists and one technical officer for attending conferences. Many scientists and technicians were deputed to attend various national and international conferences/seminars/ workshops held in the country and 48 research papers were presented at different centers of India.

Important Research Contributions

- Carbonaceous macrofossils studied from the Sirbu Shale Formation (Bhander Group) exposed near Satoli village (MP) suggest Pre-Vendian age. The heterocyst bearing algal forms from the Mesoproterozoic Jaradag Fawn Limestone (Semri Group) exposed in the Son Valley show evolutionary significance and help in making estimates for the presence of environmental oxygen during Vindhyan sedimentation.
- Recorded significant organic walled microfossils from the Tarenga Formation (Raipur Group) which indicate Vendian age and calm environment during the deposition of this upper part of the Chhattisgarh Supergroup.
- Palynofossil assemblages from various coal-bearing Gondwana sequences of Birbhum, Rajmahal, Sohagpur, Ib-river, Wardha-Godavari valley coalfields were analysed and compiled for biostratigraphic dating and correlations.
- Plant fossils investigated from various Gondwana beds of South Rewa, Mahanadi, Satpura, Wardha, Pranhita-Godavari, etc. basins have helped in interpreting floristic evolution and palaeoecology of the regions.
- The frond of *Botrychiopsis* sp and *Rubidgea*- leaf have been discovered for the first time from Satpura Gondwana Basin.
- A rich megaspore assemblage has been recovered for the first time from Early Permian Barakar Formation of Umrer Coalfield.
- A new species of *Podocarpoxylon bansaense* wood is reported for the first time from Bansa Bed of Jabalpur Formation.
- Three distinct types of evidences of insect-plant interaction have been observed in the flora of Rajmahal Basin.
- Palynofacies analyses of Early Cretaceous sequences of Sehora, District Narsinghpur brought out three distinct units with varying organic matter.
- Algal mats and bryophytic remains have been recovered from the *Isoetites*-rich locality of Cretaceous sequence near Than (Gujarat).
- Economic suitability and CBM potentiality of coals from Rajmahal and Wardha basins have been examined by studying the petrology. Tertiary coals of Assam and Meghalaya have also been studied to observe their maceral characterization and its influence on cleat cementing pattern.
- Investigated plant fossils and palynoflora from various Tertiary sequences for stratigraphic zonation and correlation. Fossil fruit of *Dipterocarpus* has been reported for the first time from Tertiary sediments.
- Fossil ascocarps made up of closely placed hyphae are reported for the first time from chert sample of Deccan Intertrappean beds of Mohgaon Kalan (MP).

- Considerable variation has been noticed in pollen grains having affinity with the family Arecaceae in general and Nypa in particular from Akli Formation (Barmer Basin).
- The source area of the Permian palynofossils recovered from Late Eocene sediments of Kopili Formation has been attributed to Lower Gondwana beds exposed in Singrimiri area of Garo Hills (Meghalaya).
- Several zonal markers of calcareous nannofossils have been recorded from a continuous sequence (Langpar-Therria formations) from Meghalaya, suggesting a strong potential for demarcation of the Danian-Selandian boundary.
- Late Quaternary pollen analysis from mangrove-dominated part of Andaman Island shows similarity in mangrove evolution with that of dataset obtained from Asia- Pacific, eastern Indonesia and northern Australia.
- The pollen analysis of Long lake sediment core near ice shelf NW of Schirmacher Oasis (Antarctica) dated back to 2000 yrs BP indicates two fold climatic oscillations, i.e. cold and humid to warm and humid.
- Ancient plant economic practices observed from some archaeological excavation sites of Uttar Pradesh have brought out considerable information on agricultural economy and other botanical remains.
- Tree ring analysis data of cedar from western Himalaya shows high variability in pre-monsoon summer temperature since 16th century as compared to early part of the series reflecting unstable climate during the Little Ice Age Period.
- The palynological assemblages comparable with Middle-Late Jurassic and Early Miocene miofloras have been recovered from Indus Suture Zone. A new fossil palm (Amesoneuron hemisiensis) has been identified from the Hemis Conglomerate (Ladakh Himalaya).
- Medicinal uses of about 192 plant species have been recorded from Shahdol district, (Madhya Pradesh).
- Chronology of palynologically analysed samples was worked out. Besides, developed a Fortran program that calculates Radiocarbon age of a sample from the counting data of Quantulus counter.

MOU between BSIP and ONGC

As per the Memorandum of Understanding signed between Institute and Oil and Natural Gas Corporation a project entitled " Palynostratigraphy and source rock potential studies of Siwalik and Subathu sediments of Himachal Pradesh and their correlation with subsurface Tertiary sequence of Punjab Plains" has been undertaken for study after joint consultations. The samples have been received from ONGC and their chemical processing has been started for the recovery of pollen and spores.

Commemoration & Memorial Lectures

On the occasion of 57th Foundation Day of the Institute, Professor Ashok Sahni, FNA of Panjab University (Chandigarh) delivered the Seventh Jubilee Commemoration Lecture on Dinosaurs of India: Dead but Alive at the Institute on September 10, 2003.

On Founder's Day (November 14th), Professor I.B. Singh, FNA of Lucknow University (Lucknow) delivered the 33rd Birbal Sahni Memorial Lecture on Quaternary Climate Change and Human History in Ganga Basin. Professor C.G.K. Ramanujam, FPbS of Osmania University (Hyderabad) delivered the 49th Sir Albert Charles Seward Memorial Lecture on Palms through Ages in Southern India: A Reconnaissance.

National Events

Like every year, Institute celebrated Independence Day and Republic Day by unfurling the National Flag. The National Science Day has been observed as open house. Scientific posters and drawing competitions were organized for local school children. The National Technology Day has also been observed as open house and a lecture was delivered by Dr B.S. Rawat, Ex-Director, GSI on Remote Sensing in the service of common Man.


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