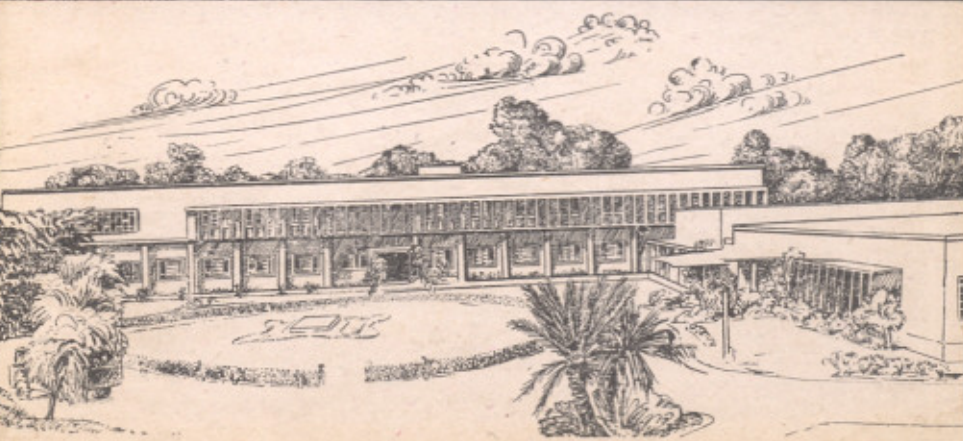


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**BIRBAL SAHNI INSTITUTE
OF PALAEOBOTANY
LUCKNOW**



**ANNUAL REPORT
1972-73**



CONTENTS

	Page
I Research	
1. Pre-Gondwana	1
2. Lower Gondwana	1
3. Palaeozoic from abroad	6
4. Mesozoic	6
5. Tertiary	10
6. Quaternary	16
II Papers Published	21
III Field Work	24
IV Sponsored/Collaborative Research	26
V Training Provided to Outsiders	28
VI Technical Assistance to Outsiders	29
VII Papers and Lectures at Symposia/ Conferences/Meeting etc.	29
VIII Representation on Committees/Boards	35
IX Founders Day	39
X Publications	40
XI Library	41
XII Museum	44
XIII Herbarium	47
XIV Building	50
XV Visitors	51
XVI The Governing Body and The Finance Committee	54
XVII The Staff	57
XVIII Budget for 1972-73	62

I. RESEARCH

1 PRE-GONDWANA

1.1 Search for the evidence of early plant life in the Vindhyan formations.

Rock samples from a well cutting in Rewa, M. P. on maceration were found to be barren of micro-organic remains.

Interesting microfossil remains were recovered from rock samples collected around Mirzapur.

1.2 Search for the evidence of plant life in Pre-Gondwana rocks of Dharwar in age (Chaibasa).

Siliceous rocks collected around Chaibasa were macerated for the recovery of biological remains. Thin sections were also prepared for micro-fossils. No indication of biological remain was found.

2. LOWER GONDWANAS

2.1 Morphological studies in the Glossopteris Flora

2.1.1 Auranga Coalfield, Bihar

Megafossils from the coal-bearing strata of Auranga coalfield have been studied. From the section near Serek-Gutur village six type of *Glossopteris* leaves, 1 sp. of *Gangamopteris* and 1 sp. of *Noeggerathiopsis* have been identified and their description have been completed. From Churia fire clay section, fertile and sterile fronds of *Sphenopteris* a new species of *Arberia* and five distinct types of *Glossopteris* leaves have been identified. Their description and photography have been completed.

Study of Micro-fossil remains from the rock sections near Gowa village, Tubed, Jagaldagga and Bagdagga has been undertaken.

2.1.2 South Karanpura Coalfield, Bihar

Morphological observations and cuticular preparations of plant assemblages from Argada 'S' seam, Naditoli seam, Lower Nakkari seam of Barakar age have been completed. A new species of *Euryphyllum* and *Noeggerathiopsis* have been identified.

From the Barren Measures succession near Nakkari village four types of *Glossopteris*, *Sphenopteris hughesi* and *Raniganjia* have been identified.

2.1.3 Raniganj Coalfield, Bengal

- (a) From the Barakar formation of Raniganj coalfield a new fan-shaped fossil plant with subparallel running veins, attached to an axis has been identified. This plant fossil has been named *Gondwanophyton* gen. nov.
- (b) Morphological studies of *Glossopteris* leaves collected from Luxmipur colliery, Raniganj coalfield have been undertaken. Five morphological types have been identified. A new type of biconvex scale leaf has been recognised.

2.1.4 Mahanadi and Brahmani valley, Orissa.

Glossopterid fructifications from Handappa in the Talchir coalfield have been studied. Investigations and revision of the previous known genera *Dictyopteridium* Feistm. and *Glossotheca* Surange and Maheshwari have been completed. Two new female genera *Partha* and *Denkania* have been identified. Investigations on *Scutum* Plumstead and *Cistella* Plumstead have been undertaken.

2.1.5 *On the nomenclature of Buriadia heterophylla Seward and Sahni.*

A paper discussing the nomenclatural confusion of *Buriadia heterophylla* has been completed and sent to press.

2.2 *Sporae dispersae and palynostratigraphy.*

2.2.1 *Jayanti Coalfield.*

A detailed palynological study of the coal-bearing strata in the Jayanti coalfield has been completed. The palynological evidence supports the recognition of Karharbari stage in the basin.

2.2.2 *Daltonganj Coalfield.*

Some calcareous sediments belonging to the Talchir formation of the Daltonganj coalfield have been palynologically investigated. Some very peculiar semicrystalline bodies, lenticular to rectangular in shape, showing distinct structure and sculpture have been recovered. These objects suggest close morphological evidence to the sponge spicules.

2.2.3 *Palaeobotany of Talchir and Karharbari Stages and Lower Gondwana glaciation.*

The contribution is a synthesis of lithological, palaeobotanical and palynological data of the Talchir-Karharbari sequence from a number of coal basins. It has been concluded that Karharbari Stage is divisible into an older and a younger formation. The former is palynologically *Calumispora* dominated and the latter by *Parasaccites* complex. The latter is also interpreted to represent the second glacial horizon which is succeeded by *Sulcatisporites* complex dominated mioflora of Lower Barakar Stage.

2.2.4 *Palynological subdivisions of Damuda Series.*

Damuda Series is interpreted to include Upper Karharbari Stage at the base. Barakar Stage is suggested to be

divisible into two parts palynologically, and Ironstone Shale Stage into three. Raniganj Stage is not divisible. Trilete spores are not attached much significance because their quantitatively high representation is considered of local origin, confined to coal facies.

2.2.5 *Giridih Coalfield, Bihar.*

64 samples of different lithologies have been studied palynologically. The study reveals one distinct miofloral change. The older part of Zone no. 1 is exclusively rich in radial monosaccates, chiefly *Parasaccites* and *Plicatipollenites* and is correlatable with the Talchir Stage. The younger part of Zone no. 1 indicates the Karharbari Stage which is characterised by the dominance of *Callumispora* and *Parasaccites*. Zone no. 2 corresponds with the Barakar Stage and is marked by the dominance of *Sulcatisporites* associated with reticuloid and striated disaccates.

2.2.6 *Auranga Coalfield, Bihar.*

17 samples of coal and shale were studied palynologically. The mioflora is characterised by the dominance of *Sulcatisporites* associated in various combination with *Thymospora*, *Horriditriletes*, *Cyclogranisporites* and *Faunipollenites*. The sporological succession of seven coal occurrences is marked by five distinct miofloral assemblages.

2.2.7 *West-Raniganj Coalfield, West Bengal.*

127 samples from Pusai and Khudia nala from West-Raniganj Coalfield were macerated and analysed. The per cent frequencies of different miospore genera reveal that the post Talchir depositions are divisible into five zones. The lowest (zone 1) contains *Callumispora*-rich mioflora and represents an inter-glacial phase. This has been assigned to the Karharbari Stage. The zone-2 and zone-3 exhibit the second monosaccate-rich flora (first monosaccate zone being in the Talchirs), representing the beginning of another glaci-

gene deposition and hence assigned to the Lower Barakar Stage. Two successional overlying assemblages (zone-4 and 5), containing non-striate disaccate and striate disaccate miospores characterize the middle and upper Barakar Stage respectively.

2.2.8 *SouthKaranpura Coalfield, Bihar.*

Quantitative study of all the 26 samples of South-Karanpura Coalfield has been completed and biometric analysis of various palyno-taxa has also been completed.

2.2.9 *Permian microflora of India.*

The knowledge of Sporae dispersae accumulated during the recent years from the Permian of India has been synthesized. 13 miofloral zones have been distinguished each characterising a distinct stage of miofloral succession in Lower Gondwana System of India.

2.2.10 *Pench-Kanhan Coalfield, M. P.*

12 samples from Talchir sediments were palynologically studied. The mioflora shows the dominance of radial monosaccate miospores and *Callumispora*. On the basis of statistical analysis two biozones (cenozones) have been described. The Lower Zone (a) characterised by the over all dominance of radial monosaccate miospores and the Upper Zone (b) characterised by the radial monosaccates and some *Callumispora* are placed in the Talchir Stage.

2.2.11 *Umrer Coalfield, Maharashtra.*

25 coal and shale samples were macerated. The study has revealed the presence of two biozones. Lower zone is dominated by varitriletes group of miospores while the upper is dominated by the radial monosaccate miospores.

2.2.12 *Kamptee Coalfield, Maharashtra.*

5 borehole samples supplied by Coal Survey Station, Nagpur, were macerated. These have not yielded spores.

2.3 Petropalynology of coals.

2.3.1 *Pench-Kanhan Coalfield.*

Palynopetrological studies from Pench-Kanhan Coalfield, Satpura Gondwana Basin, have revealed the presence of four distinct biozones and four coal types. The two biozones, C and D, recovered from VI and III coal seams of Rawanwara Colliery are placed in Karharbari Stage. Upper two zones, E and F, representing two upper coal seams are grouped in Barakar Stage. The coal types from these seams have also been studied.

2.3.2 *Godavari Basin.*

Morphography, classification and photography of biopetrological constituents of Godavari coals have been completed. The palynological aspects of the same coals has also been investigated.

3. PALAEOZOIC FROM ABROAD

3.1 *Sporae dispersae* and Palynostratigraphy.

3.1.1 *Palynological studies of the Lower Gondwanas of Brazil.*

The detailed palynological analysis of the Parana and Maranhao basins of Brazil has been completed.

4. MESOZOIC

4.1 *Megafossil assemblages.*

4.1.1 *Triassic of Ramkola-Tatapani.*

A large number of megafossils from the Lower Triassic of Ramkola-Tatapani have been examined. The following species have been identified : *Schizoneura gondwanensis*, *Sphenopteris lobifolia*, *Sphenopteria alata*, *Glossopteris communis*, *G. indica*, *G. angustifolia*, *G. longicaulis*, *G. retifera*, *G. sp.* *G. sp.* *A cf. Dictyopteridium*, *Paracalamites sp.* and *Dicroidium sp.* Description, photographs and text-figures of these plants have been completed.

4.1.2 Triassic of Nidpur.

Work on some microstrobili from the Triassic of Nidpur has been completed. For such male fructifications a new genus *Nidistrobis* has been instituted. *Nidistrobis harrisianus* sp. nov. is based on a few pollen-bearing fructifications. It comprises "pad-shaped" pollen-bearing organs which are spirally arranged around a broad axis. Each "pad-shaped" organ on its abaxial side has about 7-9 elongated pollen sacs which are embeded in its substance. Pollen grains are non-striate bisaccate approaching the organization as in *Satsangisaccites* Bharadwaj and Srivastava.

4.1.3 Juraasic of Rajmahal Hills.

A large number of chert slices from Nipania, Rajmahal hills, Bihar, have been examined. New specimens of *Pentoxylon*, *Nipaniophyllum*, *Sahnia* and *Carnoconites* have been studied. Some new informations have been gained from this study.

4.1.4 Satpura Basin.

A new conifer species from the Sher river section at Sehora has been described. The new species, *Brachyphyllum sehoraensis* is represented by leafy twigs bearing spirally arranged and appressed leaves. Leaves are hypostomatic. Stomata on the lower surface are numerous, irregularly scattered and orientated over the entire surface ; guard cells are deeply sunken.

Completed a detailed descriptive account of some leaves belonging to Dipteridaceae and Bennettitales from the western sector of the Jabalpur Stage.

4.1.5 South Rewa Basin.

The studies on the fossil plants from the Lower Cretaceous of the South Rewa Gondwana Basin have been continued. Three species of the leafy shoots of *Brachyphyllum*, *B. bansaensis* n. sp. and one species of cone-scales of *Araucarites*,

A. fibrosa n. sp. and *A. macropterus* Feistm, have been described and sent for publication. Amongst these *Marwaria* is a new genus. Except *Araucarites macropterus* all the new species are based on cuticular features.

4.1.6 *East Coast Gondwana.*

The research work on *Gleichenia gleichenoides* (Oldh. and Morr.) Bose and Sah from the East Coast Gondwana has been carried out. Besides, some Bennettitalean leaves have been studied and their description awaits publication.

4.2 *Sporae dispersae and palynostratigraphy.*

4.2.1 *Panchet of Asansol, West Bengal.*

Fresh rock samples from the Panchet of Asansol, West Bengal were collected. The miospore assemblages recovered from them have been studied in detail. Their photographs and histograms are being prepared. Palynological demarcation of the Raniganj-Panchet boundary in this section has been finalized.

4.2.2 *Jurassic of Rajmahal Hills Bihar.*

A Jurassic miospore assemblage from a section near Mirza Chowki, Rajmahal Hills has been partly studied.

4.2.3 *Upper Gondwana of Parsapani M. P.*

A section of coaly and carbonaceous shales in the Parsapani area near Bagra, has yielded a miospore assemblage comprising 30 species belonging to 18 genera. The miospore assemblage is predominated by the genera *Callialasporites*, and *Araucariacites*. *Cytheidites* and *Podocarpidites* are other important taxa. The mioflora shows certain resemblances with some of the other Upper Jurassic miofloras described from India.

4.2.4 *Lower Cretaceous Bansa Formation.*

Samples of Bansa Formation (Lower Cretaceous) exposed in the Machrar rivulet, a tributary of the Mahanadi, near

the village of Bansa, south-west of Chandia have been examined for palynoflora. The palynological assemblage is dominated by the genera *Araucariacites* and *Callialasporites*. Other quantitatively significant genera are *Podocarpidites*, *Alisporites*, *Cycadopites* and *Properinipollenites*.

4.2.5 *East Coast Gondwanas.*

Several shale samples from different localities of the East Coast Gondwanas have been macerated. Two samples have been found rich in miospores. Systematic identification of the miospore types has been partly done.

4.2.6 *Parsapani Hathidoh (Sukha Nala) M. P.*

Two coal samples from Parsapani, Hathidoh Nala (Sukha Nala), were macerated and only sample (II) yielded some miospores. Qualitatively, the miofloral assemblage consists of 18 miospore genera and 24 species. The mioflora is dominated by the coniferous pollen grains, viz., *Podocarpidites* followed by *Callialasporites*, *Podosporites* and *Araucariacites*. Cryptogamic miospores are poor. Parsapani assemblage has been compared with the comparable Mesozoic miofloral assemblages known from India. It closely compares with the Rajmahal Hills assemblage.

4.2.7 *Ranipura M. P.*

Four coal and coaly shale samples from Ranipura were found barren.

4.2.8 *Upper Cretaceous-Tertiary sediments of South Shillong Plateau, Lower Assam.*

- (a) In the late Mesozoic sediments of Shillong Plateau, three distinct geological formations namely Jadukata, Mahadeo and Langpar have been recognised on the basis of microplankton assemblages. The recognition is based on the study of palynological samples collected from south-eastern part of the

area. The spores and pollen assemblages recovered from the same samples are being studied for supplementary evidence.

- (b) Palynological rock samples of Cherra-Shella Road comprising the central part of the area are under laboratory processing. Since the recovery of microfossils from this area is very poor, a fresh collection is proposed.

4.3 Mesozoic from abroad.

4.3.1 Palynological studies on some Zirab Coals, Persia.

All the 16 spore slides from each sample were scanned and good spore specimens were microphotographed.

4.3.2 Palynological studies on some Mesozoic Coals of Iran.

Some slides from fossiliferous samples were scanned for miospores.

5. TERTIARY

5.1 Morphological and Anatomical Studies.

5.1.1 Deccan Intertrappean Flora.

In order to reinvestigate the Deccan Intertrappean fossil plants, further breaking of chert pieces was continued and more specimens of *Sahnianthus*, *Sahnipushpam*, *Enigmocarpon*, *Viracarpon*, *Tricocites*, *Rodeites*, *Azolla*, *Sparganium* and a gymnosperm wood were collected. Thin sections of *Sahnipushpam*, *Rodeites* and the gymnosperm wood were prepared for study. The conifer wood shows araucarian pitting and belongs to *Dadoxylon*.

5.1.2 Woods from Kankawati Series, (Manchar).

Study of fossil woods collected from the village Mothala and Dhaneti was continued and some woods were tentatively

identified as belonging to the family Sapindaceae and Dipterocarpaceae.

5.1.3 Fossil woods from the Siwalik beds of Nalagarh and Bhakra, Himachal Pradesh.

Further studies were continued on the fossil woods from Nalagarh and Bhakara Dam areas in Himachal Pradesh and woods like *Albizzia*, *Acacia*, *Azalia-Intsia* and a member of Dipterocarpaceae were identified.

5.1.4 Leaf Impressions from the Siwalik beds near Bikhathoree, Bihar.

Further studies on the leaf-impressions from the Siwalik beds was continued. Attempts were made to identify them with the modern taxa. One of them was tentatively identified with *Ficus*.

5.1.5 Fossil woods from Tipam Series.

Study of petrified woods from the Miocene of Tipam sandstones near Hailakandi in Cachar district of Assam indicated the presence of *Homalium*, *Sterculia*, *Vitex* and a member of Lauraceae. Modern equivalents of all these fossils are still found in the forests of Assam or Chittagong. The fossil woods of *Homalium* and *Vitex* are known for the first time from India and abroad.

5.1.6 Fossil woods from Dupitila Series.

Some more fossil woods from Deomali in NEFA were studied and attempts were made to identify them with the modern taxa among the legumes.

5.1.7 Fossil woods of the Cuddalore Series.

More petrified woods from the Cuddalore Series of South India near Pondicherry were cut and studied. Some of them have tentatively been identified as belonging to

Dipterocarpaceae, Sapindaceae, Leguminosae, Rubiaceae, Sapotaceae etc.

5.2 General.

5.2.1 *Phylogeographic evolution of Guttiferae and its bearing on the past climate.*

The family Guttiferae is almost exclusively tropical in distribution and consists of about 40 genera and 1000 species widely distributed in both the hemispheres but common in Asia and America. The geologic history of this family is traced here, which goes back to the Upper Cretaceous of France from where seeds resembling those of *Mammea* are known. Presence of fossil Guttiferae, comparable to modern taxa, in the temperate regions of the world indicate a definite change in climate from the tropical to subtropical conditions prevalent there during the period when the guttiferous taxa were known.

5.2.2 *Palaeogene and Neogene angiospermous woods from India.*

Known records of the Palaeogene angiospermous woods from the Deccan Intertrappean Series and the Neogene angiospermous woods from the Siwalik beds, the Tipam Series, the Dupitila Series and the Cuddalore Series of South India have been critically evaluated as regards their identification, source of occurrence and the present distribution of their modern comparable forms.

5.3 *Sporae dispersae and palynostratigraphy.*

5.3.1 *Mukum Coalfield, Upper Assam.*

Maceration of all the (170 samples) coal and non coal samples have been completed.

Microspores from 16 samples have been photomicrographed and about 400 spore prints have been made.

5.3.2 *Nazira Coalfield, Nagaland.*

Slides of 4 coal-shale samples from Nazira Coalfield, Nagaland have been scanned for photomicrography. 25 bore

hole samples out of 30 samples collected during December, 1972, tour of Chingki Valley Nagaland have been macerated.

5.3.3 *Tura Formation at Damalgiri, Garo Hills.*

Palynological study of the shale samples from the Eocene of Tura Formation at Damalgiri in district Garo Hills and from the Oligocene of Tikak Parbat stage at Ledo, Tipongpan and Bargolai near Margherita in Assam was continued. Pollen and spores recovered from these Palaeogene deposits were further scanned and photographed. Their study and comparison with the modern taxa is in progress.

5.3.4 *Palynology of the Tura Formation in the Type area*

The rock samples collected from Darenggiri and Rongrenggiri areas have been macerated. Samples from the former area have yielded a rich assemblage of spores and pollen grains while they proved to be barren in the latter. The productive samples are under microscopic examination. Samples from Rongrenggiri area are being reinvestigated.

5.3.5 *Palynological study in Upper Assam Oil India Project.*

(a) Morphological study of the fossil spores identical to those of the fern genus *Ceratopteris* has been completed. Its stratigraphic significance in the different levels of the Tertiary sediments of upper Assam has been worked out.

(b) Microscopic examination of the microfossil assemblage obtained from the different stratigraphic levels of a thick series of Tertiary sediments of Assam is in progress. This study is being carried out on priority basis in order to aid Oil exploration programme of Oil India Ltd.

5.3.6 *Lower Tertiary sediments of Northern India.*

(a) Laboratory processing of several samples collected from the Koshalia river section near Baroti, Kalka-Simla road, Taxal, Koti, Jabli and Dharampur representing the

Subathu, Dagshai and Kasauli formations has been completed after employing varied techniques for the recovery of palynomorphs. Some more productive horizons have been found. It has also been noticed that some horizons, which do not contain spores, pollen grains and microplanktons, are very rich in microforaminifera.

(b) Microslides of all the macerated samples have been prepared and scanned. Microphotography of some better preserved specimens has been done.

(c) Identification of spore-pollen taxa and microplankton has been started.

5.3.7 *Problems and prospects of Tertiary palynology in Northern India.*

Palynological information from the Tertiary sediment of northern India representing the Subathu, Lower Dharamsala, Upper Dharamsala, Lower Siwalik, Middle Siwalik and Upper Siwalik assemblages has been critically evaluated. Although information available so far is rather meagre, it is heartening to note that many stratigraphic levels do contain palynological assemblages. The need for concerted efforts to fill in the gaps in our knowledge has been stressed in order to increase the geologic credibility of the palynomorphs. It has been observed that the Subathu, Lower Dharamsala, Upper Dharamsala, Lower Siwalik, Middle Siwalik and Upper Siwalik assemblages are distinct from each other either qualitatively or quantitatively or on both the counts. Significance of each of these assemblage is of local interest and no broad based stratigraphic generalizations can be attempted at the moment.

5.3.9 *Rajasthan, Barmer Hill.*

Twenty two recognizable species of dispersed spores and pollen grains have been described from a sample of dark carbonaceous clay, exposed in a well cutting 125 ft. south-east from the base of the Barmer hill. The assemblage is

dominated by the angiospermic elements and the pteridophytes are next in abundance. The gymnosperms are totally absent in the assemblage. Fungal elements are common. The overall composition of the assemblage, specially the high frequency of *Proxapertites* type indicate a Palaeocene age for this clay bed.

5.3.10 *Nareda, Kutch*

The palynological fossils recovered from Nareda have been studied and identified. The assemblage closely resembles those of Panandhro and Chulrai previously described by Sah and Kar.

5.3.11 *Cauvery basin.*

A large number of grab samples have been macerated for the recovery of palynomorphs. Microslides have been prepared and scanned. Microphotography of some palynomorphs has been done. Statistical work and taxonomic observations on the Dalmiapuram assemblage are being carried out.

5.3.12 *Western Ghats.*

Productive samples have been scanned and some palynomorphs microphotographed. Taxonomic study of Warkala and Quilon assemblages is in progress.

5.4 **Biopetrology.**

5.4.1 *Neyveli lignite, South India.*

Palaeobotanical description of some biostructures of the Neyveli lignite showing affinities to the modern taxa of Leguminosae, Dipterocarpaceae, Guttiferae, Combretaceae and Palms has been made and the manuscript was completed.

5.5 **Tertiary from Abroad.**

5.5.1 *Fossil woods from the Tertiary of Thailand.*

Petrified woods collected from the north-east region of Thailand between 15°N. and 102°E. and sent to the Institute,

revealed quite a few forms nearly comparable to *Bauhinia* and *Afzelia-Intsia*, and also belonging to Sapindaceae, Combretaceae and Sapotaceae or Ebenaceae.

6. QUATERNARY

6.1 Pollen Morphology.

6.1.1 Lucknow Flora.

Seven hundred and twenty pollen slides of one hundred and eighty six species distributed over different genera and natural orders were prepared.

6.1.2 Assam Flora.

Seven hundred pollen slides of 164 species of Assam flora have been prepared. The pollen morphology and size statistical data for 50 species have been gathered.

6.1.3 Gujarat Flora.

Forty two slides of fourteen species of Gujarat flora have been prepared and investigated palynologically.

6.1.4 Nepal Flora.

Four hundred and fifty five pollen slides distributed over one hundred and ninety species of Nepal flora have been prepared. Detailed morphological study of forty species has been completed.

6.2 Pollen Analyses.

6.2.1 Kumaon Himalaya.

The paper "The Macroscopic plant remains from Post-glacial deposits from Naukutchiya Tal and Bhim Tal, Naini Tal (from Ph. D. Thesis) was finalized and sent for publication.

Re-examination of pollen flora of Kumaon Himalaya and Late Quaternary vegetational History from Naukutchiya Tal and Bhim Tal was begun.

6.2.2 Himachal Pradesh.

Two papers "Late Quaternary vegetational history in Himachal Pradesh I-Khajiar Lake" and "Pollen analysis of surface samples from Himachal Pradesh" have been processed and submitted for publication.

6.2.3 Bengal Basin .

Eight subfossil wood samples collected in situ from Kolara and Barrackpore were identified and assigned to the genera *Heritiera* and *Sonneratia*.

Barrackpore, N. Calcutta—Thirty-three samples were pollen analysed. The clay samples are either barren or contain sporadic pollen grains. The peat samples contain sufficient pollen grains among which *Heritiera*, *Holoptelea*, *Gramineae*, *Cyperaceae*, *Potamogeton* and *Typha angustifolia* have been identified. The monolete and trilete fern spores occur frequently.

Kolara, Howrah, W. Calcutta—Thirty samples were pollen analysed. The pollen grains in the underlying clay samples are mostly of non-arboreals except for *Sonneratia* of which pollen grains are abundant in samples immediately below the peat band. The overlying clay/alluvium samples are poor in pollen and a few pollen grains of *Gramineae*, *Compositae* and *Heritiera* have been noted. The peat samples are rich in pollen and spores of *Heritiera*, *Cecrops*, *Bruguiera*, *Gramineae*, *Cyperaceae* and ferns. Pollen grains of *Potamogeton* and *Typha* are consistently encountered more or less throughout the profile.

6.2.4 Shillong Assam.

Six moss cushions have been pollen analysed and reveal the prevalence of such forest constituents as *Castanopsis*, *Ternstroemia*, *Cinnamomum*, *Quercus*, *Dillenia* and *Rosaceae*. *Peperomia*, an epiphyte, is recorded in very high frequencies.

Betula, *Taxus* and *Jasminum* are lowly present whereas *Pinus* is extremely rare. Ferns represented by monolete and trilete spores are quite high. Frequencies of various pollen types recovered from moss cushions have been determined.

6.2.5 Gujarat.

Nalasarover—15 samples have been pollen analysed. The samples are mostly barren palynologically except for a few pollen grains of Gramineae, Cyperaceae and Cheno-Amaranth type. Microforaminifera are usually absent but for stray occurrence.

Malvan—26 samples have been pollen analysed. All the samples were found to be barren except samples A, H. and Z. However, the microfoaminifera (rotaloids and biseriate) have been found in all the samples though more frequently in sample No. 0.

6.2.6 Nepal.

Twelve moss cushions from Kathmandu Valley have been pollen analysed. In the pollen spectra constructed pollen grains of *Pinns roxburghii* and *Alnus* dominate and of Myrtaceae and Gramineae are co-dominant.

Eighty four samples from two profiles viz., Kalimati (Postglacial) and Manihara (Pleistocene) in Kathmandu Valley have been pollen analysed and the frequencies for each taxon calculated. Two pollen diagrams have been constructed.

Some cyperaceous seeds such as of *Scripus* and *Carex* from Manihara profile have also been encountered.

6.3 Archaeobotany.

6.3.1 Harappan Plant Economy.

Surkotada, Kutch, Gujarat (2000 B.C.-1660 B. C.)—The examination revealed thirty four charred grains which have

been tentatively identified to *Scripus* sp., *Polypogon* sp., *Poa* sp., *Vulpia* sp., *Dactylis* sp., *Setaria intermedia*, *Milium* sp., *Festuca* sp., *Carex* sp., *Eriophorum* sp., *Atriplex stockii*, *Amaranthus* sp. *Eleusine coracana*, *E. indica*, *Lolium* sp., *Euphorbia* sp., *Phragmites karka* and *Polygonum* sp. The specimens have also been photographed.

Kalibangan, Rajasthan (2000 B. C.)—Examined 9050 charred grains of which 50 grains belong to naked barley, one grain to *Pisum arvense* and the rest belong to hulled forms of *Hordeum* sp., About 10% of charred grains share the characters of both wheat and barley.

Mohenjo-Daro, Sind, Pakistan, (1750 B. C.)—400 charred grains examined and identified as of *Triticum* sp. The detailed morphological study has revealed three types of Kernels viz. —

- (i). Large sized kernels (5.16 × 2.77 × 2.59 mm)
- (ii). Medium sized kernels (5.51 × 2.68 × 2.36 mm)
- (iii). Small sized kernels (3.80 × 2.19 × 1.90 mm)

Chanhu - Daro, Sind, Pakistan, (2300—1750 B. C.)—Examined charred grains and identified as below :

- (i) *Hordeum* sp.—167 kernels. Of these two belong to hulled barley and the remaining to naked barley. Their size, shape and other morphological details have been noted.
- (ii) *Triticum* sp.—20 charred grains.

6.3.2 Chalcolithic Plant Economy

Inamgaon (Maharashtra)—The following remains of cultivated plants were identified—*Oryza sativa*—(One grain), *Triticum compactum* (Eight grains tentatively identified), *Hordeum* sp. (Ninety grains of naked barley), *Sorghum* sp. (34 grains), *Lens esculentus* (78 grains), *Phaseolus radiatus*

(13 grains), *Ph. mungo* (1 grain), *Ph. vulgaris* (35 grains), *Dolichos biflorus* (21 grains), *Pisum sativum* (13 grains), *Lathyrus* sp. (3 grains), *Vicia* sp. (1 grain) *Zizyphus jujuba* (30 seeds), *Phoenix sylvestris* (1 seed).

T. S., R. L. S. and T. L. S. of one charred dicot wood and four monocot woods were cut and nearly fifty slides were prepared. The monocot charcoal has been tentatively identified as of Bamboo.

A chart on concordance and correlation of trenches at Inamgaon excavation is also prepared.

Sonegaon (Maharashtra)—

About 30 kernels of *Triticum* sp. studied morphologically.

6.3.3 Early Historical Plant Economy-Noh-(Rajasthan)—

The following cultivated plant remains were identified—*Oryza sativa* 60 kernels 7×3 mm to 4×1.25 mm; *Hordeum* sp. 100 of hulled barley and 20 of naked barley; *Phaseolus radiatus* one complete and several fragmentary cotyledons; *Dolichos biflorus* several fragmentary cotyledons.

A few charcoal pieces supposed to be of monocots have been examined.

6.4 Aeropalynology

Three charts showing meteorological data of Lucknow for the last three preceding years were prepared.

The common pollen grains and spores present in the atmosphere during the year 1969-72 have been photographed.

The pollen grains and spores trapped from the atmosphere in Lucknow for the year 1971 and 1972 have been tabulated and presented graphically.

40 surface samples from Lucknow have been pollen analysed to assess the frequencies of various types of pollen grains present in the sediments

One chart showing pollen spectra of the surface samples of Lucknow city and suburbs has been prepared.

One chart showing daily census of fungal spores (Petri-dish counts) was prepared.

One chart showing pollination periods of different plants was prepared. Simultaneously the writing work of these was started.

II. PAPERS PUBLISHED

Following papers were published by the staff

Anand-Prakash (1972). A new monosaccate pollen from the Barakar coals of India, *Palaeobotanist*. 19(3) : 203-205.

Anand-Prakash (1972). Sporae dispersae in the coals of Pench-Kanhan and Pathakhera Coalfield (M. P.) India. *Palaeobotanist*. 19(3) : 206-210.

Bharadwaj, D. C. (1972). Lower Gondwana microfloristics. *Proc. Seminar on Palaeobot. & Indian Stratigraphy*: 212-50.

Bharadwaj, D. C. & Anand-Prakash (1972). On the palynostratigraphy of Argada 'S' seam in South Karanpura Coalfield, Bihar. *Palaeobotanist*. 19(3) : 211-213.

Bharadwaj, D. C. & Kumar, P. (1972). On the status of some miospore genera from the Mesozoic Era. *Palaeobotanist*. 19(3) : 214-224.

Bharadwaj, D. C., Kumar, P. & Singh, H. P. (1972). Palynostratigraphy of coal deposits in Jabalpur Stage,

Upper Gondwana, India. *Palaeobotanist*. **19**(3) : 225-247.

Bose, M. N. & Srivastava, Shyam C. (1973). *Nidistrobis* gen. nov. a pollen-bearing fructification from the Lower Triassic of Gopad river valley, Nidpur. *Geophytology*. **2**(2) : 211-212.

Jain, K. P. (1972). Taxonomic observations on the genus *Sewardioxylon* Gupta—a junior synonym of *Fascisvarioxylon* Jain. *Palaeobotanist*. **19**(3) : 251-252.

Kar, R. K. (1972). Palynological assemblage from the Barren Measures (Permian) of India. *Proc. Sem. Palaeopalynol. Indian Strat. Calcutta*, 1971 : 80-88.

Kar, R. K. (1972). A comparative study of cryptogamic spores of Upper Jurassic and Lower Cretaceous from Kutch, Gujarat and their stratigraphic value. *Proc. Sem. Palaeopalynol. Indian Strat. Calcutta*, 1971: 50-155.

Lele, K. M. (1972). Observations on Middle Devonian microfossil from the Barrandian basin Czechoslovakia. *Rev. Palaeobot Palynol.* **12** ; 129-134.

Lele, K. M. & Chandra, A. (1972). Palynology of the marine intercalation in the Lower Gondwana of Madhya Pradesh, India. *Palaeobotanist*. **19**(3):253-262,

Lele, K. M. & Makada, R. (1972). Studies in the Talchir flora of India-7. Palynology of the Talchir Formation in the Jayanti Coalfield, Bihar. *Geophytology*. **2**(1) : 41-73.

✓ Maheshwari, Hari K. (1972). *Lelstotheca* : a new name for *Stellotheca* Surange & Prakash. *Geophytology* **2**(1) :106.

✓ Maheshwari, Hari K. (1972). Permian wood from Antarctica and revision of some Lower Gondwana wood taxa. *Palaentographica*. **138B** : 1-43.

- Maithy, P. K. (1972). Fossil flora from the Westphalian 'D' from Piesberg near Osnabruck. *Palaeontographica*, 139-B (5-6) : 83-104.
- Navale, G. K. B. (1972). Petropalynology of Lower Gondwana durain coals. *Proc. Seminar on Palaeobot. & Indian Stratigraphy* : 109-119.
- Prakash, U. (1972). Palaeoenvironmental analysis of Indian Tertiary Floras. *Geophytology*, 2(2) : 178-205.
- Prakash U. (1972). Bois fossiles du Miocene de Touraine. *93^o Congr. natn. Soc. Sav. Tours. Sci.*, 3 : 87-101.
- Sah, S. C. D. & Kar, R. K. (1972). Palynostratigraphic evaluation of the Lower Eocene sediments of India. *Proc. Sem. Palaeopalynol. Indian Strat. Calcutta*, 1971 : 255-265.
- Sharma, C. (1972). Origin of floating Islands in the lakes at Khajjar and Rewalsar in Himachal Pradesh. *Palaeobotanist*, 19(3) : 270-276.
- Singh, H. P. (1972). Palynology of the Lower Cretaceous sediments of India. *Proc. Sem. Palaeopalynol. and Indian Strat. Calcutta*, 1971 : 159-166.
- Sukh Dev (1972). Ferns from the Cretaceous of Madhya Pradesh-2. *Palaeobotanist*, 19(3) : 277-280.
- Sukh Dev (1972). Ferns from the Cretaceous of Madhya Pradesh-3. *Palaeobotanist*, 19(3) : 281-283.
- Venkatachala, B. S. & Kar, R. K. (1972). Palynology of the Mesozoic sediments of Kutch, W. India-9. Palynological fossils from the Bhuj exposures near Dayapar, Kutch District, Gujarat State. *Proc. Sem. Palaeopalynol. Indian Strat. Calcutta*, 1971 : 166-171.

Vishnu-Mittre (1972). Problems and prospects of Quaternary palynology in India, *Proc. Seminar Palaeopalyn. Strat. Calcutta* : 48-56.

Vishnu-Mittre & Gupta, H. P. (1972). Pollen analytical study of Quaternary deposits in the Bengal basin, *Palaeobotanist*, 19(3) : 197-306.

Vishnu-Mittre (1973). Climate vs. Biotic Factor : Pollen evidence in the postglacial of N-W India, In "Perspectives of Palaeoanthropology, *Professor D. Sen Festschrift*" : 25-30.

III. FIELD WORK

1. Three members of the Palaeozoic Department visited the Lower Gondwana areas of Raniganj Coalfield—Megafossils and samples were collected for investigations.
2. A large number of megafossils and many shale samples for palynological studies were collected by three members of the Mesozoic Department from the following localities : (i) Triassic of Asansol and Madhya Pradesh, and (ii) East Coast Gondwanas.
3. Three members of the Cenozoic Department went on excursion to the Deccan Intertrappean Series of Madhya Pradesh. They visited Parapani near Chabi, Samanapur and Mehgaon near Nainpur, district Mandla, Mohgaonkalan, and Sausar, district Chhindwara and Barwaha and Mandu near Indore. A rich collection of fossil plants was made from these localities.
4. After the Kodaikanal Autumn School in October, 1972, three members of the Department of Cenozoic Palaeobotany undertook excursion to the Cuddalore

Series of South India near Pondicherry and Neyveli in the South Arcot district and Varkala beds exposed near Varkala in Trivandrum District, Kerala. They collected some leaf impressions from Varkala beds, lignites from Neyveli and petrified woods from near Pondicherry.

5. Three members of the Coal Department visited following Coalfields :
 - (i) *Singrauli Coalfield*—Samples of shales, sandstones etc. exposed along Baghaiya and Saura Nalas were collected for palynological studies. Samples of coal, coaly shales and sandstones were also collected from the road cutting section on the Singrauli to Jeer Karaunti Road.
 - (ii) *Manendragarh*—Carbonaceous shale, shale and sandstones were collected from the rocks exposed along Hasdo River and Hansia Nala for palynological studies.
 - (iii) *Chirimiri*—Samples were collected so as to represent a complete succession from Talchir-Barakar from the Kuakhoh Nala section and also from Paradol to Chirimiri railway Cutting.
 - (iv) *Bansa*—Samples of coaly shale and shales were collected from the beds exposed in Machrar River near Bansa.
6. Two members of the Coal Department undertook an excursion in December 1972 to Jorhat Coal Survey Lab., Chingki Valley, Nagaland for collection of coal samples.
7. One member of the Coal Department visited Neyveli lignite area during October 1972 for collection of lignite samples for investigations.

8. During the field trip from 23rd December, 1972 to 20th January, 1973 samples from measured sections for palynological investigation were collected from Matanamadh, Jhulrai and Panandhro in Kutch by the Oil Department.
9. One member of the Oil Department participated in the excursions undertaken by the Geological Survey of India to Rishikesh-Deoprayag, Narendra-nagar, Chandigarh, Simla, Sahastra Dhara, Chandrabrabha, Bauxite deposit of Varanasi and Singrauli Coalfield.
10. Another member of the Oil Department undertook field trip to Himachal Pradesh on 30th March, 1973 in collaboration with the Geological Survey of India party to collect rock samples for palynological investigations from the Lower Tertiary Formations.
11. Two members of the Oil Department visited the Cauvery basin and collected rock samples for palynological investigations from Pondicherry, Ariyalur, Trichinopoly, Vridhachalam, Varakalli and adjoining areas. They remained in the field from 22nd February, 1972 to 4th April, 1973.
12. One member of the Quaternary Palynology Department surveyed Kathmandu Valley in Nepal and collected polleniferous material of Nepal flora, moss cushions, surface samples and samples from Pleistocene deposits.

IV. SPONSORED/COLLABORATIVE RESEARCH

A. Palaeozoic Department

- (i) A study of plant fossils collected from Ramkola-Tatapani Coalfield (Permo-Triassic in age) has been completed (in collaboration with the Mesozoic Department).

- (ii) Study of the miospore assemblages of Carboniferous age collected from Libya has been jointly taken in collaboration with the Oil Palynology Department.

B. Mesozoic Department

- (i) A collaborative study of a Triassic petrified wood from the coal-sack bluff, Antarctica was undertaken with Professor Dr. J. M. Schopf of the United States Geological Survey, Columbus, Ohio. Peel sections, slides and photographs have been prepared.
- (ii) Study of *Cladostrobus* Zalessky, a male fructification from the Soviet Union and the systematics of the sterile cordaitalean leaves was completed in collaboration with Dr. Sergei V. Meyen of the Geological Institute of the Academy of Sciences of the U.S.S.R., Moscow. Paper is being published by *Lethaea*.
- (iii) The paper on the Revision of the Dana collection of fossil plants, from Australia in collaboration with Dr. J. M. Schopf of U.S.A. and Dr. John Rigby of Australia is expected to be completed by next autumn.
- (iv) Collaborative research work is being done with Mr. B. P. Patra, Lecturer, Geology Department, Ravenshaw College, Cuttack, Orissa, on the fossil plants from the East Coast Gondwana.

C. Cenozoic Department

Study of fossil woods from the Tertiary of South Bohemia in collaboration with the Palaeontology Department, National Museum, Praha, Czechoslovakia,

D. Oil Palynology Department

- (i) Palynostratigraphical studies of the Tertiary surface

and subsurface rocks of Upper Assam. (Project supported by Oil India Ltd., Duliajan).

- (ii) Palynological investigations of the Palaeogene sediments of the Shillong Plateau in collaboration with the Department of Applied Geology, Dibrugarh University, Assam.
- (iii) Palynology of successive Mesaverde coals near receding shorelines of the Mancos (Upper Cretaceous) Sea, U.S.A., with the Geology Department, Michigan State University, E. Lansing, U.S.A.
- (iv) (a) Palynostratigraphy of the Libyan Basin, N. W. Africa.
- (b) Palaeopalynology of the Bedouri Bore hole, Queensland, Australia in collaboration with Campagnie Francaise des petroles, Bordeaux, France.

V. TRAINING PROVIDED TO OUTSIDERS

Training was provided in techniques and research to the following :

- (i) Dr. D. M. Banerji ... Geology Department, Delhi University, Delhi.
- (ii) Mr. B. P. Patra ... Geology Department, Ravenshaw College, Cuttack, Orissa.
- (iii) Mr. M. S. Rawat ... Botany Department Government Degree College, Schore, M. P.
- (iv) Dr. Prabha Kalia ... Geology Department, Delhi University, Delhi.

VI. TECHNICAL ASSISTANCE TO OUTSIDERS

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|--------------------------------|-----|--|
| 1. Palynological consultant | ... | Oil India Ltd., Duliajan, Assam. |
| 2. Archaeological materials | ... | Deccan College, Poona ;
Archaeology Department,
Rajasthan ; Archaeological
Survey of India ; Mr.
Y. D. Sharma and Mr.
M. C. Joshi, Supdts.
Purana Kila, Delhi. |
| 3. Soil samples from Rajasthan | | Dr. K. T. M. Hegde,
Archaeol, Dept., M. S.
University, Baroda. |
| 4. Soil samples from Lucknow | | Dr. I. B. Singh, Pool Offi-
cer Geology Department,
University Lucknow. |
| 5. Lignite | ... | Neyveli lignite Corpora-
tion of India. |

VII. PAPERS AND LECTURES AT SYMPOSIA/ CONFERENCES/MEETINGS ETC.

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|--|----------------------|---|
| 1. Indian Lower Gondwana
Ferns. | S. Chandra | Autumn School
in Palaeobotany,
Kodaikanal,
Sept. 1972. |
| 2. Morphology of <i>Glosso-
pteris</i> and allied genera | S. Chandra | do. |
| 3. Pre-Gondwana
plants | land P. K.
Maithy | do. |

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|-----|--|--------------------|---|
| 4. | Megafloristic sub-divisions of Damudas | P. K. Maithy | do. |
| 5. | Permian flora of India —Megafossils. | P. K. Maithy | do. |
| 6. | Glossopterid fructifications. | K. R. Surange | do. |
| 7. | Palynologic correlation of the Lukuga Series, Zaire. | M. N. Bose | Vth African Micropalaeontological Colloquium held at Addis Ababa. April 1972. |
| 8. | Palaeobotany in India | M. N. Bose | Botany Department, University of Oslo, Oslo April 1972. |
| 9. | Bennettitales | M. N. Bose | Autumn School in Palaeobotany held at Kodai-kanal. September, 1972. |
| 10. | Triassic flora of India | M. N. Bose | do. |
| 11. | Mesozoic Pteridophytes of India. | Sukh-Dev | do. |
| 12. | Unclassified gymnosperms of the Indian Mesozoic. | Sukh-Dev | do. |
| 13. | Raniganj-Panchet Boundary. | Hari K. Maheshwari | do. |
| 14. | Indian Palaeozoic lycopsids and sphenopsids. | Hari K. Maheshwari | do. |

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| 15. | Mesozoic Pteridosperms | Shyam C. Srivastava | do. |
| 16. | Triassic microflora of India. | Shyam C. Srivastava | do. |
| 17. | Floristic evidence in the stratigraphical sub-division of the Indian Tertiary. | R. N. Lakhanpal | do. |
| 18. | Physical conditions of the Indian Tertiary. | R. N. Lakhanpal | do |
| 19. | Tertiary floras of India | R. N. Lakhanpal | University Botany Laboratory, Madras. |
| 20. | The antiquity of angiosperms. | R. N. Lakhanpal | Contribution to symposium on evolution of angiosperms at the Science Congress Session, Chandigarh. |
| 21. | Fossils : their formation and study. | R. N. Lakhanpal | Department of Botany Dharma Samaj College Aligarh. |
| 22. | Early Vascular Plants | R. N. Lakhanpal | do. |
| 23. | Palaeogene angiospermous woods from India. | U. Prakash | Autumn School in Palaeobotany, Kodaikanal, September 1972. |

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| 24. | Neogene angiospermous woods from India. | N. Awasthi | do. |
| 25. | Palaeobotany of Talchir and Karharbari Stages and Lower Gondwana glaciation. | D. C. Bharadwaj | do. |
| 26. | Palynological Sub-divisions of Damuda Series. | D. C. Bharadwaj | do. |
| 27. | Petropalynology of Lower Gondwana coals of India. | G. K. B. Navale | do. |
| 28. | Palaeobotany of Neyveli lignite. | G. K. B. Navale | do. |
| 29. | Permian Microflora of India. | Suresh C. Srivastava | do. |
| 30. | Palaeozoic cryptogamic spores from India. | R. S. Tiwari | do. |
| 31. | Palaeozoic Disaccate pollen from India. | R. S. Tiwari | do. |
| 32. | Geology of Lower Gondwana formations in Mohpani Coalfield. | Anand-Prakash | G. S. I. Field Training Camp 1972. |
| 33. | Biostratigraphic resolution of the Dubrajpur beds. | S. C. D. Sah & S. C. Shah | Autumn School in Palaeobotany, Koda kanal, September, 1972. |
| 34. | Palaeogene biostratigraphy of Shillong Plateau. | S. C. D. Sah | do. |

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| 35. | Age and correlation of Tura Formation in Type Area. | S. C. D. Sah | do. |
| 36. | Mesozoic cryptogamic spores from India. | H. P. Singh | do. |
| 37. | Mesozoic gymnospermous pollen grains from India. | H. P. Singh | do. |
| 38. | Jurassic-Lower Cretaceous microflora from India. | H. P. Singh | do. |
| 39. | Indian fossil fungi | K. P. Jain | do. |
| 40. | Stratigraphic distribution of Indian microplanktons. | K. P. Jain | do. |
| 41. | Age of Krols | R. K. Kar | do. |
| 42. | Palynostratigraphy in Western India. | R. K. Kar | do. |
| 43. | Maestrichtian microplanktons from Assam. | S. C. D. Sah, R. Y. Singh & K. P. Jain | The Second Indian Colloquium on micropalaeontology and Stratigraphy. |
| 44. | Problems and prospects of Tertiary palynology in northern India. | H. P. Singh, A K. Khanna & S. C. D. Sah. | do. |

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| 45. | Two professional lectures | S. C. D. Sah | Oil India Ltd., Duliajan, Assam. |
| 46. | One professional lecture | S. C. D. Sah | Applied Geology Department, Dibrugarh University, Dibrugarh, Assam. |
| 47. | Three professional lectures. | S. C. D. Sah | Geology Department, Delhi University, Delhi. |
| 48. | Palynological interpretation of the sedimentary environment. | R. Y. Singh | Officers Training programme (G. S. I.) Dala (Mirzapur) Camp. |
| 49. | Quaternary vegetation of N. W. India. | Visnu-Mittre | Autumn School in Palaeobotany, Kodaikanal, Sept. 1972. |
| 50. | Environmental changes during the Quaternary in India. | Vishnu Mittre | do. |
| 51. | The boundary problem during Quaternary in India. | Vishnu-Mittre | do. |
| 52. | Plant remains and climate from Late Harappan and other Chalcolithic cultures of India. | Vishnu-Mittre | Proc. Archaeol. Society, India, Kurukshetra. |
| 53. | Introduction to the floral history of the Kathmandu Valley. | Vishnu-Mittre | Nepal Conservation Society, Nepal. |

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| 54. | Indian fossil diatoms. | H. P.
Gupta | Autumn School
in Palaeobotany,
Kodaikanal,
September,
1972. |
| 55. | History of legumes in
India. | H. P.
Gupta | do. |
| 56. | Late Quaternary vegeta-
tional history of W.
India. | H. P.
Gupta | do. |

VIII. REPRESENTATION ON COMMITTEES/ BOARDS

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|----|---------------------|-----|---|
| 1. | Dr. K. R. Surange | ... | Secretary, Editorial
Board.
'The Palaeobotanist'.
Member, Editorial
Board, 'Geophytology'.
Member, Sectional Com-
mittee 6th Indian Natio-
nal Science Academy.
Member, Executive
Committee, 'The Palaeo-
botanical Society'. |
| 2. | Dr. R. N. Lakhanpal | ... | Chief Editor, 'Geophyto-
logy'.
Member, Editorial Board,
'The Palaeobotanist'.
Member, Editorial Board,
'Palaeontological Society
of India.
Editor, 'Catalogue of
India Fossil Plants'. |

3. Dr. D. C. Bharadwaj
 Chairman, Organizing Committee 4th International Palynological Conference.
 Secretary, 'The Palaeobotanical Society'.
 Member, Editorial Board, 'Geophytology'.
 Member, Editorial Board, 'The Palaeobotanist'.
4. Dr. M. N. Bose
 Member, Editorial Board, 'The Palaeobotanist'.
5. Dr. Vishnu-Mittre
 Vice-Chairman, Organizing Committee IV International Palynological Conference.
 Member, Advisory Board World Pollen Flora.
 Member, Central Advisory Board for Archaeology, Government of India.
 Member, Executive Council, Indian Quaternary Research Society.
6. Dr. S. C. D. Sah
 Secretary-General, Organizing Committee IV International Palynological Conference.
7. Dr. K. M. Lele
 Secretary, Organizing Committee IV International Palynological Conference.

8. Dr. G. K. B. Navale
Secretary, Organizing Committee IV International Palynological Conference.
9. Dr. H. P. Singh
Secretary, Organizing Committee IV International Palynological Conference.
10. Dr. K. P. Jain
Secretary, Organizing Committee IV International Palynological Conference.
Joint Secretary, 'The Palaeobotanical Society'.
11. Dr. P. K. Maithy
Assistant Secretary, Organizing Committee, IV International Palynological Conference.
12. Dr. H. K. Maheshwari
Member, Editorial Board, 'Geophytology'.
Editor, Catalogue of Indian fossil plants.
Assistant Secretary, Organizing Committee, IV International Palynological Conference.
13. Dr. R. S. Tiwari
Assistant Secretary, Organizing Committee, IV International Palynological Conference.
Member, Executive Council, 'The Palaeobotanical Society'.

14. Dr. R. K. Kar Assistant Secretary, Organizing Committee, IV International Palynological Conference.
15. Dr. H. P. Gupta Assistant Secretary, Organizing Committee, IV International Palynological Conference.
16. Dr. Suresh C. Srivastava Member, Organizing Committee, IV International Palynological Conference.
17. Dr. Anand-Prakash Member, Organizing Committee, IV International Palynological Conference.
18. Dr. Pramod Kumar Member, Organizing Committee, IV International Palynological Conference.
19. Dr. Chhaya Sharma Member, Organizing Committee, IV International Palynological Conference.
20. Dr. R. Y. Singh Member, Organizing Committee, IV International Palynological Conference.
21. Dr. Anil Chandra Member, Expert Committee, Natural History Museum, New Delhi.

IX. FOUNDERS DAY

(1) The Founders Day was celebrated on 14th November, 1972, the birth day of Professor Birbal Sahni, F. R. S., the Founder of the Institute.

In the morning wreaths and flowers were placed on the Samadhi of Professor Birbal Sahni.

The main function started at 5.00 p. m. Dr. Gopal Tripathi Vice-Chancellor, Lucknow University was the Chief Guest at the well attended function.

Professor, T. S. Sadasivan, Chairman, Birbal Sahni Institute of Palaeobotany welcomed the Chief Guest Dr. Gopal Tripathi and other guests.

At 5.30 p. m. Professor T. A. Bennet-Clark, F. R. S. Visiting Professor, Centre for Advanced Studies, University of Madras delivered the 2nd Professor Birbal Sahni Memorial Lecture entitled "Plant Control Mechanisms".

Professor K. R. Surange, Director, Birbal Sahni Institute of Palaeobotany, Lucknow, thanked the Chief Guest and others guests.

(2) Professor T. S. Mahabale, F. N. A., Maharashtra Association for the Cultivation of Sciences, Poona delivered the 20th Sir Albert Charles Seward Memorial Lecture entitled "The water ferns their origin and spread" on 15th November 1972.

(3) Dr. E. K. Janaki Ammal, F. N. A., Special Fellow, Centre for Advanced Studies, University of Madras delivered the 2nd Silver Jubilee Commemoration Lecture entitled "Plants and Man" on 16th November 1972.

X. PUBLICATIONS

1. The Journal—The *Palaeobotanist*

- (a) Volume 19, number 3 of the Journal was published.
- (b) Volume 20, numbers 1 to 3, and Volume 21, numbers 1, 2 were sent to Press.
- (c) Five Symposia held during the Silver Jubilee Palaeobotanical conference were sent to the Press.

2. Seward Memorial Lecture

The XIX Sir Albert Charles Seward Memorial Lecture on 'The Strange Bennettiales' by Prof. T. M Harris was sent to the Press.

3. Birbal Sahni Memorial Lecture

The First lecture on 'Fossil Plants and Continental Drift' by Prof. C. A. Arnold was sent to the Press.

4. Silver Jubilee Lecture

The First lecture on 'Major ecological steps in the development of plant life' by Prof. K. Faegri was sent to Press.

Annual Reports

The reports for 1969-70 and 1970-71 were printed and the one for 1971-72 was sent to the Press.

6. Bye-Laws & Memorandum of Association.

These were printed during the course of the year.

7. Sale.

During 1972-73 an income of Rs. 31,022.78 was registered from sale proceeds of Institute's publications. This sum includes the following foreign exchange earned :—

U. S. \$.	Rs. 2,535.30
£.	77.50

XI. LIBRARY

1. Books.

Number of books added during the year	83
Total number of books as on 31.3.73	2,615

2. Journals

Number of issues of journals received during the year.	206
Total number of issues of journals as on 31.3.73.	5,694

3. Reprints

Number of reprints received during the year.	532
Total number of reprints as on 31.3.73.	21,230

4. Microfilms

Total number of microfilms as on 31.3.73.	194
---	-----

5. Exchange

Number of papers purchased for exchange.	30
Number of papers received as gifts.	1
Total number of reprints sent out on exchange.	1,413
Number of individuals on exchange	332
Number of institutions on exchange.	61
Sets of papers of Prof. Birbal Sahni were sent out.	2

6. Requests for exchange received from the following Institutions :

1. Ceskoslovenska Akademie Ved, Geologicky Ustav, Library, Dittrichova 3, Praha-2.

2. Geologicky Ustav Sav Stefanikova 41, Bratislava, Czechoslovakia, CSSR.
3. Istituto di Geologia Palaeontologia, Dell' Universita Degli Studi, Roma, Italey.

7. Visits to the Library :

As usual a number of research students and scientists visited the Institute to consult the latest literature in Palaeobotany and its allied topics available in this library. Books, journals and reprints were loaned to the following organizations :—

1. Geological Survey of India,
Northern Region, Lucknow.
2. Botany Department,
Lucknow University.

Lucknow.

3. Geology Department,
Punjab University,

Chandigarh.

4. Indian National Scientific Documentation
Centre,
Hill side Road,

Delhi,

5. Maharashtra Association for
Cultivation of Sciences,
Low College Road, **Poona.**

8. Display :

To promote closer acquaintance with the current scientific knowledge to the scientists the new arrivals of literature were displaced on every first working day of the week.

9. Maintenance.

A large number of out of print and rare books and periodicals were reconditioned. The covers on many of the reprints were replaced.

10. New assignments :

A. Reprographic activities :

- i. A Panaprint Electrostatic Photocopying Machine was purchased. The multiple copies of some important out of print publications were made since its purchase. In addition to this the multiple copies of some important official documents were also made.
- ii. **Microfilm** : Some important plates of the brittle and torn out publications were microfilmed, printed and bound alongwith the texts.

B. Documentation Service

Keeping in view of the current awareness services of a technical library, efforts are made to this extent to assist the readers by providing a monthly list of current articles in various journals called "DOCUMENTATION LIST". This exhaustive list is a mimeographed one. This includes a number of processes starting from the selection of palaeobotanical information from various periodicals, books, reprints, reports and any other sources of information based on palaeobotany and its allied fields of research, received by this library.

11. Subject catalogue

The project of subject cataloguing, which is no less important than author catalogue, was taken up to meet the various subject approach to the available literature. All the articles in various publications received during the year

were given their appropriate place in subject catalogue cards by providing suitable heading. In addition to this, title and cross reference cards were also made.

XII. MUSEUM

A. Exhibition Halls :

1. Geology Hall (Hall No. 1)—

All the show cases in this hall were renovated by polishing the exteriors and changing the linen cloths, legends and labels.

2. Botany Hall (Hall No. 2)—

The Botany Hall had to be temporarily rearranged to accomodate fossil and other material from the Basement Hall which was vacated for repairs. The hall was, therefore closed to visitors.

B. Fossil Store Hall (Hall No. 3)—

This hall was completely vacated for reflooring and other repairs. Material from this hall was shifted to the Lecture Hall, Botany Hall, Prof. Sahni's room, and the basement tunnel.

(i) Catalogued specimens as on 31.3.73	48,535
(ii) Specimens from foreign countries as on 31.3.73	983
(iii) Number of type and figured specimens as on 31.3.73.	1,056

(iv) Number of figured and type slides as on 31.3.73.	4,480
(v) Number of negatives of figured and type specimens as on 31.3.73.	3,112

C. New Collections :

During the year collections were made from about 162 localities from India as well as foreign countries by the institute staff. Number of specimens collected :

(i) Palaeozoic	...	1,100
(ii) Mesozoic	...	500
(iii) Tertiary	...	750
(iv) Coal samples	...	150
(v) Oil samples	...	100
(vi) Quaternary samples	...	663

D. Specimens received from outside for investigation and report :

Some specimens were received from the following agencies for investigation at the institute and to report thereon :

- (i) Project Manager, Luangwa Valley Conservation and Development Project, Zambia (5 wood specimens).
- (ii) Department of Geology and Geophysics, I. I. T., Kharagpur (27 Bauxite samples).
- (iii) Department of Botany, S. P. College, Dumka, Bihar (1 specimen).
- (iv) Director, R. P. Section, G. S. I., Lucknow (Precambrian samples for palynological investigation).

(v) Rev. Swami Pranavananda of Holy Kailash and Mansarovar (1 fossil wood from Andhra Pradesh).

(vi) Mr. K. C. Sahni, F. R. I. Dehradun (1 fossil wood).

The type and figured specimens of the Congo collections worked out at the institute have been returned to the Musée' Royale de Centrale Afrique, Tervuren, Belgium.

E. Presentation of duplicate fossils :

Duplicate plant fossil specimens were sent to the following :—

1. Mr. Bernd Weber, 8023 Dreson, Braunschweiger, G. D. R.
2. Botany Department, P. G. Vigyan Mahavidyalaya, Gwalior.
3. Botany Department, St. Andrews College, Gorakhpur.
4. School of Studies in Geology, Vikram University, Ujjain.
5. Geology Department, Delhi University, Delhi.
6. Botany Department, Utkal University, Bhubaneswar.
7. Botany Department, Osmania University, Hyderabad.
8. Mr. H. M. Kapoor, G. S. I., Lucknow for Dr. K. Ischii of Japan.

F. Gifts received :

A geological map of New York has been received from the State Education Department, University of State of New York.

G. Silver Jubilee activities :

The museum arranged a palaeobotanical exhibition from 16th August to 20th August, 1972 as part of the year

long Silver Jubilee celebration of the Institute. Local research and academic institutions were specially invited. The exhibitions was also covered by the local press.

H Natural History Museum, New Delhi :

Department of Science and Technology, Government of India invited the institute to organize and set up palaeobotanical gallery at the proposed Natural History Museum, New Delhi. The Director and the Curator discussed, jointly and separately, the proposed set up in the Expert Committee. Following recommendations were made :

- (i) The geological time clock under panel I would be prepared by the Sahni Institute.
- (ii) Two or three dioramas with reconstruction models under Panel B-3 would be prepared by the Sahni Institute.
- (iii) The Sahni Institute would contribute to the Palaeozoic fossil gallery under panel B-2 (life in Palaeozoic).
- (iv) The fossil gallery under Panel B-3 (life in Mesozoic) will be composed and contributed largely by the institute.

The Expert Committee agreed that some of the reconstructions of Palaeozoic available at Sahni Institute, could be made use of in composing dioramas under panel B-2 (life in Palaeozoic) to be undertaken by the G. S. I.

XIII. Herbarium

Herbarium Specimens

Addition of plant specimens during the year	225
Total number of plant specimens as on 31.3.73	9,213

Fruit & Seeds

Addition of fruits and seeds during the year	20
Total No. of fruits & Seeds as on 31.3.73	696

Woods

Addition of wood samples during the year	76
Total Number of wood samples as on 31.3.73	2,403
Total number of wood slides as on 31.3.73	1,665

Pollen slides

Addition of pollen slides during the year	482
Total number of pollen slides as on 31.3.73	8,022

Other slides

Total number as on 31.3.73	4,632
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In the year 1972-73 two excursions were held one for collection of living plant material and other for identification of herbarium specimens. One member went to the Forest Research Institute, Dehradun to identify the collections from Kulu, Manali, Mandi, Mussorrie and Mirzapur collected earlier. About 400 Specimens were identified. Identified plant specimens were accessioned but could not be incorporated in the herbarium as these could not be mounted and labelled. Another member accompanied the Cenozoic Palaeobotany Department to the Deccan intertrappean localities of Madhya Pradesh. He collected about 9 plant species from Parapani, Mehgava Ghati, Moghao Kalan, Sausar, Barwaha and Maudava which includes herbarium specimens, woods, fruits and seeds. Some of these specimens were matched and identified tentatively in the herbarium.

Information, regarding the palaeobotanical history of *Euphorbia royleana* required by the pharmaceutical Expert to U. P. Government, Ranikhet, was furnished.

A piece of Bamboo root was received from the Vijnan Mandir, Hailakandi ; Assam to investigate the reason for its glowing during night under wet conditions. The Officer-in-charge of Vijnan Mandir has been requested to send more information. The material has been exhibited in the herbarium.

Forty wood samples were received from the Forest Product Laboratory, Department of Environment, Canada and twenty five wood samples from the Institute Penyelidikan Perhuttan, Kepong, Selangor, Malaysia on exchange. In return specimens of Indian species would be sent.

An order for the supply of wood samples on payment was placed with the conservator of forests, Kuching, Sarawak and Forest Research Branch, Sandakan, Malaysia. The consignment from the Forest Research Branch, Sandakan is yet to arrive but the wood samples from the Conservator of Forest, Kuching, Sarawak have been received.

Pollen slides submitted by the Quaternary Palynology Department have been catalogued and accessioned. Index cards of these slides have also been prepared.

A set of forty plant specimens has been sent to the Assistant Director, Floristic Botany Division, N.B.G., Lucknow and a set of fifty plant specimens to the Forest Botanist, Systematic Botany Branch, F.R.I. Dehradun on exchange. About 100 or more plant specimens from duplicates have been sorted out to be sent to P. W. Leenhouts Rijksherbarium, Leiden, Netherland, from whom we have received plant specimens in exchange in the preceding years.

Poisoning of herbarium specimens was carried out and the sheets were changed and labelled. Mounting of some plants was also done. Plant specimens of the families Acanthaceae, Amahafthaceae, Ampelidaceae, Anacardiaceae, Annonaceae, Apocynaceae, Araliaceae, Aristolochiaceae, Asclepediaceae, Balanophoraceae, Begoniaceae, Berberidaceae, Bignoniaceae

ae, Bixineae, Boraginaceae, Burseraceae, Cactaceae, Calitrichaceae, Cappariaceae, Chenopodiaceae, Cistaceae, Combretaceae, Compositae, Connaraceae, Convolvulaceae, Coriariaceae, Cornaceae, Crassulaceae, Cruciferae, Cucurbitaceae, Cupuliferae, Cytinaceae Datisceae, Dilleniaceae, Dioscoriaceae, Dipsacaceae and Dipterocarpaceae were checked and the identification and their nomenclature was corrected, after studying them in details under the microscope. Pteridophytic material brought by the Director from Poona was identified and incorporated.

A plant specimen collected from Kodaikanal was presented to the herbarium by the Cenozoic Department. The specimen was identified and incorporated.

Two Russian Botanists Dr. A. K. Shvovbsow & Dr. (Mrs.) G. M. Proskuriakova of Main Botanic Garden, Academy of Sciences, Moscow visited our herbarium and consulted the plant specimen of the family Tamaricaceae. Dr. R. O. Whyte of Hongkong, carrying out research on the origin of family Gramineae under UNESCO scheme, saw our collection of family Gramineae.

XIV BUILDING

Apart from general maintenance of building the following constructions were taken up in hand during the year under report.

1. Construction of Carbon Dating Laboratory.
2. Construction of 6 Laboratory rooms.
3. Reflooring of Basement, and Palaeozoic Laboratory.
4. Petty works—
 - (i) Replastering of back side walls of Jungla and three rooms.

- (ii) Aluminium strips to be fixed to the stairs.
- (iii) Tube lights to be fitted in the Jungla and three rooms in the basement.
- (iv) Repairs to back side Nali from which water sweeps into the basement.
- (v) Fitting of nets on windows of visiting Scientist suites.
- (vi) Fitting of net on ventilator of the Basement.

Work regarding reflooring of Library and Aluminium strips to Stairs are yet to be completed. Electric Power connection and Sanitary work to C-14 Laboratory still remain to be given.

2. Garden —

About 60 roses have been propagated in the Institute's Campus by means of budding. Besides about 80 other plants have also been developed in the Garden.

XV VISITORS

1A. Distinguished persons

Mr. W. W. Walham,
Scientific Attache, U. S. Embassy,
New Delhi.

Mr. S. K. Dutt,
Science Specialist, U. S. Embassy,
New Delhi.

Mr. William C. Steere,
New York Botanical Garden,
Bronx, New York 10458, U. S. A.

Mr. R. O. Whyte,
1604, Star House, Kowloon, Hong Kong.

Mr. N. R. Banerjee,
Director (Exploration) Archeological
Survey of India, New Delhi.

Mr. K. N. Dixit,
National Museum, New Delhi.

Mr. S. N. Khan,
R. O. Pathology Department F. R. I.
Dehra Dun.

Mr. G. L. N. Arya,
Oil India, Ltd., Duliajan Assam.

Dr. G. L. Shah,
Reader, Botany Department
Sardar Patel University, Gujrat.

Mr. S. Kumar,
Head, Botany Department,
M. S. College, Saharanpur.

Mr. N. S. Jain & Family,
Director, Geological Survey of India,
Engineering division, Lucknow.

Dr. A. K. Skvortsova,
Main Botanic Garden, Academy of Sciences,
Moscow, U.S.S R.

Dr. (Mrs) G. M. Proskuriakova,
Main Botanic Garden, Academy of Sciences,
Moscow, U.S.S.R.

Dr. S. S. Patel,
27 Rue de Madrid, Paris-8

Dr. R. C. Kanwar,
Department of Geology, Punjab University,
Chandigarh.

Dr. S. Rangaswami,
Professor of Chemistry, Delhi University, Delhi.

Dr. Piloo E. Bharucha,
Hon. Professor of Pediatrics,
Seth G. S. Medical College & King Edward
Memorial Hospital, Parel Bombay.

2. Educational and other institutions

A. R. Chowdhury Inter College, Bariyawan,
Faizabad U. P.

Lalbagh Girls Inter College, Lucknow.

Botany Department, D.A.V. College, Kanpur.

Mount Carmel School, Lucknow.

Nari Shiksha Niketan Girls School, Lucknow.

Jubilee Girls Inter College, Lucknow.

Baba Thakur Das High School, Lucknow.

Christian College, Lucknow.

Botany Department Bhagalpur University,
Bhagalpur, Bihar.

Botany Department, Tribhuvan University,
Kathmandu, Nepal.

Botany Department, University of Udaipur,
Udaipur, Rajasthan.

Botany Department D. B. S. College, Kanpur.

Geology Department, Ranchi University,
Ranchi, Bihar.

Constructive Training College, Lucknow.

I. T. R. C., C. D. R. I., N. B. G. and Composite
Food Laboratory, Lucknow.

Department of Botany D. S. College, Aligarh, U. P.

Department of Anthropology, University,
Raipur, Madhya Pradesh.

Kasniganj College, Cachar, Assam.

Veterinary College, Hissar.

XVI. THE GOVERNING BODY & THE FINANCE COMMITTEE

1. *The Governing Body*

CHAIRMAN

Professor T. S. Sadasivan,
"Gokulam", 54, M. K. A. Koil St.,
Madras-600004.

MEMBERS

Mrs. Savitri Sahni,
686, Birbal Sahni Marg,
Lucknow.

Dr. K. Subramanyam,
Director,
Botanical Survey of India,
14, Madan Street,
Calcutta-13.

Professor D. D. Pant,
Head of the Botany Department,
University of Allahabad,
Allahabad.

Mr. A. J. Kidwai,
Secretary to the Govt. of India,
Department of Science & Technology,
Technology Bhavan, New Mehrauli Road,
New Delhi-110029.

Prof. A. R. Rao,
No. 2, XI Main Road, 3rd Block,
East Jayanagar,
Bangalore-11.

Dr. R. V. Sitholey, Upto July, 1972
Scientist-in-Charge,
National Botanic Gardens,
Lucknow.

Prof. S. C. Agarwala,
Head of the Botany Department, do
Lucknow University,
Lucknow.

Professor A. G. Jhingran,
Head of the Geology Department, do
Delhi University,
Delhi.

Mr. M. S. Balasundaram, Upto 22 Nov. 1972
Director-General,
Geological Survey of India,
Calcutta-13.

Professor Sripadrao Kilpady, Upto July, 1972
1-2-8/8, Street No. 1, Himayat Nagar,
P. C. Hyderabad-29.
Hyderabad.

Professor K. R. Surange,
Director,
Birbal Sahni Institute of Palaeobotany,
Lucknow. (Member—Secretary)

Mr. R. K. Khare,
Registrar,
Birbal Sahni Institute of Palaeobotany,
Lucknow (Non-member Asstt. Secretary).

NEW MEMBERS

Professor T. S. Mahabale, Maharashtra Association for the Cultivation of Science, Law College Road, Poona	From July onward
Dr. Gopal Tripathi, Vice-Chancellor, Lucknow University, Lucknow.	do
Mr. S. Santhanam, Deputy Financial Adviser to the Govt. of India, Deptt. of Science & Technology, New Delhi.	do
Mr. A. B. Das Gupta, Managing Director, Oil India Ltd., 17 Parliament Street, New Delhi-11.	From July onward
Mr. M. N. Deshpande, Director-General, Archaeological Survey of India, New Delhi-11.	do
Professor Uma Shankar Srivastava Professor of Zoology, University of Allahabad, Allahabad.	do
Dr. M. K. Roy Chowdhury, Director-General, Geological Survey of India, Calcutta-13.	From 23rd Nov. onward

2. Finance Committee

CHAIRMAN

Professor T. S. Sadasivan,
"Gokulam",
54, M.K.A. Koil St.,
Madras-600004.

MEMBERS

Professor S. C. Agarwala,
Head of the Botany Department,
Lucknow University,
Lucknow.

Professor K. R. Surange,
Director,
Birbal Sahni Institute of Palaeobotany,
Lucknow.

XVII THE STAFF

Director

Professor K. R. Surange, M.Sc., Ph.D. (Lucknow),
Ph.D. (Cantab), F.Pb.S., F.N.I.

Department of Palaeozoic Palaeobotany

Dr. K. M. Lele, M.Sc., Ph.D.

Dr. P. K. Maithy, M.Sc., Ph.D.

Dr. Mrs. Shaila Chandra, M.Sc., Ph.D.

Dr. Mrs. Rehana Makada, M.Sc., Ph.D.

Mr. A. K. Srivastava, M.Sc. (Research Scholar upto
26.5.72; since 27.5.72 Junior Scientific Assistant.)

Miss Reshma Bijlani, M.Sc. (Research Scholar) from
22.11.72.

Department of Mesozoic Palaeobotany

Dr. M. N. Bose, M.Sc , Ph.D., F.Pb.S. *Head*
Correspondant de l'arsom

Dr. Sukh Dev, M.Sc. (Hons.), Ph.D. (Lucknow)
Ph.D. (Reading)

Dr. H. K. Maheshwari, M.Sc., Ph.D.

Dr. Shyam C. Srivastava, M.Sc , Ph.D.

Miss Jayasri Banerjee, M.Sc.

Miss Zeba Bano, M.Sc. (Research Scholar) from
20.10.72.

Department of Tertiary Palaeobotany

Dr. R. N. Lakhanpal, M.Sc., Ph.D., *Head*
F.Pb.S., F.B.S., F.N.A.Sc.

Dr. U. Prakash, M.Sc., Ph.D.

Dr. N. Awasthi, M.Sc., Ph.D.

Dr. M. B. Bande, M.Sc., Ph.D. from 17.8.72.

Miss, Sushma Pant, M.Sc. upto 16.11.72

Mr. M. Nadrendra (Research Scholar) from 27.10.72,

Department of Coal Palaeobotany

Dr. D. C. Bharadwaj, M.Sc., Ph.D. (Lucknow) *Head*
Dr. rer Nat. (Bonn), F.B.S , F.Pb.S

Dr. G. K. B. Navale, M.Sc., Ph.D., F.G.S.,
B.G.M.S.

Dr. R. S. Tiwari, M.Sc., Ph.D.

Dr. Suresh C. Srivastava, M.Sc , Ph.D.

Dr. Anand-Prakash, M.Sc., Ph.D.

Dr. Pramod Kumar, M.Sc , Ph.D.

Mr. B. K. Misra, M.Sc.

Miss Archana Dwivedi, M.Sc.

Miss Vijaya Rana, M.Sc. (Research Scholar)
from 19.10.72

Department of Quaternary Palaeobotany

Dr. Vishnu Mittre, M.Sc., Ph.D. (Lucknow) *Head*
Ph.D. (Cantab)

Dr. H. P. Gupta, M.Sc., Ph.D.

Dr. Mrs. Chhaya Sharma, M.Sc., Ph.D.

Miss Asha Khandelwal, M.Sc.

Miss R. Savithri, M.Sc. (Research Scholar)
from 5.6.72.

Department of Oil Palynology

Dr. S. C. D. Sah, M.Sc., Ph.D. *Head*

Dr. Haripal Singh, M.Sc., Ph.D.

Dr. K. P. Jain, M.Sc., Ph.D.

Dr. R. K. Kar, M.Sc. Ph.D.

Dr. R. Y. Singh, M.Sc., Ph.D.

Mr. R. K. Saxena, M.Sc.

Mr. A. K. Khanna, M.Sc. (Research Scholar)
from 25.10.72.

Department of Geology

Mr. S. K. Kulshershta, M.Sc.

Mr. N. C. Mehrotra, M.Sc.

ADMINISTRATION

Mr. R. K. Khare (Registrar) upto 14.11.72 and thereafter on refusal leave upto 8.3.73.

Mr. V. P. Gulati (Deputy Registrar)

Mr. S. D. Mehtani (Office Assistant)

Mr. S. K. Suri (Stenographer)

Mr. S. P. Chadha (P. A. to Director)

Mrs. P. K. Srivastava (Receptionist)

Mr. H. S. Srivastava, (U.D.C.)

Mr. Bhagwan Sidgh (U.D.C.)

Mr. Ramesh Chandra (U.D.C.)

Mr. I. J. S. Bedi (Steno-typist)

Mr. Anand Prakash (Steno-typist) upto 1.2.73

Mr. M. L. Arvindakshan (Steno-typist) upto 1.2.73.

Accounts

Mr. Ghanshyam Singh (Accounts Officer)

Mr. S. B. Verma (Accountant)

Mr. T. N. Shukla (U.D.C.)

Mr. B. K. Jain (U.D.C.)

Mr. N. N. Joshi (L.D.C)

Mr. R. K. Takru (L.D.C.)

Publication

Mr. N. N. Moitra (Publication Incharge)

Library

Mr. J. N. Nigam (Librarian)

Miss S. Bajaj (Library Assistant upto 20.10.72)

Museum

Dr. Anil Chandra, M.Sc., Ph.D. (Curator)

Mr. T. S. Mohan Shanker (Museum Assistant) upto
24.1.73 with lien for 2 years.

Mr. N. C. Saxena (Junior Museum Assistant upto
24.1.73; since 25.1.72 Offg. Museum Assistant)

Mr. J. C. Srivastava (Offg. Junior Museum Assistant
since 3.2.73).

Herbarium

Dr. H. A. Khan, M.Sc., Ph.D. (Curator)

Mr. G. P. Srivastava (Herbarium Incharge)

Mr. J. C. Srivastava (Herbarium Assistant upto
2.2.73)

Mr. Diwakar Pradhan (Herbarium Assistant
from 21.3.73)

Laboratory Services

Mr. R. C. Gupta (Junior Technical Assistant) (on lien)

Mr. D. C. Joshi " "

Miss Asha Bharadwaj " "

Miss Madhavi Chowdhury " "

Miss Indra Kumari " "

Mr. H. N. Boral " "

Mr. Raj Bir Singh " "

Miss Kamla Amaral
(Scheme "Palynological Studies" from
Oil India Ltd.)

Mr. N. K. Khasnavis (Laboratory Assistant)

Store

Mr. I. J. Mehra (Store-Keeper)

Photography & Drawing

Mr. S. S. Rana (Artist)

Mr. P. C. Roy (Photographer)

XVIII. BUDGET 1972-73

Head	Actual Expenditure Rupees in Lakhs approx.)
1. Plan	
(i) <i>Recurring</i>	
Pay of Officers	0.834
Dearness Pay of Officers	0.125
Pay of Establishment	0.303
Dearness Pay of Establishment	0.134
Provident Fund Contribution	0.081
Allowance & Honoraria	0.486
Maintenance of Vehicles and Equipment	0.060
Contingencies	0.220
	<hr/>
	2.243
	<hr/>

(ii) *Capital*

Apparatus & Equipment	0.714
Services Ancillary to Research	0.067
Works & Building	0.895
Furniture and other requirements	0.133
	<hr/>
	1.809
	<hr/>

C-14 Laboratory

Works and Building	0.790
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	2.599
	<hr/>

2. Non-Plan

Recurring

Pay of Officers	1.870
Dearness Pay of Officers	0.157
Pay of Establishment	1.328
Dearness Pay of Establishment	0.591
P. F. Contribution	0.289
Allowance & Honoraria	1.565
Contingencies	1.274
Maintenance	0.156
Chemicals & Apparatus	0.200
	<hr/>
	7.430
	<hr/>