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Atlas of Spores and Pollen from the Triassic Succession of India

Diamond Jubilee Special Publication

Birbal Sahni Institute of Palaeobotany
Lucknow
Atlas of Spores and Pollen from the Triassic Succession of India
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The task to collate, edit, update and create a systematic inventory of fossil plants known from Indian sedimentary successions was first initiated by scientists of the Birbal Sahni Institute of Palaeobotany after the Silver Jubilee Celebrations in November, 1971. Though it was a daunting task as the information was scattered in various journals and many other publications, this effort materialized with the publication of "A Catalogue of Indian Fossil Plants" by R. N. Lakhanpal et al. in 1976. This single volume catalogue included all plant mega- and microfossil records published from 1821 to 1970. As enormous data had subsequently gathered in the next two decades, another Catalogue was released during the Birbal Sahni Birth Centenary Celebrations in 1991. However, due to the wealth of the available data impossible to be incorporated in a single compendium, 11 Fascicules on different fossil groups and/or geologic time span were prepared, each authored by subject experts from the Institute.

In connection with the Diamond Jubilee Celebrations of the Institute this year, the idea to again update the information came up during discussions in our group meetings sometimes in January, 2006. Despite the short notice and a tall order, several of my Institute colleagues readily volunteered to take up the uphill task. It is indeed heartening to see that these Catalogues/Atlases have been completed in record time. I wish to express my most sincere appreciation to all those who contributed their energy and skill in giving shape to these individual compilations.

The present "Atlas of Spores and Pollen from Triassic succession of India" by Archana Tripathi, Vijaya & Ram Awatar is a welcome addition to the list of Institute publications. The Atlas incorporates check-list of all the taxa with their taxonomic status, stratigraphic distribution, geographic occurrence and biozonation potential. Such information would surely help enhance their role in biostratigraphy. I believe this compendium would prove equally useful for researchers and scholars in Academia and Industry.
During the last fifty years since mid Nineteenth Century, much data of spores and pollen in the Mesozoic palynostratigraphy are added to the knowledge. In view of the implication of these palynotaxa in morpho-taxonomy and stratigraphy, an urgent need has arisen to prepare an Atlas. This would certainly facilitate the learning of these time entities and their contribution in palaeobotanical studies. Present compilation has come-up from the palynological information, initially contributed by so many palynologists, working in different parts of the world. Otherwise, this would never had been possible for us to bring this Atlas to the readers in this specialized field. Final preparation of this Atlas has drawn critical attention towards the correct information about each taxon, and putting into systematic style.

We are grateful to Dr. N.C. Mehrotra, Director, Birbal Sahni Institute of Palaeobotany, Lucknow to initiate to prepare the Atlas of Triassic Spores and Pollen. We have worked to the best of our ability to prepare this publication, since the yielding of this idea (January 2006). We hope that this Atlas would certainly facilitate the accruing data in resolution of stratigraphic status of rock strata.

We extend our sincere thanks to Dr Suresh Chandra Srivastava for the critical reviewing and suggestions. Dr. Srikant Murthy has helped unconditionally for searching the required literature from our Institute Library.

Archana Tripathi
Vijaya
Ram-Awatar
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INTRODUCTION

Spore and pollen produced by land plants constitute an important and diverse element (part) of palaeobotanical record from late Early Palaeozoic onwards. Their wide dissemination in continental and marine strata have proven exceptionally useful as biostratigraphic indices (tool).

The rapidly growing data have added more knowledge to palaeobotanical studies, and that have stressed towards the need of indexed information. And this Atlas is independently researched from original palynological literature. The information given here includes the name of the taxa with author(s) citation, details of holotype-locality from where the holotype described, horizon and age of the sample as per original status and diagnostic features. The translation of details of genera into English was done wherever found necessary. The holotype figure is scanned from original publication. In some taxa, where the photograph of genotype is not illustrated, diagrammatic line drawings, mentioned in the Synopsis by Potonié (1956, 1958, 1960, 1966), Jansonious and Hill (1976), are adapted to complete this information.

The names of area, locality and states cited herein are the original, described by the author. Regarding the horizon and age, the Geological age, has been simplified in terms of standard time scale, instead of local age connotations referred in original citations. No further comments are made to morpho-taxonomic status of taxa (Table-1), each taxon is accepted here as commented in latest publication by the author. Under each taxa, its type species is described; further more all the species, recorded from Triassic strata, are listed in Table 1. To supplement the data, species instituted from Indian Triassic sediments are dealt here with their full details. The word Diagnostic Features, used here, includes all the relevant characters to identify a genus or species (taxon).

A complete bibliography is also provided that includes all those publications which contain the details about morpho-taxonomy of these spores and pollen, and Triassic palynostratigraphy on Indian subcontinent. To simplify the use of this Atlas, a checklist of spores and pollen, identified in the Triassic succession of India, has been provided alphabetically (Table 1). These are also grouped under different categories following most simplified classification for fossil spores and pollen by Potonié (1956, 1960, 1970, 1975). Besides, there is record of those spores and pollen, which are basically the constituents of the Permian palynoflora, but do continue in the Triassic sediments. These taxa are marked with an asteric in Table 1, to simplify the Triassic palynostratigraphy. The palynological data included here, dates only up to the year 2005.

We also appreciate the commendable job done by some palynostratigraphers – de Jersey, N.J.; Dolby, J.B.; Balme, B.E; Jansonius, J.; Pocock, S.J.A., who had translated the palynological literature from German language, and commented on morpho-taxonomic status of many taxa. This has helped us in extracting the morpho-taxonomic information of various taxa. Our attempt to bring out this Atlas is to provide the status of the palynostratigraphy of the Triassic succession in India. This would certainly enable future workers in this specialized field of Palaeobotany/ Palaeopalynology.

Notwithstanding the problems, palynostratigraphic correlation must be considered as one of the cutting edge discipline, that provided definitive means of dating and correlating terrestrial sequences and
intra- and inter-basinal correlation. Here, a comprehensive palynostratigraphic scheme is given for Triassic palynostratigraphy on Indian peninsula. This scheme is based on qualitative and quantitative aspects of Triassic palynoflora, and the FAD’s of index species. Utilization of these characterization in palynozone identification, and also its stratigraphic placement is the pre-requisite.

While preparing this Atlas, the text matter and photographs, extracted from the original publication, have been organized invariably with the help of Computer. With the advancement of the information technology, it has been possible to complete this synthesis within six months from the inception of the idea of preparing an Atlas on the fossil spores and pollen from Triassic succession of India. Being fully conscious, there may still remain the possibility of leaving any kind of detail. For that we, a team of three persons, is fully responsible. Moreover, we draw the attention of readers to this valuable publication, a symbolic of the Diamond Jubilee of BSIP (1946-2006).
The survey of the published palynological data from the Triassic succession on Indian peninsula and the Himalaya, shows presence of variety of spore and pollen. Based on the available information, a check-list of all species on record from Triassic succession is given in Table-1. In some cases, where the species could not be determined within a genus, such specimens are listed or described as species in a particular genus. Such cases are listed in the check-list as sp. in a genus if no other species of that genus is recorded from a basin. The names of taxa are arranged in alphabetical order within a group – monolete, simple trilete, cingulate-zonate, striate bisaccate, nonstriate bisaccate, taeniate bisaccate, monosaccate, polysaccate, sulcate (nonsaccate), circumpoll and alete.

Table - 1

**MONOLETE SPORE**

**Genus** Aratrisporites Leschik emend. Playford and Dettmann 1965
A. banksi Playford 1965
A. coryliseminis Klaus 1960
A. fischeri (Klaus) Playford and Dettmann 1965
A. flexibilis Playford and Dettmann 1965
A. granulatus (Klaus) Playford and Dettmann 1965
A. minimus Schultz 1970
A. paenulatus Playford and Dettmann 1965
A. parvispinosus (Leschik) Playford and Dettmann 1965
A. strigosus Playford 1965

**Genus** Chasmatosporites Nilsson 1958
C. sp.

**Genus** Columinisporites Peppers 1964
C. sp.

**Genus** Denwasporites Kumar 1999
D. anhonii Kumar 1999

**Genus** Ghoshiaportes Kar 1969
G. didecus Kar 1969

**Genus** Kendosporites Surange and Chandra 1954*
K. sp.

**Genus** Laevigatosporites Ibrahim 1933*
L. colliensis (Balme and Hennelly) Venkatachala and Kar 1968
L. sp.

**Genus** Leschikisporis Potonié emend. Bharadwaj and Singh 1964
L. aduncus Potonié emend. Bharadwaj and Singh 1964
L. sp.

**Genus** Navalesporites Sarate and Ram-Awatar 1984*
N. spinosus Sarate and Ram-Awatar 1984

**Genus** Polypodiisporites Potonié 1934
P. ipsviciensis(de Jersey) Playford and Dettmann 1965
P. mutabilis Balme 1970
P. sp.

**Genus** Punctatosporites Ibrahim 1933
P. walkomi de Jersey 1962

**Genus** Striatosporites Bharadwaj 1954*
S. braziliensis Bharadwaj, Kar and Navale 1976

**Genus** Thymospora Wilson and Venkatachala 1963*
T. cerebrata Venkatachala and Rawat 1978
T. gondwanensis Bharadwaj and Salujha 1964

**SIMPLE TRILETE SPORE**

**Genus** Alsophilidites (Cookson) Potonié 1954
- A. densus Singh, Srivastava and Roy 1964
- A. sp.

**Genus** Anapiculatisporites Potonié and Kremp 1954
- A. telephorus Pautsch 1958

**Genus** Apiculatisporis Potonié and Kremp 1956*
- A. globosus (Leschik) Playford and Dettmann 1965
- A. sp.

**Genus** Aulisporites Leschik emend. Klaus 1960
- A. astigmosus (Leschik) Klaus 1960

**Genus** Baculatisporites Thomson and Pflug 1953
- B. clavaeoides Sah and Jain 1965
- B. sp.

**Genus** Biratisporites Delcourt and Sprumont emend. Delcourt et al. 1963
- B. dubius Maheshwari and Banerji 1975
- B. potoniaei Delcourt and Sprumont 1955

**Genus** Brevitriletes Bharadwaj and Srivastava emend. Tiwari and Singh 1981*
- B. communis Bharadwaj and Srivastava emend. Tiwari and Singh 1981
- B. levis (Balme and Hennelly) Bharadwaj and Srivastava 1969
- B. unicus Bharadwaj and Srivastava emend. Tiwari and Singh 1981

**Genus** Cadargasporites de Jersey and Paten emend. Reiser and Williams 1964
- C. baculatus de Jersey and Paten emend. Reiser and Williams 1969
- C. granulatus de Jersey and Paten emend. Reiser and Williams 1969
- C. reticulatus de Jersey and Paten 1964
- C. verrucosus Reiser and Williams 1969

**Genus** Calamospora Schopf, Wilson and Bentall 1944*
- C. breviradiata Kosanke 1950
- C. implexa Playford 1965

**Genus** Callumispora Bharadwaj and Srivastava emend. Tiwari et al. 1989*
- C. barakarensis Bharadwaj and Srivastava emend. Tiwari et al. 1989

**Genus** Carnisporites Madler 1964
- C. hercynicus Madler 1964
- C. mesozoicus (Klaus) Madler 1964
- C. raniganjensis Tiwari and Rana 1980

**Genus** Ceratosporites Cookson and Dettmann 1958
- C. helidonensis de Jersey 1971

**Genus** Clavatisporites Kedves and Simoncsics 1964
- C. hammenii (Herbst) de Jersey
- C. sp.

**Genus** Clavatruletes Herbst 1965
- C. pseudocingulatus Venkatachala and Rawat 1978

**Genus** Conbaculatisporites Klaus 1960
- C. baculatus Bharadwaj and Singh 1964
- C. mesozoicus Klaus 1960

**Genus** Concavissimisporites Delcourt and Sprumont emend. Delcourt, Dettmann and Hughes 1963
- C. penolaensis Dettmann 1963
- C. subverrucosus Venkatachala 1969
- C. sp.

**Genus** Converrucosisporites Potonié and Kremp 1954
- C. cameroni (de Jersey) Playford and Dettmann 1965
- C. jenensis Rheinhardt 1964
- C. lunzensis Bharadwaj and Singh 1964
- C. sp.

**Genus** Convolutispora Hoffmeister, Staplin and Malloy 1955
- C. microrugulata Schulz 1967
- C. perfecta Kumaran and Maheshwari 1980

**Genus** Convervucosporites Banerji and Maheshwari 1975
- C. contactus Banerji and Maheshwari 1975
- C. densus Banerji and Maheshwari 1975
- C. variabilis Kumaran and Maheshwari 1980

**Genus** Convoluitispora Hoffmeister, Staplin and Malloy 1955
- C. microrugulata Schulz 1967
- C. perfecta Kumaran and Maheshwari 1980
- C. sp.

**Genus** Craterisporites de Jersey 1970
- C. rotundus de Jersey 1970
### Atlas of Spores and Pollen from the Triassic Succession of India

<table>
<thead>
<tr>
<th>Genus</th>
<th>Year</th>
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**Note:** Names in italics indicate the type species.
L. arnatus Visscher 1966
L. lapposus Visscher 1966
L. villosus Visscher 1966

**Genus** Leptolepidites Couper 1953
L. argentaformis (Bolkhovitina) Morbey 1975
Leptolepidites sp. cf. L. bossus

**Genus** Lophotriletes (Naumova) Potonié and Kremp 1954
L. minimus Saluja 1965
L. rectus Bharadwaj and Saluja 1964
L. sp.

**Genus** Lycopodiacidites Couper emend. Potonié 1956
L. kuepperi Klaus 1960
L. rugulatus (Couper) Schultz 1967
L. sp.

**Genus** Lycopodiumsporites Thiergart ex Delcourt and Sprumont 1955
Lycopodiumsporites sp. cf. L. austroclavatidites

**Genus** Microbaculispora Bharadwaj 1962*
M. tentula Tiwari 1965
M. sp.

**Genus** Microfoveolatispora Bharadwaj 1962*
M. foveolata Tiwari emend. Tiwari and Singh 1981

**Genus** Microreticulatisporites Knox emend. Potonié and Kremp 1954
M. sp.

**Genus** Neoraistrickia Potonié 1956
N. taylorii Playford and Dettmann 1965
N. sp.

**Genus** Novitasporites Tiwari and Rana 1981
N. triangularis Tiwari and Rana 1981
N. triassicus Tiwari and Rana 1981

**Genus** Orbella Maljavkina 1949
O. indica Tiwari and Rana 1980

**Genus** Osmundacidites Couper 1953
O. baculatus Tiwari and Ram-Awatar 1989
O. panchetensis Kar 1970
O. pilatus Tiwari and Rana 1981
O. senectus Balme 1963
O. wellmanii Couper 1953
O. sp.

**Genus** Plicatisporites Lele and Makada 1972*
P. distinctus Lele and Makada 1972

**Genus** Punctatisporites Ibrahim emend. Potonié and Kremp 1954*
P. indicus Tiwari 1968
P. fungosus Balme 1970

P. mauroensis Maheshwari and Banerji 1975
P. uniformis Tiwari 1968

**Genus** Pustulatisporites Potonié and Kremp 1954
P. blackstonensis de Jersey 1970

**Genus** Pyramidosporites Segroves 1967
P. racemosus Balme 1970

**Genus** Reticulatisporites Ibrahim emend. Potonié and Kremp 1954
R. sp.

**Genus** Retitriletes (Hammen) ex Pierce 1961
R. huttonensis McKellar 1974

**Genus** Retusotriletes Naumova 1953
R. dejersjyi Venkatathchala and Rawat 1978

**Genus** Rugulatisporites Pflüg and Thomson in Thomson and Pflüg 1953
R. trinus de Jersey and Hamilton 1967
R. sp.

**Genus** Scabratisporites Visscher 1966
S. scabratus Visscher 1966

**Genus** Subberrurisporis Kar 1970
S. rudis Kar 1970

**Genus** Tigrisporites Klaus 1960
T. halleinis Klaus 1960
T. playfordii de Jersey and Hamilton 1967
T. sp.

**Genus** Todisporites Couper 1958
T. major Couper 1958
T. minor Couper 1958
T. sp.

**Genus** Trilites Couper emend. Potonié 1956
T. tuberculiformis Cookson 1947

**Genus** Trilites Couper emend. Potonié 1956
T. tuberculiformis Cookson 1947

**Genus** Triquetrites Wilson and Coe emend. Schopf, Wilson and Bentall 1944
T. proratus Balme 1970
T. sp.

**Genus** Undulatisporites Pflüg in Thomson and Pflüg 1953
U. dilucidus Kraeusel and Leschik 1955
U. sp.

**Genus** Uvaesporites Döring 1965
U. glomeratus Döring 1965
U. verrucatus (de Jersey) Helby in Jansonius 1971

**Genus** Verrucosisporites Ibrahim emend. Smith 1971
V. bosei Maheshwari and Banerji 1975
V. carnarvonensis de Jersey and Hamilton 1967
V. contactus Clarke 1965
V. densus Bharadwaj and Tiwari 1977
V. distinctus Tiwari 1965
V. donarii Potonié and Kremp 1955
V. kazingaonensis Tripathi, Tiwari and Kumar 1990
V. morulae Klaus 1960
V. narmianus Balme 1970
V. racemus (Peppers) Smith 1971
V. surangeli Maheshwari and Banerji 1975
Verrucosisporites sp. cf. V. thuringiacus
V. triassicus Bharadwaj and Tiwari 1977
V. varians Volkheimer 1972
V. sp.
Genus Zebrasporites Klaus 1960
Z. sp.

CINGULATE-ZONATE TRILETE SPORE

Genus Aequitriradites Delcourt and Sprumont 1955
A. minor Mädler 1964
Genus Angulisporites Bharadwaj 1954
A. triassicus Venkatachala and Rawat 1978
Genus Annulispora de Jersey 1959
A. folliculosa (Rogalska) de Jersey 1959
Genus Antulsporites Archangelsky and Gamerro 1966
A. bihariensis Venkarachala and Rawat 1978
Genus Camarozonosporites Potonié emend. Klaus 1960
C. clivosus McKeller 1974
C. rudis (Leschik) Klaus 1960
Genus Chasmatosporites (Nilsson) Pocock and Jansonius 1969
C. apertus (Rogalska) Nilsson 1958
C. hians Nilsson 1958
Genus Cingutriletes Pierce emend. Dettmann 1963
C. claus (Balme) Dettmann 1963
C. sp.
Genus Cingulizonates Dybova and Jachowitz emend. Butterworth et al. 1964
C. indicus Kumaran and Maheshwari 1980
C. rhoeticus (Reinhardt) Schultz 1967
C. verrucosus Kumaran and Maheshwari 1980

Genus Densoisporites Weyland and Krieger emend. Dettmann 1963
D. complicatus Balme 1970
D. contactus Bharadwaj and Tiwari 1977
D. mesozoicus Singh, Srivastava and Roy 1964
D. nejburgii Balme 1970
D. novicus Kumar 1973
D. playfordi (Balme) Dettmann 1963
D. poatinaensis Playford 1965
D. velatus Weyland and Krieger 1953
D. sp.
Genus Densosporites Berry emend. Potonié and Kremp 1954
D. raceviewensis de Jersey 1971
D. sp.
Genus Distalanulisporites Klaus 1960
D. sp.
Genus Duplexisporites Deák emend. Playford and Dettmann 1965
D. gyratus Playford and Dettmann 1965
Genus Foraminisporis Krutzsch 1959
F. sp.
Genus Gondisporites Bharadwaj 1962*
G. raniganjensis Bharadwaj 1962
G. reticulatus Tiwari and Ram-Awatar 1989
G. sp.
Genus Indotriradites Tiwari 1964*
I. mammilatus Bharadwaj and Tiwari 1977
I. saeptatus (Balme) Bharadwaj and Tiwari 1977
I. verrucifer de Jersey and Hamilton 1967
I. wargalensis (Balme) Bharadwaj and Tiwari 1977
Genus Iraquispora Singh 1964*
I. labrata Singh 1964
Genus Kraeuselisporites Leschik 1955
K. cuspidus Balme1963
K. rallus Balme 1970
K. saeptatus Balme1963
K. verrucifer de Jersey and Hamilton 1967
K. wargalensis Balme 1970
K. sp.
Genus Limatulasporites Helby and Foster in Foster 1979
L. fossulatus (Balme) Helby and Foster in Foster 1979
L. limatulus (Playford) Helby and Foster in Foster 1979
Genus Lundbladispora Balme emend. Playford 1965
L. baculata Bharadwaj and Tiwari 1977
L. brevicula Balme 1963
L. bullata Venkatachala and Rawat 1978
L. densispinosa Bharadwaj and Tiwari 1977
L. microconata Bharadwaj and Tiwari 1977
L. obsoleta Balme 1963
L. raniganjensis Tiwari and Rana 1981
L. recurvata Venkatachala and Rawat 1978
L. reticulata Tiwari and Rana 1980
L. warti Tiwari and Rana 1981
L. willmottii Balme 1963
L. sp.
Genus Lycospora Schopf, Wilson and Bentall emend. Potonié and Kremp 1954
L. sp.
Genus Muerrigerisporites Krutsch 1963
M. sp.
Genus Neveispores de Jersey and Paten 1964
N. fossulatus Balme 1970
N. limatulus Playford 1965
N. vallatus de Jersey and Paten 1964
Genus Polycingulatisporites Simoncsics and Kedves emend. Playford and Dettmann 1965
P. crenulatus Playford and Dettmann 1965
P. densatus (de Jersey) Playford and Dettmann 1965
P. sp.
Genus Potonieitriradites Bharadwaj and Sinha 1969*
P. subtilis Sinha 1972
Genus Rajmahalispora Tiwari, Tripathi and Kumar 1984
R. reticulata Tiwari, Tripathi and Kumar 1984
R. rugulata Tiwari, Tripathi and Kumar 1984
R. triassicus Tiwari, Tripathi and Kumar 1984
Genus Reticulatisporites (Ibrahim) Potonie and Kremp 1954
R. sp.
Genus Rewanispora de Jersey 1970
R. joueolata de Jersey 1970
Genus Ringosporites Tiwari and Rana 1981
R. fossulatus (Balme) Tiwari and Rana 18981
R. ringus Tiwari and Rana 1981
R. sp.
Genus Semiretisporis Reinhardt 1961
S. denmeadi de Jersey emend. de Jersey 1970
Genus Simeonospora Balme 1970
S. khlonovae Balme 1970
Genus Spinotrilletes Mädler 1964
S. echinoides Mädler 1964
S. senecioides Mädler 1964
S. sp.
Genus Taurocuspores Stover emend. Playford and Dettmann 1965
T. verrucatus Schultz 1967
Genus Tethysispora Vijaya and Tiwari in Vijaya et al. 1988
T. playfordii Vijaya and Tiwari in Vijaya et al. 1988
T. unica Vijaya and Tiwari 1988 in Vijaya et al. 1988
T. sp.
Genus Tikisporites Kumaran in Kumaran and Maheshwari 1980
T. balmei Kumaran in Kumaran and Maheshwari 1980
T. complicatus Kumaran in Kumaran and Maheshwari 1980
Genus Uvaesporites Döring 1965
U. verrucosus (de Jersey) Helby in de Jersey 1971

STRIATE BISACCATE POLLEN

Genus Crescentipollenites Bharadwaj emend. Bharadwaj, Tiwari and Kar 1974*
C. amplus (Balme and Hennelly) Tiwari and Rana 1980
C. bengalensis (Maheshwari and Banerji) Tiwari and Rana 1981
C. fuscus (Bharadwaj) Bharadwaj, Tiwari and Kar 1974
C. hirsutus (Kar) Bharadwaj, Tiwari and Kar 1974
C. sp.
Genus Distriatites Bharadwaj 1962*
D. bilateris Bharadwaj 1962
D. insculptus (Playford and Dettmann) Bharadwaj and Srivastava 1969
D. sp.
Genus Faunipollenites Bharadwaj 1962*
F. bharadwajii Maheshwari 1967
F. gopadensis Bharadwaj and Srivastava 1969
F. perexiguus Bharadwaj and Saluja 1965
F. singraliensis Sinha 1972
F. varius Bharadwaj emend. Tiwari et al. 1989
Genus Gondwanipollenites Bose and Maheshwari emend. Maheshwari and Banerji 1975*
G. bengalensis Maheshwari and Banerji 1975
G. diffusus (Bharadwaj and Saluja) Maheshwari and Banerji 1975
G. magnificus (Bharadwaj and Saluja) Bose and Maheshwari 1968
G. multistriatus Banerji and Maheshwari 1975
Genus Hami pollenites Wilson 1962*
H. sp.
Genus Hindipollenites Bharadwaj 1962*
L. incertus Bharadwaj and Saluja 1964
L. naviculus Venkatachala and Kar 1968
L. raniganjensis Bharadwaj 1962
L. rarus Bharadwaj and Saluja 1964
L. singularis Bharadwaj and Saluja 1964
L. triassicus Bharadwaj and Tiwari 1977
Genus Protohaploxypinus Samoilovich emend.
Morby 1975*
F. goriensis (Potonié and Lele) Hart 1964
F. microcarpus (Schaarschmidt) Balme 1970
P. samoilovichii Jansonius 1975
P. varius (Bharadwaj) Balme 1970
P. sp.
Genus Rhizomaspora Wilson 1962*
R. biharia Banerji and Maheshwari 1975
R. costa Venkatachala and Kar 1968
R. divaricata Wilson 1962
R. indica Tiwari 1965
R. triassica Tiwari and Rana 1981
Genus Schizopollis Venkatachala and Kar 1964*
S. disaccoides Venkatachala and Kar 1964
S. distinctus Sinha 1972
Genus Striapolollenites Bharadwaj 1962*
S. monosaccoides Tiwari and Rana 1981
S. obliquus Bharadwaj and Saluja 1964
Genus Striattites Pant emend. Bharadwaj 1962*
S. cancellatus (Balme and Hennelly) Potonié 1958
S. communis Bharadwaj and Saluja 1964
S. gopalensis Srivastava 1970
S. levistriatus Bharadwaj and Tiwari 1977
S. notus Bharadwaj and Saluja 1964
S. panchetensis Tiwari and Rana 1981
S. sidhiensis Bharadwaj and Srivastava 1969
S. solitus Bharadwaj and Saluja 1964
S. subtilis Bharadwaj and Saluja 1964
S. varius Kar 1968
S. sp.
Genus Striatoabietites Sedova emend. Hart 1964*
S. aytugii Visscher 1966
S. multistriatus Balme and Hennelly 1955
Genus Striatopiceites Sedova 1956*
S. clarus Kar 1970
S. minutus Venkatachala and Kar 1968
Genus Striapolocarpetites Soritschewa and Sedova emend. Bharadwaj and Saluja 1964*
S. auriculatus Vijaya and Tiwari in Vijaya, Kumar, Singh and Tiwari 1988
S. crassistriatus Lele and Srivastava 1977
S. decorus Bharadwaj and Saluja 1964
S. diffusus Bharadwaj and Saluja 1964
S. dubraipurensis Tripathi, Tiwari and Kumar 1990
S. labrus Tiwari 1965
S. magnificus Bharadwaj and Saluja 1964
S. nidpurensis Bharadwaj and Srivastava 1969
S. oblongatus (Bose and Maheshwari) Tiwari and Rana 1981
S. ovalis Sinha 1972
S. ovatus (Maheshwari) Tiwari and Rana 1980
S. rotundus (Maheshwari) Bharadwaj and Dwivedi 1981
S. tiwari Bharadwaj and Dwivedi 1981
S. venustus Bharadwaj and Saluja 1965
Genus Striasulcites Venkatachala and Kar 1968*
S. ovatus Venkatachala and Kar 1968
Genus Striatisaccus Mädler 1964
S. sp.
Genus Strotersporites Wilson 1962*
S. raniganjensis Kar 1970
S. sp.
Genus Tumoripollenites Bharadwaj 1962*
T. baculosus Bharadwaj 1962
Genus Verticipollenites Bharadwaj 1962*
V. crassus Bharadwaj and Saluja 1964
V. debilis Venkatachala and Kar 1968
V. finitimus Bharadwaj and Saluja 1964
V. gibbosus Bharadwaj 1962
V. oblongus Bharadwaj 1962
V. secretus Bharadwaj 1962
V. subcircularis Bharadwaj and Saluja 1964
V. sp.
NON-STRIATE BISACCATE POLLEN

**Genus** Accinctisporites Leschik 1955
- *A. ligatus* Leschik 1955
- *A. sp.*

**Genus** Alisporites Daugherty emend. Jansonius 1971
- *A. asansoliensis* Maheshwari and Banerji 1975
- *A. circulicorpus* Clarke 1963
- *A. damudicus* Tiwari and Rana 1981
- *A. grandis* (Cookson) Dettmann 1963
- *A. grauogelli* Klaus 1964
- *A. grobus* Bharadwaj and Tiwari 1977
- *A. indicus* Bharadwaj and Srivastava 1969
- *A. landianus* Balme 1970
- *A. minutisaccus* Clarke 1965
- *A. opii* Daugherty 1971
- *A. ovalis* Kumar 1973
- *A. parvus* Thiergart and Fratz 1962
- *A. plicatus* Kar, Kieser and Jain 1962
- *A. tenuicorpus* Balme 1970
- *A. sp.*

**Genus** Angustisulcites Freudenthal emend. Visscher 1966
- *A. grandis* (Freudenthal) Visscher 1966
- *A. klausii* Freudenthal 1964

**Genus** Ashmoripollis Helby 1987
- *A.educta* Helby 1987

**Genus** Brachysaccus Mädler 1964
- *B. eskensis* de Jersey 1962
- *B. indicus* Kumaran and Maheshwari 1980
- *B. ovalis* Madler 1964
- *B. triassicus* Tripathi, Tiwari and Kumar 1990
- *B. sp.*

**Genus** Caytonipollenites Couper 1958
- *C. sp.*

**Genus** Cedripites Wodehouse 1933
- *C. priscus* Balme 1970
- *C. sp.*

**Genus** Colpectopollis Pflüg emend. Visscher 1966
- *C. sp.*

**Genus** Cristatisaccus Mädler 1964
- *C. cristatus* Mädler 1964

**Genus** Cuneatisporites Leschik 1955*
- *C. mirabilis* Tiwari and Rana 1981
- *C. radialis* Leschik 1955
- *C. rarus* Kar 1968
- *C. sp.*

**Genus** Cyclosaccus Mädler 1964
- *C. podocarpoides* Mädler 1964
- *Cyclosaccus* sp. cf. *C. radialis* Leschik 1955

**Genus** Falcisporites Leschik emend. Klaus 1963
- *F. australis* (de Jersey) Stevens 1981
- *F. minutosaccus* Kumaran and Maheshwari 1980
- *F. nidipurensis* (Bharadwaj and Srivastava) Kumaran and Maheshwari 1980
- *F. nuthalensis* (Clarke) Balme 1970
- *F. snopkouae* Visscher 1966
- *F. stabulis* Balme 1970
- *F. sp.*

**Genus** Granosaccus Mädler 1964
- *G. reniformis* Misra, Prasad and Rawat 1996

**Genus** Ibisporites Tiwari 1968*
- *I. diplosaccus* Tiwari 1968
- *I. sp.*

**Genus** Illinites Kosanke emend. Klaus 1964*
- *J. sp.*

**Genus** Jugasoporites Leschik emend. Klaus 1964*
- *J. sp.*

**Genus** Kräppipollenites Tiwari and Vijaya 1995
- *K. indicus* Tiwari and Vijaya 1995
- *K. sp.*

**Genus** Limitisporites Leschik emend. Potonié 1958
- *L. sp.*

**Genus** Minutosaccus Mädler 1964
- *M. acutus* Mädler 1964
- *M. crenulatus* Dolby in Dolby and Balme 1976
- *M. maedleri* Kumaran and Maheshwari 1980
- *Minutosaccus* sp. cf. *M. potoniae*
- *M. sp.*

**Genus** Nidipollenites Bharadwaj and Srivastava 1969
- *N. monoletus* Bharadwaj and Srivastava 1969
- *N. sp.*

**Genus** Ovalipollis Krutzch emend. Pocock and Jansonius 1969
- *O. rarus* Klaus 1960
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Genus *Pinuspollenites* Raatz 1937
  *P. thoracatus* Balme 1970
  *P. sp.*

Genus *Platysaccus* Naumova emend. Potonié and Klaus 1954*
  *P. fuscus* Goubin 1965
  *P. queenslandi* de Jersey 1962
  *P. sp.*

Genus *Plicatisaccus* Pautsch 1971
  *P. badius* Pautsch 1971

Genus *Podocarpeapollenites* Thiergart 1949
  *P. sp.*

Genus *Podocarpidites* Cookson emend. Couper 1953
  *P. alareticulatus* Sah and Jain 1965
  *P. grandis* Sah and Jain 1965
  *P. rarus* Singh et al. 1964
  *P. typicus* Sah and Jain 1965
  *P. vermiculatus* Kumar 1973
  *P. sp.*

Genus *Rimaesporites* Leschik 1955
  *R. aquilonalis* Goubin 1965
  *R. potoniei* Leschik 1955
  *R. sp.*

Genus *Sahnites* Pant emend. Tiwari and Singh 1984*
  *S. panchetensis* Tiwari and Singh 1984
  *S. sp.*

Genus *Samaropollenites* Goubin 1965
  *S. indicus* Misra, Prasad and Rawat 1996
  *S. speciosus* Goubin 1965
  *S. sp.*

Genus *Satsangisaccites* Bharadwaj and Srivastava 1969
  *S. nidpurensis* Bharadwaj and Srivastava 1969
  *S. triassicus* Bharadwaj and Srivastava 1969
  *S. sp.*

Genus *Scheuringipollenites* Tiwari 1973*
  *S. barakarensis* (Tiwari) Tiwari 1973
  *S. maximus* (Hart) Tiwari 1973
  *S. royii* (Bharadwaj and Srivastava) Tiwari 1973
  *S. tentulus* (Tiwari) Tiwari 1973
  *S. triassicus* (Bharadwaj and Srivastava) Tiwari 1973
  *S. sp.*

Genus *Staurosaccites* Dolby in Dolby and Balme 1976
  *S. densus* Kumaran and Maheshwari emend. Tripathi, Tiwari and Kumar 1990
  *S. marginalis* Kumaran and Maheshwari 1980
  *S. minutus* Kumaran and Maheshwari 1980
  *S. ovalis* Kumaran and Maheshwari 1980
  *S. quadrifidus* Dolby in Dolby and Balme 1976
  *S. tharipatharensis* Kumaran in Maheshwari and Kumaran 1979
  *S. sp.*

Genus *Triadispora* Klaus 1964
  *Triadispora* sp. cf. *T. crassa*
  *T. plicata* Klaus 1964
  *T. vilis* Scheuring 1970

Genus *Vesicaspora* Schemel emend. Mädler 1964*
  *V. sp.*

Genus *Vestigisporites* Balme and Hennelly emend. Tiwari and Singh 1984*
  *V. sp.*

Genus *Vitrveisporites* Leschik emend. Jansonius 1962
  *V. pallidus* Reissinger 1940
  *V. savitrii* Reissinger 2000
  *V. sp.*

Genus *Voltziaceaesporites* Klaus 1964
  *V. heteromorpha* Klaus 1964

**TAENIATE BISACCATE POLLEN**

Genus *Arcuatipollenites* Tiwari and Vijaya 1995
  *A. asansoliensis* (Tiwari and Rana) Tiwari and Vijaya 1995
  *A. damudicus* (Tiwari and Rana) Tiwari and Vijaya 1995
  *A. ovatus* (Goubin) Tiwari and Vijaya 1995
  *A. paliensis* (Tiwari and Ram-Awatar) Tiwari and Vijaya 1995
  *A. pellucidus* (Goubin) Tiwari and Vijaya 1995
  *A. tethysensis* (Vijaya and Tiwari) Tiwari and Vijaya 1995
  *A. sp.*

Genus *Chordasporites* Klaus 1960
  *C. australiensis* de Jersey 1962
  *C. klausii* Kumaran and Maheshwari 1980
  *C. magnus* Klaus 1964
  *C. minutus* Kar, Kieser and Jain 1972
  *C. raniganjensis* Maheshwari and Banerji 1975
  *C. singulichorda* Klaus 1960
  *C. voltziaformis* Visscher 1966
Archnana Tripathi, Vijaya and Ram-Awatar

C. sp.

**Genus** Corisaccites Venkatachala and Kar 1966*
C. alutas Venkatachala and Kar 1966
C. sp.

**Genus** Dicappipollenites Tiwari and Vijaya 1995*
D. balmei Tiwari and Vijaya 1995
D. sp.

**Genus** Gutulapollenites Goubin 1965*
G. hannonicus Goubin 1965
G. sp.

**Genus** Infernopollenites Scheuring 1970
I. claustratus Scheuring 1970
I. janarensis Kumaran and Maheshwari 1980
I. parvus Scheuring 1970
I. pseudoclaustratus Kumaran and Maheshwari 1980
I. simplex Kumaran and Maheshwari 1980
I. sulcatus (Pautsch) Scheuring 1970

**Genus** Lueckisporites Potonié and Klaus emend. Klaus 1963*
L. crassus Sinha 1972
L. junior Klaus 1960
L. nyakapendensis Hart 1964
L. singhii Balme 1970
L. virkkiae Potonié and Klaus1954

**Genus** Lunatisporites Leschik emend. Scheuring 1970
L. acutus Leschik emend. Scheuring 1970
L. gopadensis Bharadwaj and Srivastava 1969
L. nivaliensis Leschik 1955
L. novimundi (Jansonius) Kumaran and Maheshwari 1980
L. pellucidus (Goubin) Maheshwari and Banerji 1975
L. rhaeticus (Schultz) Warrington 1974

**Genus** Taeniaesporites Leschik emend. Klaus 1963
T. obex Balme 1963
T. rhaeticus Schultz 1967
T. sp.

**Genus** Trabeculosporites Trivedi and Misra emend. Tiwari and Ram-Awatar 1992
T. gopadensis Trivedi and Misra emend. Tiwari and Ram-Awatar 1992

**MONOSACCATE POLLEN**

**Genus** Barakarites Bharadwaj and Tiwari 1964*
B. indicus Bharadwaj and Tiwari 1964
B. triquetrus Tiwari 1965
B. sp.

**Genus** Callialasporites Dev 1961
C. dampieri (Balme) Dev 1961
C. microvelatus Schultz 1966
C. trilobatus (Dev) Bharadwaj and Kumar 1972
C. turbatus (Balme) Schultz 1967
C. sp.

**Genus** Cannanoropollis Potonié and Sah 1960*
C. densus (Lele) Bose and Maheshwari 1968
C. mehtae (Lele) Bose and Maheshwari 1968

**Genus** Crustaesporites Leschik 1954
C. trilobatus Venkatachala and Rawat 1978

**Genus** Densipollenites Bharadwaj 1962*
D. annulatus Jha 1995
D. densus Bharadwaj and Srivastava 1969
D. indicus Bharadwaj 1962
D. invius Bharadwaj and Salujha 1964
D. magnicorpus Tiwari and Rana 1981
D. minimus Venkatachala and Kar 1968
D. pullus Segroves 1969
D. sp.

**Genus** Divarisaccites Bharadwaj and Tripathi 1966*
D. leiei Venkatachala and Kar 1966
D. strengeri Bose and Kar 1966

**Genus** Enzonalasporites Leschik emend. Scheuring 1970
E. densus (Leschik) Dolby and Balme 1976
E. ignacii (Leschik) Maheshwari and Kumaran 1979
E. leschikii Madler 1964
E. vigens Leschik 1955

**Genus** Goubinispora Tiwari and Rana 1981
G. indica Tiwari and Rana 1981
G. morondavensis (Goubin) Tiwari and Rana 1981
G. sp.

**Genus** Kamthisaccites Srivastava and Jha 1986*
K. kamthiensis Srivastava and Jha 1986
K. sp.

**Genus** Parasaccites Bharadwaj and Tiwari 1964*
P. bilateralis Tiwari 1965
P. korbaensis Bharadwaj and Tiwari 1964
P. obscurus Tiwari 1965

**Genus** Patinasporites Leschik emend. Klaus 1960
P. iustus Klaus 1960

**Genus** Playfordiaspora Maheshwari and Banerji emend. Vijaya 1995
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P. annulata Tiwari and Rana emend. Vijaya 1995
P. cancellosa Maheshwari and Banerji emend. Vijaya 1995
P. crenulatus (Wilson) Vijaya 1995
P. hexagonalis (Klaus) Vijaya 1995
P. velata (Leschik) Vijaya 1995
P. sp.

Genus Potonisiasporites Bhardwaj emend. Bhardwaj 1955*

Genus Plicatipollenites Lele 1964*

Genus Pseudenzonalasporites Scheuring 1970

Genus Striomenosaccites Bharadwaj 1962*

Genus Diplodendrites Bharadwaj and Srivastava 1969*
P. nidpurensis Bharadwaj and Srivastava 1969
P. sinuosus (Balme and Hennelly) Bharadwaj and Srivastava 1969

Genus Pretricioipollenites Danze-Corsin and Lavine 1963
P. bharadwajii Balme 1969

Genus Weylandites Bharadwaj and Srivastava 1969
W. bilateralis Bharadwaj and Srivastava 1969
W. circularis Bharadwaj and Srivastava 1969
W. indicus Bharadwaj and Srivastava 1969
W. irregularis Bharadwaj and Srivastava 1969
W. lucifer (Bharadwaj and Salujha) Bharadwaj and Srivastava 1969
W. minutus Bharadwaj and Srivastava 1969
W. sp.

CIRCUMPOLL GROUP

Genus Camerosporites Leschik emend. Scheuring 1970
C. minor Kumaran and Maheshwari 1980
C. pseudoverrucatus Scheuring 1970
C. secatus Leschik emend. Scheuring 1970
C. verrucatus de Jersey 1971
C. sp.

Genus Classopollis Pflüg emend. Pocock and Jansonius 1961
C. anasillos Filatoff 1975
C. harrisii Muir and Konij-Cittert 1970
C. meyeriana (Klaus) de Jersey 1974
C. simplex Reiser and Williams 1969
C. sp.

Genus Discisporites Leschik emend. de Jersey 1964
Genus *Duplicisporites* Leschik emend. Klaus 1960  
*D. psilatus* de Jersey 1964  
*D. triassicus* Kar 1970  
*Genus Duplicisporites* Leschik emend. Klaus 1960  
*D. granulatus* Leschik 1955  
*D. sp.*  
Genus *Granuloperculatipollis* Venkatachala and Góczán 1964  
*G. distinctus* Kumaran in Maheshwari and Kumar 1979  
*G. flavatus* Kar 1970  
*G. problematicus* Kar 1970  
*Genus Granuloperculatipollis* Venkatachala and Góczán 1964  
*G. distinctus* Kumaran in Maheshwari and Kumar 1979  
*G. flavatus* Kar 1970  
*G. problematicus* Kar 1970  
*Genus Rhäetipollis* Schultz 1967  
*R. germanicus* Schultz 1967  
*Genus Araucariacites* (Cookson) Couper 1958  
*A. australis* Cookson 1947  
*A. fissus* Rieser and Williams 1969  
*A. sp.*  
*Genus Bartenia* Helby 1987  
*B. communis* Helby 1987  
*Genus Brazillea* Tiwari and Navale 1967*  
*B. punctata* Tiwari and Navale 1967  
*Genus Cerebropollenites* Nilsson emend. Singh and Kumar 1969  
*C. nilssoni* Singh and Kumar 1969  
*C. sp.*  
*Genus Circulispores* de Jersey 1962  
*C. parvus* de Jersey 1962  
*Genus Conaletes* Reinhardt and Schön 1967  
*C. gondwanensis* Kumaran and Maheshwari 1980  
*Genus Conipollenites* Cameron 1974  
*C. arabis* Cameron 1974  
*Genus Densostriapollis* Tiwari and Rana 1981  
*D. damudicus* Tiwari and Rana 1981  
*Genus Equisetosporites* Daugherty 1941  
*E. sp.*  
*Genus Graminoides* Goubin 1965  
*G. cernes* Goubin 1965  
*Genus Grebespora* Jansonius 1962  
*G. concentrica* Jansonius 1962  
*Genus Hemisphaeridium* Hemmer and Nygreen emend. Sinha 1969*  
*H. signum* Hemmer and Nygreen 1967  
*H. singrauliensis* Sinha 1969  
*H. sp.*  
*Genus Inaperturopollenites* Thomson and Pflüg emend. Potonié 1958  
*I. nebulosus* Balme 1970  
*I. sp.*  
*Genus Laricoidites* Potonié 1931  
*L. desquamatus* Goubin 1965  
*L. gigantus* Brenner 1963  
*L. intragranulatus* Bharadwaj and Singh 1964  
*L. magnus* Potonié, Thomson and Thiergart 1950  
*L. sp.*  
*Genus Lecaniella* Cookson and Eisenack 1962  
*L. foveolatus* Filatoff 1975  
*Genus Leiosphaeridia* Eisenack emend. Downie and Sarjeant 1963  
*L. sp.*  
*Genus Maculatasporites* Tiwari 1965*  
*M. indicus* Tiwari 1965  
*M. sp.*  
*Genus Peltacystia* Balme and Sergroves 1966*  
*P. venosa* Balme and Sergroves 1966  
*P. sp.*  
*Genus Pilasporites* Balme and Hennelly emend. Tiwari and Navale 1967*  
*P. bharadvajii* Balme 1970  
*P. crateriformis* Jain 1968  
*P. plurigenus* Balme and Hennelly 1956  
*Genus Quadrirsporites* Hennelly emend. Potonié 1961*  
*Q. horridus* Potonié and Lele 1961  
*Genus Rimaspora* Kar 1970*  
*R. plicata* Kar 1970  
*Genus Schizosporis* Cookson and Dettmann 1959*  
*S. reticulatus* Cookson and Dettmann 1959  
*Genus Tasmanites* Newton emend. Eisenack 1958*  
*T. suevicus* (Eisenack) Wall 1965
DESCRIPTIONS OF GENERA AND SPECIES

In this chapter, all those genera have been dealt which are recorded from the Triassic succession on Indian peninsula. The criteria for the descriptions given in following pages are: (I) type species of all the genera given in the check-list, are described irrespective of their type locality and country. This is to enable the user to identify the same from other species in a genus; (II) all those species given in check-list, which are instituted from Indian Gondwana strata are dealt here in; (III) the details of those species, which are instituted from the Permian rock succession, and do occur into the Triassic strata, are not included in this chapter. This is because of their relatively less significance in the stratigraphic determination of the Triassic palynoflora.

The type species of each genus on record is described with the details of -- holotype and the variations in morphographic characters within the species, along with locality, horizon and age, from where it is instituted. This is in view to facilitate the understanding of variations within a genus, and the comparison and identification of the species of a genus. The details of morphographic features described here are the features which can pin point the identification of a genus and species.

Efforts have been made to illustrate the holotype of all species described herein, either by the photograph or the text-figure given by the author (s). However, in some cases no illustration is given, because it could not be retrieved due to bad quality. The text-figures and photographs illustrated here in, are not to the scale.

MONOLETE SPORE

Genus Aratrisporites Leschik emend. Playford and Dettmann 1965
Type Species: *Aratrisporites parvispinosus* Leschik 1955

Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Zonate, bilateral, broadly oval spore; monolete, rays enclosed within elevated lips; exine two-layered, cavate, loosely enveloping, proximally attached to a homogeneous inner layer; outer layer finely patterned, and sculpturated with grana, coni, spinulae, spinae and saetae.

Aratrisporites parvispinosus Leschik 1955
Holotype: Leschik1955; pl. 5, figs. 2, 4; size 62.5 x 56 µm

Genus Chasmatosporites Nilsson 1958
Type Species: *Chasmatosporites major* Nilsson 1958
Locality: Schonen, Sandakra
Horizon and Age: Liassic, Late Triassic
Diagnostic Features: ± Oval to subcircular spore; monolete to half trilete; exine infrareticulate, proximally rough.

Chasmatosporites major Nilsson 1958
Holotype: Nilsson 1958; pl. 3, fig. 12; size 77 µm
Localities: Schonen, Sandakra
Horizon and Age: Liassic, Late Triassic
Diagnostic Features: Horizontally oval; size 75-80 µm; monolete extend 4/5 along longer axis; exine less than 1 µm, finely infrareticulate.

**Genus Columnisporites** Peppers 1964
Type Species: *Columnisporites ovalis* Peppers 1964
Locality: Illinois, USA
Horizon and Age: Late Pennsylvanian, Carboniferous
Diagnostic Features: Bilateral, bean shaped to ellipsoidal; probably monolete; exine thick, covered overall with three to many elevated anastomosing and branching ridges running parallel to the longer axis, in between many closely placed vertical grooves.

*Columnisporites ovalis* Peppers 1964
Holotype: Peppers 1964; pl. 1; fig. 11; size 30 x 37 µm

Localities: Illinois, USA
Horizon and Age: Late Pennsylvanian, Carboniferous
Diagnostic Features: Size 37-81 µm in longest dimension; exine 1-2 µm thick, 3-10 horizontal ridges, 2.5 µm wide x 1 µm high, vertical grooves 1 µm wide.

**Genus Denwasporites** Kumar 1999
Type Species: *Denwasporites anhonii* Kumar 1999
Locality: Anhoni Village, Chhindwara District, Madhya Pradesh, India
Horizon and Age: Denwa Formation, Late Triassic
Diagnostic Features: Bilateral, oval-concavo-convex monolete spore; exine infrapunctate.

*Denwasporites anhonii* Kumar 1999
Holotype: Kumar 1999; pl. 1, fig. 1; size 74 x 51 µm; Slide No. BSIP 12257

Localities: Anhoni Village, Chhindwara District, Madhya Pradesh, India
Horizon and Age: Denwa Formation, Late Triassic
Diagnostic Features: Size 70-80 x 50-60 µm; exine infrapunctate, folded along margin.

**Genus Ghoshiasporites** Kar 1969
Type Species: *Ghoshiasporites didecus* Kar 1969
Locality: Bore-core no. K2, 275.62-275.72 m, North Karanpura Coalfield, Bihar, India
Horizon and Age: Raniganj Formation, Late Permian
Diagnostic Features: Bilateral, oval monolete spore; exine proximally laevigate, distally sculptured with coni, spine and verrucae.

*Ghoshiasporites didecus* Kar 1969
Holotype: Kar 1969; pl. 1, fig. 10; size 61 x 50 µm; Slide No. BSIP 3331
Localities: Bore-core no K2, 275.62-275.72 µm, North Karanpura Coalfield, Bihar, India
Horizon and Age: Raniganj Formation, Late Permian
Diagnostic Features: Size 80 x 55 µm; exine 2-3 µm thick, coni 1-2 µm, mixed with spines, verrucae.

**Genus Laevigatosporites** (Ibrahim) Schopf, Wilson and Bentall 1944
Type Species: *Laevigatosporites vulgaris* Ibrahim 1933
Locality: Ruhrgebiet, Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Late Carboniferous
Diagnostic Features: Bilateral, elliptical spore; monolete mark distinct, along longer axis; exine proximally smooth, indistinctly punctate on distal face.

*Laevigatosporites vulgaris* (Ibrahim) Ibrahim 1933
Holotype: Ibrahim 1933; pl. 2, fig. 16; size 54 x 69.5 µm
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**Leschikisporites aduncus** Potonié emend. Bharadwaj and Singh 1964

*Locality:* Ruhrgebiet, Flöz Ägir, Germany  
*Horizon and Age:* Westphalian B/C, Late Carboniferous  
*Diagnostic Features:* Horizontally oval; size 35-77 µm; monolete mark weak; exine indistinctly punctate.

**Leschikisporites aduncus** Potonié emend. Bharadwaj and Singh 1964

*Holotype:* Leschik 1955; pl. 3, fig. 17; size 43 µm

**Locality:** Ruhrgebiet, Flöz Égir, Germany  
*Horizon and Age:* Westphalian B/C, Late Carboniferous  
*Diagnostic Features:* Horizontally oval; size 35-77 µm; monolete mark weak; exine indistinctly punctate.

**Genus Leschikisporis** Potonié emend. Bharadwaj and Singh 1964

*Type Species:* *Leschikisporites (Punctatosporites) aduncus* Leschik 1955

*Locality:* Neuwelt bei Basel, Switzerland  
*Horizon and Age:* Keuper, Late Triassic  
*Diagnostic Features:* Rounded to oval spore; mono- to asymmetrical trilete mark, one ray being shorter than other two; exine beset with fine granular sculpture.

**Punctatosporites minutus** Ibrahim 1933

*Holotype:* Ibrahim 1933; pl. 5, fig. 33; size 22.5 x 25.5 µm

*Locality:* Ruhrgebiet, Flöz Égir, Germany  
*Horizon and Age:* Westphalian B/C, Late Carboniferous  
*Diagnostic Features:* Horizontally oval; size 16-25 µm; exine less than 1 µm thick, grana 0.5 µm in diameter.

**Punctatosporites minutus** Ibrahim 1933

*Locality:* Ruhrgebiet, Flöz Égir, Germany  
*Horizon and Age:* Westphalian B/C, Late Carboniferous  
*Diagnostic Features:* Bilateral, oval, bean-shaped spore; faint monolete; exine thick, with sub-verrucate sculpture.

**Genus Polypodiisporites** Potonié 1934

*Type Species:* *Polypodiisporites favus* Potonié 1934

*Locality:* Vienne, Beisselsgrube, Germany  
*Horizon and Age:* Eocene  
*Diagnostic Features:* Bean shaped, notched along longer axis; size 40-55 µm; monolete mark 5-6 µm long; exine thick with sub-verrucate sculpture, 2-3 µm in diameter.

**Polypodiisporites favus** Potonié 1934

*Holotype:* Potonié 1934; pl. 1, figs. 19, 20; size 57 µm

*Locality:* Vienne, Beisselsgrube, Germany  
*Horizon and Age:* Eocene  
*Diagnostic Features:* Bean shaped, notched along longer axis; size 40-55 µm; monolete mark 5-6 µm long; exine thick with sub-verrucate sculpture, 2-3 µm in diameter.

**Genus Punctatosporites** Ibrahim 1933

*Type Species:* *Punctatosporites minutus* Ibrahim 1933

*Locality:* Ruhrgebiet, Flöz Égir, Germany  
*Horizon and Age:* Westphalian B/C, Late Carboniferous  
*Diagnostic Features:* Bilateral, oval spore; monolete; exine thin, with granular sculpture.

**Punctatosporites minutus** Ibrahim 1933

*Holotype:* Ibrahim 1933; pl. 5, fig. 33; size 22.5 x 25.5 µm

**Genus Thymospora** Wilson and Venkatachala 1963

*Type Species:* *Laevigatosporites thiessenii* (Kosanke) Wilson and Venkatachala 1963

*Locality:* Pennsylvania, USA  
*Horizon and Age:* Late Carboniferous – Permian  
*Diagnostic Features:* Oval to bean shaped spore; simple monolete; exine 1-2 µm thick, verrucose, obvermiculate to rugose.
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Thymospora thiessenii Wilson and Venkatachala 1963
Holotype: Wilson and Venkatachala 1963; pl. 1, fig. 1; size 18 µm

Locality: Pennsylvania, USA
Horizon and Age: Late Carboniferous-Permian
Diagnostic Features: Size 18-44 µm; exine 1-2 µm thick, verrucose, verrucae 1-2 µm in diameter.

Thymospora gondwanensis Bharadwaj and Salujha 1964
Holotype: Bharadwaj 1962; pl. 5, fig. 80; size 28 µm

Locality: Raniganj Coalfield, West Bengal, India
Horizon and Age: Raniganj Formation, Late Permian
Diagnostic Features: Size 22-34 µm; monolete up to 3/4 of length; exine beset with verrucae, 2 µm broad, sharp tipped, 25-35 verrucae on periphery.

Thymospora cerebrata Venkatachala and Rawat 1978
Holotype: Venkatachala and Rawat 1978, pl. 1, fig. 27; size 30 x 40 µm
Locality: Purnea Basin, Bihar, India
Horizon and Age: Early Triassic
Diagnostic Features: Size 36 x 40 x 48 µm; monolete extend more than 1/2 in length; exine 4 µm thick, proximally granulose, distally low verrucae forming pseudoreticulum.

SIMPLE TRILETE SPORE

Genus Alsophilidites (Cookson) Potonié 1954
Type Species: Alsophilidites keruelensis Cookson 1947
Locality: Cumberland Bay, Kerguelen-Archipelago
Horizon and Age: Tertiary
Diagnostic Features: Size 34.5-61 x 32-61 µm; sub-triangular; faint trilete, rays reach up to equator; exine thin, smooth.

Alsophilidites densus Singh, Srivastava and Roy 1964
Holotype: Singh, Srivastava and Roy 1964; pl. 2, fig. 15; size 80 µm; Slide No. BSIP 1790

Locality: Umia beds, Cutch, India
Horizon and Age: Wealden, Early Cretaceous
Diagnostic Features: Size 60-80 µm; subtriangular with broadly rounded apex; rays extend up to equator; exine thick, infrapunctate.

Genus Anapiculatisporites Potonié and Kremp 1954
Type Species: Anapiculatisporites isselburgensis Potonié and Kremp 1954
Locality: Ruhrgebiet, Bohrung Isselburg, Germany
Horizon and Age: Lower Westphalian B, Carboniferous
Diagnostic Features: Sub-rounded spore; trilete distinct, rays reaching up to equator; exine proximally smooth, beset with coni on distal face and equator.

Anapiculatisporites isselburgensis Potonié and Kremp 1954
Holotype: Potonié and Kremp 1954; pl. 20, fig. 97; size 56 µm
Locality: Ruhrgebiet, Bohrung Isselburg, Germany
Horizon and Age: Lower Westphalian B, Late Carboniferous
Diagnostic Features: Size 50-80 µm; exine proximally smooth, ± 25 coni on distal face and equator.

**Genus Apiculatisporis** Potonié and Kremp 1956
Type Species: *Apiculatisporis aculeatus* (Ibrahim) Potonié and Kremp 1956
Locality: Ruhrgebiet, Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Late Carboniferous
Diagnostic Features: Circular spore; trilete indistinct; exine sculptured with small coni.

*Apiculatisporis aculeatus* (Ibrahim) Potonié 1956
Holotype: Ibrahim 1933; pl. 6, fig. 57; size 53 µm

Locality: Ruhrgebiet, Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Late Carboniferous
Diagnostic Features: Size 48-53 µm; trilete faint, rays end curvaturate; exine thick, smooth to finely punctuate.

**Genus Aulisporites** Leschik emend. Klaus 1960
Type Species: *Aulisporites canalis* Leschik 1955
Locality: Neuewelt bei Basal, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Size 43-63 µm; oval spore; trilete faint, one ray smaller, 4-5 µm than other two, contact area 10 µm in diameter; exine 1.5 µm thick, smooth to finely punctuate.

**Genus Baculatisporites** Thomson and Pflug 1953
Type Species: *Baculatisporites primarius* Wolff 1934
Locality: Grube Freigericht bei Dettingen, Germany
Horizon and Age: Pliocene, Tertiary
Diagnostic Features: Circular spore; trilete distinct, rays extend up to equator; exine beset with small bacula and coni.

*Baculatisporites primarius* Wolff 1934
Holotype: Wolff 1934; pl. 4, fig. 8; size 47 µm

Locality: Grube Freigericht bei Dettingen, Germany
Horizon and Age: Pliocene, Tertiary
Diagnostic Features: Size 20-70 µm; exine beset with 3 µm long x 1 µm wide bacula and coni.

*Baculatisporites clavaeoides* Sah and Jain 1965
Holotype: Sah and Jain 1965; pl. 1, fig. 28; size 68 µm; Slide No. BSIP 3110-3/4

Locality: Sakrigalighat, Rajmahal Hills, Bihar, India
Horizon and Age: Bajocian to Oxfordian, Jurassic
Diagnostic Features: Size 50-68 µm; trilete distinct, rays 3/4 of radius; exine 1.5-2 µm thick, densely baculate, bacula 2-3 µm long x 1 µm wide with rounded to truncate apex.

**Genus Biretisporites** Delcourt and Sprumont emend. Delcourt, Dettmann and Hughes 1963
Type Species: *Biretisporites potoniaei* Delcourt and Sprumont 1955
Locality: Hainaut, Belgium
Horizon and Age: Wealdien, Early Cretaceous
Diagnostic Features: Approximately triangular spore; trilete distinct, rays small, narrow, prominent ridge encircling rays ends along the equator; exine thick, faintly scabrate to smooth.

*Biretisporites potoniaei* Delcourt and Sprumont 1955
Holotype: Delcourt and Sprumont 1955; pl. 41, fig. 10; size 99.5 x 53.1 µm

**Genus Cadargasporites** de Jersey and Paten emend. Reiser and Williams 1969
Type Species: *Cadargasporites baculatus* de Jersey and Paten 1964
Locality: Charleys Creek, Scout Bore No.19, 70-80 ft, Queensland, Australia
Horizon and Age: Jurassic
Diagnostic Features: Circular to sub-circular spore; trilete distinct, rays extending up to margin; exine thin except a sharply defined contact area on proximal face around the laesurae, sculptured with granulate, reticulate, verrucate, spinulate pattern allover the body.

*Cadar gasporites baculatus* de Jersey and Paten 1964
Holotype: de Jersey and Paten 1964; pl. 2, fig. 5; size 71 µm

**Genus Calamospora** Schopf in Schopf, Wilson and Bentall 1944
Type Species: *Calamospora hartungiana* Schopf in Schopf, Wilson and Bentall 1944
Locality: Illinois, Vermilion County, Salt Fork, NW Faimont, USA
Horizon and Age: Palaeozoic
Diagnostic Features: Spherical spore with crescentic folds; trilete rays short, less than 1/2 spore radius; exine less than 2 µm thick, smooth, minutely granulate-rugose.

*Calamospora hartungiana* Schopf in Schopf, Wilson and Bentall 1944
Holotype: Schopf in Schopf, Wilson and Bentall 1944, pl. 51, fig. 1; size 100 µm
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Locality: Illinois, Vermilion County, Salt Fork, NW Faimont, USA

Horizon and Age: Palaeozoic
Diagnostic Features: Size 80-100 µm; exine much folded; trilete rays about 1/4 of radius; exine less than 1 µm thick, smooth to minutely granulate.

**Genus Callumispora** Bharadwaj and Srivastava emend. Tiwari, Srivastava, Tripathi and Vijaya 1989

Type Species: *Callumispora barakarenensis* Bharadwaj and Srivastava 1969
Locality: Nandira Colliery, Talcher Coalfield, Orissa, India
Horizon and Age: Barakar Formation, Early Permian
Diagnostic Features: Radial spore; trilete mark with distinct labra; exine laevigate, infrapunctate structured.

*Callumispora barakarenensis* Bharadwaj and Srivastava emend. Tiwari, Srivastava, Tripathi and Vijaya 1989
Holotype: Bharadwaj and Srivastava 1969; pl. 1, fig. 1; size 117 µm; Slide No. BSIP 2904
Locality: Nandira Colliery, Talcher Coalfield, Orissa, India
Horizon and Age: Barakar Formation, Early Permian
Diagnostic Features: Size 88-140 µm; subcircular; trilete rays 1/2 - 3/4 of radius; exine 4-6 µm thick, stratified, laevigate to infrapunctate, microverrucose in inter-ray area.

*Callumispora fungosa* (Balme) Bharadwaj and Srivastava 1969

Holotype: *Punctatisporites fungosus* Balme 1963; pl. 4, fig. 10; size 114 µm
Locality: Well at point 217, Upper Greenough River area, Sample 44070, Western Australia
Horizon and Age: Kockatea Shale, Early Triassic
Diagnostic Features: Size 83-119 µm; exine 6-7 µm thick, infrapunctate with irregularly dispersed shallow pits, less than 1 µm, forming anastomosing channels.

*Callumispora magna* Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 1, fig. 6; size 160 µm; Slide No. BSIP 5975
Locality: Eastern bank of Janar Nala about 2 km southeast of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 100-160 µm; circular to subcircular; exine 1-2 µm thick with small puncta and sparse microverrucae, 1-2.5 µm in diameter, frequently associated with distinct folds.

**Genus Carnisporites** Mädler 1964

Type Species: *Carnisporites (Retusotriletes) mesozoicus* Klaus 1960
Locality: Sphaerosiderit ausdem Bergbau Seekopf bei Lunz, Austria
Horizon and Age: Carnian, Late Triassic
Diagnostic Features: Roundly circular spore; trilete rays extending up to equator to form perfect curvaturae; exine scabrate, infraguanulose, proximally smooth in contact area.
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Carnisporites mesozoicus (Klaus) Mädler 1964
Holotype: Klaus1960; pl. 28, fig. 6; size 45 µm

Locality: Sphaerosiderite aus dem Bergbau Seekopf bei Lunz, Austria
Horizon and Age: Carnian, Late Triassic
Diagnostic Features: Size 35-55 µm; exine ±3 µm thick; trilete rays thick-lipped forming perfect curvatureae; exine scabrate, infragranulose, proximally smooth in contact area.

Carnisporites raniganjensis Tiwari and Rana 1980
Holotype: Tiwari and Rana 1980; pl. 1, figs. 12, 13; size 60 µm; Slide No. BSIP 5557

Locality: Borehole no. RNM-4, sample no. 5, Depth 59 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Size 60-72 µm; exine 5 µm thick; trilete rays 4/5 of the radius, associated with 5-7 µm wide labra, ends forming 5 -7 µm wide well-marked arcuate rim, contact area finely infragranulose.

Ceratosporites equalis Cookson and Dettmann 1958
Holotype: Cookson and Dettmann 1958; pl. 14, figs. 17-19; size 36 µm

Locality: Wonthaggi State Coal Mine area, S. Australia
Horizon and Age: Cretaceous
Diagnostic Features: Convexly triangular; size 36-50 µm; trilete rays thick lipped; exine sculptured with blunt headed bacula, ± 1 µm broad x 3-4 µm long.

Genus Clavatisporites Kedves and Simoncsics 1964
Type Species: Clavatisporites clarus Kedves and Simoncsics 1964
Locality: Urkut, Hungary
Horizon and Age: Jurassic
Diagnostic Features: Subtriangular-circular spore; trilete distinct, rays reaching up to ± 2/3 equator; exine thick, beset with clava.

Clavatisporites clarus Kedves and Simoncsics 1964
Holotype: Kedves and Simoncsics 1964; pl. 8, fig. 10; size 50 µm

Locality: Urkut, Hungary
Horizon and Age: Jurassic
Diagnostic Features: Broadly subtriangular to sub-circular spore; trilete rays extend up to equator; exine ± 1 µm thick, clava ± 1 µm broad at base x 2-3 µm high.

Genus Clavatriletes Herbst 1965
Type Species: Clavatriletes hammenii Herbst 1965
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Localities: Son Juan Province, Argentina
Horizon and Age: Norian, Late Triassic
Diagnostic Features: Triangular to roundly triangular spore; trilete distinct, rays extend up to equator; exine thick, sculptured with big clavae.

*Clavatrilletes hammenii* Herbst 1965
Holotype: Herbst 1965; pl. 2, figs. 14, 15; size 45 µm
Locality: Son Juan Province, Argentina

Localities: Son Juan Province, Argentina
Horizon and Age: Norian, Late Triassic
Diagnostic Features: More or less triangular; size 39-47 µm; trilete ray do not reach equator, slightly thickened; exine 2.5 µm thick, covered with clavae, often densely distributed and touch at the tips; clavae 4.5-7 µm long x 2.8-3.7 µm wide.

*Clavatrilletes pseudocingulatus* Venkatachala and Rawat 1978
Holotype: Venkatachala and Rawat 1978; pl. 1, fig. 12; size 40 µm
Locality: Purnea Well, Purnea, Bihar, India
Horizon and Age: Early Triassic
Diagnostic Features: Roundly triangular; size 40-42 µm; contact area laevigate-scabrate; sculptural elements clavae 4-8 µm long x 3 µm wide, arising from outer limit of contact-area, distally clavae short-stalked, forming reticulum.

Genus *Conbaculatisporites* Klaus 1960
Type Species: *Conbaculatisporites mesozoicus* Klaus 1960
Locality: Salzbergwerk Hallein-Durnberg bei Salzburg Knorr-Schachtricht, 44 m nach Sprengmittel-magazin, Austria
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Size 39-48 µm; trilete rays 2/3 of spore radius; exine baculate, bacula on both faces, ± 1 x 2 µm in size.

Genus *Concavissimisporites* Delcourt and Sprumont emend. Dettmann 1963
Type Species: *Concavissimisporites verrucosus* Delcourt and Sprumont 1955
Locality: Hainaut, Belgium
Horizon and Age: Wealden, Early Cretaceous
Diagnostic Features: Triangular spore, broad and rounded apex with concave inter-radial sides; trilete distinct, rays 2/3 of radius; exine sculptured with verrucae of varied size and shape.

*Concavissimisporites verrucosus* Delcourt and Sprumont 1955
Holotype: Delcourt and Sprumont 1955; pl. 2, fig. 1; size 90 µm

Localities: Hainaut, Belgium
Horizon and Age: Wealden, Early Cretaceous
Diagnostic Features: Size 40-45 µm; broadly triangular; trilete rays 2/3 of radius; exine verrucose, verrucae 1.5-2 µm.

*Concavissimisporites subverrucosus* Venkatachala 1969
Holotype: Venkatachala 1969; pl. 1, fig. 17; size 70 x 80 µm; Slide No. BSIP Bha 8/2

Locality: Pur river section, near Bhuj, Kutch, India
Horizon and Age: Bhuj Formation, Early Cretaceous
Diagnostic Features: Size 80-100 µm; trilete rays 3/4 of radius; exine 4-6 µm thick, sculptured with low verrucae.

Genus Converrucosisporites Potonié and Kremp 1954
Type Species: Converrucosisporites (Verrucosisporites) triquetrus (Ibrahim) Potonié and Kremp 1954
Locality: Ruhrgebiet, Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Late Carboniferous
Diagnostic Features: Sub-triangular spore; trilete distinct; exine sculptured with verrucae of varied size and shape.

Converrucosisporites triquetrus (Ibrahim) Potonié and Kremp 1954
Holotype: Ibrahim 1933; pl. 7, fig. 61; size 38.5 x 42.5 µm

Locality: Ruhrgebiet, Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Late Carboniferous
Diagnostic Features: Size 38.5-58.5 µm; trilete rays extend up to equator; exine sculptured with 3-4 µm big verrucae, projected.

Genus Convertubisporites Banerji and Maheshwari 1975
Type Species: Convertubisporites contactus Banerji and Maheshwari 1975

Localities: South bank of Sukri River, 0.8 km from Kaima, Auranga Coalfield, Bihar, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Subcircular to subtriangular spore; trilete distinct, rays extending up to 2/3 of radius; exine predominantly sculptured with tubercles, coni and verrucae all over and weekly developed in inter-ray area.

Convertubisporites contactus Banerji and Maheshwari 1975
Holotype: Banerji and Maheshwari 1975; pl. 1, fig. 11; size 67 x 75 µm; Slide No. BSIP 4703-7

Localities: South bank of Sukri River, 0.8 km from Kaima, Auranga Coalfield, Bihar, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 60-80 µm; exine densely tuberculate, tubercles 2.3 µm long x 1 µm wide, 45-55 in number.

Convertubisporites densus Banerji and Maheshwari 1975
Holotype: Banerji and Maheshwari 1975; pl. 1, fig. 8; size 70 µm; Slide No. BSIP 4691-15

Localities: South bank of Sukri River, 0.8 km from Kaima, Auranga Coalfield, Bihar, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 70-88 µm; exine 1-2 µm thick, ornamented with tubercles, verrucae and coni, closely placed and equally strong.

Convertubisporites variabilis Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 3, fig. 13; size 60 µm; Slide No. BSIP 5954

Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 50-72µm; trilete rays sometimes associated with membranous lips; exine 1-2 µm thick, sometimes sculptural elements at equator associated with papillae, elements less than 0.5 µm apart, 2-4 µm long x 1.2 µm wide.

Genus Convolutispora Hoffmeister, Staplin and Malloy 1955
Type Species: Convolutispora florida Hoffmeister, Staplin and Malloy 1955
Locality: Illinois, USA
Horizon and Age: Hardinsburg Formation, Mississippian
Diagnostic Features: Circular to subcircular spore; trilete rays up to 3/4 of equator; exine 2-3 µm thick, ornamented with overlapping verruculate ridge like processes, closely anastomosing muri forming incomplete, coarse reticulum on surface.

Convolutispora florida Hoffmeister, Staplin and Malloy 1955
Holotype: Hoffmeister, Staplin and Malloy 1955; pl. 38, figs. 5-6; size 49 µm

Locality: Illinois, USA
Horizon and Age: Hardinsburg Formation, Mississippian
Diagnostic Features: Size 39-50 µm; circular to subcircular spore; trilete rays up to 3/4 of equator; exine 2-3 µm thick, ornamented with closely anastomosing, coarse oververmiculate, convoluted ridges on surface, ridges 2.8 - 6.3 µm wide.

Convolutispora perfecta Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 3, fig. 13; size 78 µm; Slide No. BSIP 5966

Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic: Size 61-78 µm; exine 2-3 µm thick, ornamented with anastomosing muri forming an imperfect reticulum, 1-2 µm wide lumina, muri 2-3.5 µm broad, 3-5 µm high, projecting beyond equatorial margin in polar view.

Genus Craterisporites de Jersey 1970
Type Species: Craterisporites rotundus de Jersey 1970
Locality: N.S. 272, 1600 ft, Moreton Basin, Queensland, Australia
Horizon and Age: Raceview Formation, Late Triassic
Diagnostic Features: Subcircular to convexly subtriangular spore; trilete indistinct due to sculpture, rays thick lipped, extend up to equator; exine proximally smooth, on distal face and equator sculptured dominantly with ring shaped projections, regularly distributed.

Craterisporites rotundus de Jersey 1970
Holotype: de Jersey 1970; pl. 1, fig. 8; size 37 µm
Archana Tripathi, Vijaya and Ram-Awatar

Locality: N.S. 272, 1600 ft, Moreton Basin, Queensland, Australia
Horizon and Age: Raceview Formation, Late Triassic
Diagnostic Features: Size 33-53 µm; trilete rays lipped, 1.5-2 µm thick; ring projections 2.5-7 µm in basal diameter, 1.5-2 µm high.

**Genus Cyathidites** Couper 1953
Type Species: *Cyathidites australis* Couper 1953
Locality: Ohika beds L12 (type); Garvey Creek Hawks Crag breccia L55; Paparoa beds, L1, 27, New Zealand
Horizon and Age: Jurassic to Early Cretaceous
Diagnostic Features: Subtriangular spore with broadly rounded apices, concave sides; trilete distinct, rays 2/3 of radius; exine psilate to indistinctly scabrate.

*Cyathidites australis* Couper 1953
Holotype: Couper 1953; pl. 2, figs. 11, 12; size 60 µm

Locality: Ohika beds L12 (type); Garvey Creek Hawks Crag breccia L55; Paparoa beds, L1, 27, New Zealand
Horizon and Age: Jurassic to Early Cretaceous
Diagnostic Features: Size 54-77 µm; broadly sub-triangular with deeply concave inter-radial sides; trilete rays extend up to 4/5 of radius; exine less than 1 µm thick, feebly scabrate.

*Cyathidites distinctus* Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 2, fig. 3; size 60 µm; Slide No. BSIP 5914

**Genus Cyclogranisporites** Potonié and Kremp 1954
Type Species: *Cyclogranisporites (Granulatisporites) leopoldi* (Kremp) Potonié and Kremp 1954
Locality: Ruhrgebiet, Flöz Ágir, Germany
Horizon and Age: Wesphalian B/C, Late Carboniferous
Diagnostic Features: Size 25-35 µm; exine beset with grana allover, grana size less than 1 µm, about 65 grana on periphery.

*Cyclogranisporites leopoldi* (Kremp) Potonié and Kremp 1954
Holotype: Potonié and Kremp 1954; pl. 20, fig. 103; size 33 µm

Locality: Ruhrgebiet, Flöz Ágir, Germany
Horizon and Age: Wesphalian B/C, Late Carboniferous
Diagnostic Features: Size 25-35 µm; exine beset with grana allover, grana size less than 1 µm, about 65 grana on periphery.

*Cyclogranisporites triletus* Kar 1970
Holotype: Kar 1970; pl. 1, fig. 13; size 60 µm; Slide No. BSIP 3463

Locality: Boré-coré No. RE9, depth 83 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 45-70 µm; trilete rays broad, well developed; exine granulose, grana closely placed.

*Cyclogranisporites distinctus* Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 2, fig. 3; size 60 µm; Slide No. BSIP 5914
Locality: Eastern bank of Janar Nala about 2 km southeast of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 53-65 µm; exine 1.5-2 µm thick, grana ± 1 µm in diameter, closely spaced, uniformly disposed forming a negative reticulum.

**Genus Cyclotriletes** Mädler 1964
Type Species: *Cyclotriletes granulatus* Mädler 1964
Locality: Jena, Thuringia, Germany
Horizon and Age: Buntsandstein, Early Triassic
Diagnostic Features: Circular spore; trilete rays without curvatura; exine thick beset with variable small grana and coni.

*Cyclotriletes granulatus* Mädler 1964
Holotype: Mädler 1964; pl. 1, fig. 4; size 74 µm

Locality: Jena, Thuringia, Germany
Horizon and Age: Buntsandstein, Early Triassic
Diagnostic Features: Size 55-75 µm; trilete rays without curvatura; exine ± 2 µm thick beset with 3-4 µm big grana and coni.

**Genus Decisporis** Kar 1970
Type Species: *Decisporis variabilis* Kar 1970
Locality: Bore-core No. RE9, depth 84 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Triangular-subtriangular spore; with or without inner body; trilete well developed; exine laevigate proximally, variously sculptured with grana, microverrucae, coni, spines, bacula on distal face; exoeine may form incipient flange in some cases.

*Decisporis variabilis* Kar 1970
Holotype: Kar 1970; pl. 1, fig. 18; size 47 µm; Slide No. BSIP 3477

Locality: Bore-core No. RE9, depth 82.5 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 40-62 µm; exine 2.5 µm thick, distally closely sculptured with grana and microverrucae.

*Decisporis panchetensis* Kar 1970
Holotype: Kar 1970; pl. 1, fig. 22; size 50 µm; Slide No. BSIP 3475

Locality: Bore-core No. RE9, depth 82.5 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 38-56 µm; trilete rays sinuous, extending up to equator; exine proximally laevigate, distally sculptured mostly with spines; interspinal space granulose-microverrucate.

*Decisporis rudis* Kar 1970
Holotype: Kar 1970; pl. 1, fig. 20; size 54 µm; Slide No. BSIP 3471

Locality: Bore-core No. RE9, depth 82.5 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Archanathripathi, Vijaya and Ram-Awatar

Diagnostic Features: Size 45-65 µm; exine distally variously sculptured, minutely folded to appear as rugose; exoexine generally forms an incipient, inconsistent flange.

**Genus Deltidospora** Miner emend. Potonié 1956

*Type Species: Deltidospora hallii* Miner 1935

*Locality*: Casade County, Montana, Greenland

*Horizon and Age*: Kootenai Formation, Cretaceous

*Diagnostic Features*: Triangular to deltoid sporangium; trilete rays extend 2/3 of radius, inter-radial sides concave to convex; exine smooth.

*Deltidospora hallii* Miner 1935

*Holotype*: Miner 1935; pl. 24; fig. 7; size 30 µm

**Locality**: Casade County, Montona, Greenland

*Horizon and Age*: Kootenai Formation, Cretaceous

*Diagnostic Features*: Size 33-39 µm; deltoid-triangular spore; trilete simple, rays extend 2/3 of radius; exine smooth, less than 1 µm thick.

**Genus Dictyophyllidites** Couper emend. Dettmann 1963

*Type Species*: *Dictyophyllidites harrisii* Couper 1958

*Locality*: Yorkshire, Grishorpe Beds, UK

*Horizon and Age*: Bajocian, Middle Jurassic

*Diagnostic Features*: Triangular spore; trilete distinct, thickened along rays, elevated lips, extending 3/4 of radius; exine ±2 µm thick, smooth to faintly patterned.

*Dictyophyllidites harrisii* Couper 1958

*Holotype*: Couper 1958; pl. 21, fig. 6; size 50 µm

**Locality**: Yorkshire, Grishorpe Beds, UK

*Horizon and Age*: Bajocian, Middle Jurassic

*Diagnostic Features*: Size 40-68 µm; exine sculptured with verrucae, grana around haptotypic mark, laevigate in rest area.

*Dictyophyllidites decus* Kar 1970

*Holotype*: Kar 1970; pl. 1, fig. 2; size 50 µm; Slide No. BSIP 3461

*Locality*: Bore-core No. RE9, depth 82.5 m, Raniganj Coalfield, West Bengal, India

*Horizon and Age*: Panchet Formation, Early Triassic

*Diagnostic Features*: Size 40-68 µm; exine sculptured with verrucae, grana around haptotypic mark, laevigate in rest area.

*Dictyophyllidites glutinous* Maheshwari and Banerji 1975

*Holotype*: Maheshwari and Banerji 1975; pl. 1, fig. 3; size 62 µm; Slide No. BSIP 4588-19

*Locality*: North-western branch of Nonia Nala, East of Kumarpur, District Burdwan, West Bengal, India

*Horizon and Age*: Panchet Formation, Early Triassic

*Diagnostic Features*: Size 40-68 µm; exine sculptured with verrucae, grana around haptotypic mark, laevigate in rest area.

**Genus Dictyotriletes** Naumova emend. Potonié and Kremp 1954

*Type Species*: *Dictyotriletes (Sporonites) bireticulatus* (Ibrahim) Potonié and Kremp 1955

*Locality*: Ruhrgebiet, Flöz Ägir, Germany

*Horizon and Age*: Westphalian B/C, Carboniferous
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Diagnostic Features: Broadly triangular spore; trilete indistinct due to reticulum; lumen with high muri on exine surface, outline irregular.

Dictyotritletes bireticulatus (Ibrahim) Potonié and Kremp 1955
Holotype: Potonié and Kremp 1955; pl. 16, fig. 296; size 57.5 µm

Locality: Ruhrgebiet, Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Carboniferous

Diagnostic Features: Size 40-60 µm; trilete rays 2/3 radius long; exine surface with 7-15 µm wide lumen, 1-1.5 µm high muri and outline irregular.

Genus Dictyotosporites Cookson and Dettmann 1958
Type Species: Dictyotosporites speciosus Cookson and Dettmann 1958
Locality: Victoria, Wonthaggi State, Coal Mine Area, Australia
Horizon and Age: Pre-Albian, Early Cretaceous
Diagnostic Features: Broadly subtriangular to circular spore; trilete distinct, sometimes invisible due to sculpture; exine thick, surface reticulum composed of terminal branches, discrete or coalescent, elevated all over.

Dictyotosporites speciosus Cookson and Dettmann 1958
Holotype: Cookson and Dettmann 1958; pl. 16, fig. 5; size 43 µm

Locality: Victoria, Wonthaggi State, Coal Mine Area, Australia
Horizon and Age: Pre-Albian, Early Cretaceous
Diagnostic Features: Size 40-50 µm; subcircular; trilete rays associated with thickening; exine 2-3 µm thick; muri ± 1 µm thick enclosing 1-3 µm wide lumen.

Genus Divaripunctites Kar 1970
Type Species: Divaripunctites globosus Kar 1970
Locality: Bore-core No. RE9, depth 82.5 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Circular to subcircular spore; trilete strongly developed; exine proximally punctate, distally laevigate with or without folds.

Divaripunctites bifurcatus Banerji and Maheshwari 1975
Holotype: Banerji and Maheshwari 1975; pl. 1, fig. 4; size 70 µm; Slide No. BSIP 4700-6

Locality: South bank of Sukri River, 0.8 km from Kaima, Auranga Coalfield, Bihar, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 55-75 µm; trilete distinct, rays bifurcate at the ends; exine 1 µm thick, proximally punctate, generally with microfolds on distal face.

Divaripunctites globosus Kar 1970
Holotype: Kar 1970; pl. 1, figs. 6a-6b; size 62 µm; Slide No. BSIP 3472

Locality: Bore-core No. RE9, depth 82.5 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
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Diagnostic Features: Size 45-70 µm; trilete rays 3-10 µm long; exine 2-4 µm thick, proximally punc-
tate, distally laevigate.

Divaripunctites plicatus Kar 1970
Holotype: Kar 1970; pl. 1, figs. 9a-9b; size 50 µm;
Slide No. BSIP 3464

Locality: Bore-core No. RE9, depth 83 m, Raniganj
Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic

Genus Dubrajisporites Tiwari and Tripathi 1987
Type Species: Dubrajisporites triassicus Tiwari and
Tripathi 1987
Locality: Borehole RJR-2, sample No. 32, depth
398.20-398.99 m, near Kazigaon, Rajmahal
Basin, Bihar, India
Horizon and Age: Dubrajpur Formation, Late Triassic
Diagnostic Features: Size 40-65 µm; exine up to 1.5
µm thick, distally laevigate, much folded.

Dubrajisporites triassicus Tiwari and Tripathi 1987
Holotype: Tiwari and Tripathi 1987; figs. 8A-D; size
71.5 µm; Slide No. BSIP 9323

Locality: Borehole RJR-2, sample no. 32, depth
398.20-398.99 m, near Kazigaon, Rajmahal
Basin, Bihar, India
Horizon and Age: Dubrajpur Formation, Late Triassic
Diagnostic Features: Size 66-90 µm; exine 2-4 µm
thick, sculptured with coarse reticulum, lumina 13-
20 µm wide, larger sculptural elements 6-8 µm
long x 2.5-4.0 µm wide, smaller elements 1-5 µm
long x 1-2.5 µm wide.

Dubrajisporites bulbosus Tiwari and Tripathi 1987
Holotype: Tiwari and Tripathi 1987; fig. 10 A; size 83
µm; Slide No. BSIP 9321

Locality: Borehole RJR-2, sample No. 32, depth
398.20-398.99 m, near Kazigaon, Rajmahal
Basin, Bihar, India
Horizon and Age: Dubrajpur Formation, Late Triassic
Diagnostic Features: Size 63-81 µm; exine 2-3 µm
thick, lumina 8-20 µm, sculptural elements fin-
ger-shaped and round-headed spines and proc-
esses with simple or lobed tips, larger elements 6-
12 µm long x 3.5-5 µm wide, smaller elements 2.5-
6 µm long x 1.5-5 µm wide, muri enclosing large,
straight or curved process, may be bi-to tetra
lobed.

Dubrajisporites isolatus Tripathi, Tiwari and Kumar
1990
Holotype: Tripathi, Tiwari and Kumar 1990; pl. 1,
fig. 20; size 65 µm; Slide No. BSIP 9323
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Locality: Borehole RJR-2, sample no. 32, depth 398.20-398.99 m, near Kazigaon, Rajmahal Basin, Bihar, India
Horizon and Age: Dubrajpur Formation, Late Triassic
Diagnostic Features: Size 53-68.5 µm; exine sculptured all over with isolated coni, spines and verrucae, arranged in reticuloid pattern to enclose polygonal areas, sculptural elements in polygonal areas 2-5.5 µm long x 1-4.5 µm wide at the base.

*Dubrajisporites unicus* Tripathi, Tiwari and Kumar 1990
Holotype: Tripathi, Tiwari and Kumar 1990; pl. 1, fig. 18; size 58.0 µm; Slide No. BSIP 9323

Locality: Borehole RJR-2, sample no. 32, depth 398.20-398.99 m, near Kazigaon, Rajmahal Basin, Bihar, India
Horizon and Age: Dubrajpur Formation, Late Triassic
Diagnostic Features: Size 58-81 µm; exine 2-3 µm thick, bigger sculptural elements 4-7 µm long x 1.5-3 µm wide, smaller elements 1.5-2.5 µm long x 1-2.5 µm wide.

Genus *Eupunctisporites* Bharadwaj 1962
Type Species: *Eupunctisporites poniatiensis* Bharadwaj 1962
Locality: Poniati Seam, Poniati Mine, East Raniganj Coalfield, West Bengal, India
Horizon and Age: Raniganj Formation, Late Permian
Diagnostic Features: Circular spor; trilete distinct, rays lips elevated; exine 4-6 µm thick, distinctly punctate, puncta ± 1 µm, irregularly shaped, 2-3 µm apart.

*Eupunctisporites poniatiensis* Bharadwaj 1962
Holotype: Bharadwaj 1962; pl. 1, fig. 4; size 90 µm

Locality: North-western branch of Nonia Nala, East of Kumarpur, District Burdwan, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 60-73 µm; exine thin, puncta ± 1 µm, folds present on the surface.

Genus *Foveosporites* Balme 1957
Type Species: *Foveosporites canalis* Balme 1957
Locality: Murphy’s Shaft near Donnybrook, Perth Basin, Western Australia
Horizon and Age: Donnybrook Sandstone, Early Cretaceous (?)
Diagnostic Features: Circular to roundly triangular; trilete rays extend up to periphery; exine 2 µm thick, ornamented with irregularly disposed pits or short channels.

*Foveosporites canalis* Balme 1957
Holotype: Balme 1957; pl. 1, fig. 15; size 34 µm
Archana Tripathi, Vijaya and Ram-Awatar

Locality: Murphy’s Shaft near Donnybrook, Perth Basin, Western Australia
Horizon and Age: Donnybrook Sandstone, Early Cretaceous (?)
Diagnostic Features: Size 30-37 µm; roundly triangular with convex sides; trilete rays with raised lips; exine 2 µm thick, ornamented all over with irregularly disposed pits of ± 1 µm diameter, may coalesce to form short channels.

_Foveosporites triassicus_ Kumaran and Maheshwari 1980

Holotype: Kumaran and Maheshwari 1980; pl. 4, fig. 1; size 78 µm; Slide No. BSIP 5991
Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 65-80 µm; exine 1.5 µm thick, foveolae ± 1.5 µm, densely placed.

**Genus** Gabonisporis Boltenhagen 1967
Type Species: _Gabonisporis vigourouxii_ Boltenhagen 1967
Locality: Gabon, Pointe-Clairette, Africa
Horizon and Age: Senomanian, Late Cretaceous
Diagnostic Features: Subtriangular to subspherical spore; trilete distinct to invisible due to sculpatures, rays thick lipped extended up to 3/4 of radius; perine present, ornamented with setae and bacula.

_Gabonisporis vigourouxii_ Boltenhagen 1967
Holotype: Boltenhagen 1967; pl. 1, fig. 1; size 35 µm

Locality: Gabon, Pointe-Clairette, Africa
Horizon and Age: Senomanian, Late Cretaceous
Diagnostic Features: Size 30-45 µm; subspherical spore; perine ornamented with setae, bacula (papillae), 4-7 µm long, forming negative reticulum on surface.

_Gabonisporis papillosus_ Tripathi, Tiwari and Kumar 1990
Holotype: Tripathi, Tiwari and Kumar 1990; pl. 1, fig. 9; size 70 µm; Slide No. BSIP 9322
Locality: Borehole RJR-2, sample no. 32, depth 398.20-398.99 m, near Kazigaon, Rajmahal Basin, Bihar, India
Horizon and Age: Dubrajpur Formation, Late Triassic
Diagnostic Features: Size 70-90 µm; perisporial covering frilly, enveloping the body completely or sometimes leaving the contact area free; densely ornamented with tongue shaped papillae, verrucae, 1-3 µm in size.

**Genus** Grandispora Hoffmeister, Staplin and Malloy 1955
Type Species: _Grandispora spinosa_ Hoffmeister, Staplin and Malloy 1955
Locality: Kentucky, Webster County, USA
Horizon and Age: Hardingsburg Formation, Late Mississippian, Carboniferous
Diagnostic Features: Circular spore; trilete mark weak, rays reaching up to the body equator; central body enclosed in a bladder; body exine and bladder, both laegivate? or punctuate to granulose with small scattered spines.

_Grandispora spinosa_ Hoffmeister, Staplin and Malloy 1955
Holotype: Hoffmeister, Staplin and Malloy 1955; pl. 39, fig. 10; size 118 µm
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**Genus Granulatisporites** Ibrahim 1933 emend. Potonié and Kremp 1954
Type Species: **Granulatisporites granulatus** Ibrahim 1933
Locality: Ruhrgebiet, Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Late Carboniferous
Diagnostic Features: Subtriangular spore; trilete distinct to indistinct, rays extend up to the equator; exine thick, beset with grana.

**Granulatisporites granulatus** Ibrahim 1933
Holotype: Ibrahim 1933; pl. 6, fig. 51; size 30 x 31 µm

**Genus Guttatisporites** Visscher 1966
Type Species: **Guttatisporites guttatus** Visscher 1966
Locality: Boring 31, K.N.Z., Hengelo, depth 405.50 m (Röt salinar), The Netherlands
Horizon and Age: Upper Bunter, Early Triassic
Diagnostic Features: Circular to subtriangular spore; trilete distinct, rays extend up to the equator; exine covered with irregularly shaped verrucae, elements polygonal to crenulate.

**Guttatisporites guttatus** Visscher 1966
Holotype: Visscher 1966; pl. 2, figs. 1A, B; size 95 µm

**Guttatisporites ambiguus** Tiwari and Rana 1980
Holotype: Tiwari and Rana 1980; pl. 1, fig. 7; size 92 µm; Slide No. BSIP 5550

Locality: Borehole RNM-4, sample no. 5, depth 59.00 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Exine 4-7 µm thick, covered with 1-1.5 µm high verrucae, giving a non-uniform pattern on exine surface.
Genus *Haradisporites* Singh and Kumar 1972
Type Species: *Haradisporites mineri* Singh and Kumar 1972
Locality: Harad River near Hathnapur, Narsinghpur District, Madhya Pradesh, India
Horizon and Age: Jabalpur Formation, Early Cretaceous
Diagnostic Features: Triangular spore with straight to ± convex inter-apical sides; sharply rounded apex; trilete rays more than 3/4 of radius, sinuous near the apex; exine thin, irregularly folded, smooth to faintly sculptured.

*Haradisporites mineri* Singh and Kumar 1972
Holotype: Singh and Kumar 1972; pl. 1, figs. 1-2; size 34 x 32 µm; Slide No. BSIP 3417/8
Locality: Harad River near Hathnapur, Narsinghpur District, Madhya Pradesh, India
Horizon and Age: Jabalpur Formation, Early Cretaceous
Diagnostic Features: Size 25-42 µm; deltoid spore with straight to ± convex inter-apical sides; trilete rays more than 3/4 of radius, sinuous near the apex; exine thin, less than 1 µm thick, irregularly folded.

*Haradisporites scabratus* Kumar 1973
Holotype: Kumar 1973; pl. 1, figs. 7-8; size 30 x 30 µm; Slide No. BSIP 3421/5
Locality: Harad River near Hathnapur, Narsinghpur District, Madhya Pradesh, India
Horizon and Age: Jabalpur Formation, Early Cretaceous
Diagnostic Features: Size 25-34 µm; subdeltoid; rays slightly sinuous; exine 1-1.5 µm thick, faintly sculptured.

Genus *Klukisporites* Couper 1958
Type Species: *Klukisporites variegatus* Couper 1958
Locality: Yorkshire, Lower Deltaic, UK
Horizon and Age: Bajocian, Middle Jurassic
Diagnostic Features: Triangular spore, trilete distinct, rays 2/3 of radius; exine sculptured with granules or verrucae on proximal face, distally coarse foveo-reticulate.

*Klukisporites variegatus* Couper 1958
Holotype: Couper 1958; pl. 19, fig. 7; size 56 µm
Locality: Yorkshire, Lower Deltaic, UK
Horizon and Age: Bajocian, Middle Jurassic
Diagnostic Features: Size 45-110 µm; exine 3-5 µm thick, sculptured with granules or verrucae on proximal face, distally with coarse foveo-reticulate, 2.5-7 µm wide pits, muri 2-5 µm thick.

Genus *Lapposisporites* Visscher 1966
Type Species: *Lapposisporites lapposus* Visscher 1966
Locality: Boring 31, K.N.Z., Hengelo, depth 392.00 m (Röt Salinar), The Netherlands
Horizon and Age: Upper Bunter, Early Triassic
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Diagnostic Features: Tetrahedral tetrad sporule; trilete distinct; exine covered with scabrae, grana, gemmae, verrucae, echinae in different combinations.

Genus Lapposisporites Couper 1966
Holotype: Visscher 1966; pl. 3, figs. 1A, B; size 98 \( \mu m \)

Locality: Boring 31, K.N.Z., Hengelo, depth 392.00 m (Röt Salinar), The Netherlands
Horizon and Age: Upper Bunter, Early Triassic
Diagnostic Features: Exine densely ornamented with scabrae and 1.5 \( \mu m \) grana and gemmae.

Genus Leptolepidites Couper 1953
Type Species: Leptolepidites verrucatus Couper 1953
Locality: Ohika beds, L 12 (type), Garvey Creek Hawks Crag Breccia, L 55, New Zealand
Horizon and Age: Jurassic
Diagnostic Features: Subtriangular to circular sporule, convex to concave inter-radial sides; trilete distinct, rays long; exine thick, sculptured with irregularly shaped verrucae, equally on both faces.

Leptolepidites verrucatus Couper 1953
Holotype: Couper 1953; pl. 2, fig. 14, 15; size 31 \( \mu m \)

Locality: Ohika beds, L12 (type), Garvey Creek Hawks Crag Breccia, L15, New Zealand
Horizon and Age: Jurassic
Diagnostic Features: Size 37-43 \( \mu m \); exine thickness not discernible, proximally smooth, distal face with hyaline outer coat thrown into low closely spaced convolutions' giving 'ragged' appearance.

Genus Lycopodiacidites Couper emend. Potonié 1956
Type Species: Lycopodiacidites bullerensis Couper 1953
Locality: Ohika beds, L12 (type), Garvey Creek Hawks Crag Breccia, L15, New Zealand
Horizon and Age: Jurassic
Diagnostic Features: Triangular to subcircular sporule; trilete faint, rays reaching up to equator; exine proximally smooth or with reduced sculpture, distal face clearly and heavily sculptured with verrucae of varied size and shape.

Lycopodiacidites bullerensis Couper 1953
Holotype: Couper 1953; pl. 1, fig. 9; size 41 \( \mu m \)

Locality: Ohika beds, L12 (type), Garvey Creek Hawks Crag Breccia, L15, New Zealand
Horizon and Age: Jurassic
Diagnostic Features: Subtriangular sporule; triletes, rays enclosed in membranous elevated lips, extend up to equator; exine thick, smooth proximally, reticulate sculpted both equatorially and distally.

Genus Lycopodiumsporites Thiergart 1938
Type Species: Lycopodiumsporites (Sporites) agathoecus (Potonié) Thiergart 1938
Locality: Geiseltal bei Merseburg, Grube Cecilie, Germany
Horizon and Age: Eocene
Diagnostic Features: Subtriangular sporule; triletes, rays enclosed in membranous elevated lips, extend up to equator; exine thick, smooth proximally, reticulate sculpted both equatorially and distally.

Lycopodiumsporites agathoecus (Potonié) Thiergart 1938
Lectotype: Potonié 1934; pl. 1, fig. 25; size 87 \( \mu m \)
Archana Tripathi, Vijaya and Ram-Awatar

Locality: Geiseltal bei Merseburg, Grube Cecile, Germany
Horizon and Age: Eocene
Diagnostic Features: Size 36.6 x 73.4 µm; reticulum coarse, muri 3 µm high, 3-4 µm wide, lumen circular to oval, 5-12 µm in diameter.

**Genus Neoraistrickia** Potonié 1956
Type Species: *Neoraistrickia (Trilites) truncatus* Cookson 1953
Locality: South Australia
Horizon and Age: Comaum, Pre-Tertiary
Diagnostic Features: Broadly triangular to subcircular; trilete distinct, rays extend up to equator; exine beset with straight, truncate-headed bacula all over the surface.

*Neoraistrickia truncatus* (Cookson) Potonié 1956
Holotype: Cookson 1953; pl. 2, fig. 36; size 31.7 µm

Locality: South Australia
Horizon and Age: Comaum, Pre-Tertiary
Diagnostic Features: Size 31-55 µm; exine beset with evenly placed truncate headed bacula all over, 3.5 µm long.

**Genus Novitasporites** Tiwari and Rana 1981
Type Species: *Novitasporites triassicus* Tiwari and Rana 1981
Locality: Borehole RD-1, sample no. 5, depth 600.58 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 36-120 µm; circular to subcircular; exine 2-5 µm thick, infrapunctate, covered tightly with a hyaline, unstructured perisporial covering, unevenly 1-3 µm wide.

*Novitasporites triangularis* Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 2, fig. 33; size 70 x 74 x 66 µm; Slide No. BSIP 5626

Locality: Borehole RD-1, sample no. 5, depth 600.58 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 66-105 µm; triangular to roundly triangular spor; perine distinct, up to 4 µm wide; exine 2-4 µm thick, infrapunctate.

**Genus Orbella** Maljavkina 1949
Type Species: *Orbella colliculoides* Maljavkina 1949
Locality: W-Sibirien, Nasiwaewskaja, USSR
Horizon and Age: Early Cretaceous
Diagnostic Features: Circular spore; trilete distinct, rays 3/4 radius long, encircling contact area; exine laevigate.

multifurcate ends; exine thick, psilate, infrapunctate.

*Novitasporites triassicus* Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 2, fig. 26; size 96 µm; Slide No. BSIP 5627
**Orbella colliculoides** Maljavkina 1949  
Holotype: Maljavkina 1949; pl. 9, fig. 5; size 35 µm  

Locality: W-Sibirien, Nasiwaewskaja, USSR  
Horizon and Age: Early Cretaceous  
Diagnostic Features: Size 20-35 µm; exine finely scabrate.

**Orbella indica** Tiwari and Rana 1981  
Holotype: Tiwari and Rana 1981; pl. 1, fig. 1; size 22 µm; Slide No. BSIP 5636  

Locality: Borehole RD-1, sample no. 5, depth 600.58 m, Raniganj Coalfield, West Bengal, India  
Horizon and Age: Panchet Formation, Early Triassic  
Diagnostic Features: Size 24-32 µm; subcircular; exine thin, less than 1 µm, infragranulose in inter-ray area.

**Genus Osmundacidites** Couper 1953  
Type Species: *Osmundacidites wellmanii* Couper 1953  

**Osmundacidites wellmanii** Couper 1953  
Holotype: Couper 1953; pl. 1, fig. 5; size 44 µm  

Locality: Ohika beds, L12 (type), Garvey Greek Hawks Crag, Breccia, L55, New Zealand  
Horizon and Age: Jurassic  
Diagnostic Features: Size 40-63 µm; exine 1.5 µm thick, granular to papillate, sculpture ± 1 µm, reduced on proximal face.

**Osmundacidites baculatus** Tiwari and Ram-Awatar 1989  
Holotype: Tiwari and Ram-Awatar 1989; pl. 1, fig. 12; size 53 µm; Slide No. BSIP 9052  

Locality: Near Dargaon Village, Johilla River Section, Johilla Coalfield, Madhya Pradesh, India  
Horizon and Age: Panchet Formation, Late Permian / Early Triassic  
Diagnostic Features: Size 50-60 µm; exine ± 1 µm thick; sculptural elements predominantly round headed bacula, 3-5 µm long x 1-1.5 µm broad, intermixed with less than 1 µm coni and spines.

**Osmundacidites panchetensis** Kar 1970  
Holotype: Kar 1970; pl. 1, fig. 15; size 70 µm; Slide No. BSIP 3468  

Locality: Bore-core No. RE9, depth 83 m, Raniganj Coalfield, West Bengal, India  
Horizon and Age: Panchet Formation, Early Triassic  
Diagnostic Features: Size 60-90 µm; exine 2 µm thick with spines, papilla and coni, evenly distributed.

**Osmundacidites pilatus** Tiwari and Rana 1981  
Holotype: Tiwari and Rana 1981; pl. 2, fig. 30; size 48 x 49 µm; Slide No. BSIP 5641
Locality: Borehole RD-I, sample no. 5, depth 600.58 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 45-50 µm; trilete not prominent; exine 1 µm thick, sculptured with 3.5 µm broad x 5 µm high and round-headed pila, intermixed with few verrucae, closely placed all over the body.

**Genus** Punctatisporites Ibrahim emend. Potonié and Kremp 1955
Type Species: *Punctatisporites punctatus* Ibrahim 1933
Locality: Ruhrgebiet, Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Late Carboniferous
Diagnostic Features: Circular spore; trilete distinct, rays 2/3 of radius; exine proximally smooth, distally punctate, infragranulose.

*Punctatisporites punctatus* Ibrahim emend. Potonié and Kremp 1955
Holotype: Ibrahim 1933; pl. 2, fig. 18; size 77 µm

Locality: Ruhrgebiet, Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Late Carboniferous
Diagnostic Features: Size 50-77 µm; rays up to equator; exine 1-2 µm thick, proximally smooth, distally punctate, infragranulose.

*Punctatisporites maiturensis* Maheshwari and Banerji 1975
Holotype: Maheshwari and Banerji 1975; pl. 1, fig. 10; size 77.5 µm; Slide No. BSIP 4604-9

Locality: North-western branch of Nonia Nala, East of Kumarpur, District Burdwan, West Bengal, India
Horizon and Age: Maitur Formation, Early Triassic
Diagnostic Features: Size 60-90 µm; trilete distinct, commissures sinuous, ray end sometimes forked; exine 2 µm thick, irregularly infolded, puncta often well developed in inter-radial areas.

**Genus** Pyramidosporites Segroves 1967
Type Species: *Pyramidosporites cyathodes* Segroves 1967
Locality: Bore No. 4, 93 feet, Woolaga Creek, Perth Basin, Western Australia
Horizon and Age: Wagina Sandstone, Late Permian
Diagnostic Features: Obligate tetrahedral tetrad; germinial aperture not seen; each member unsculptured, bound to each other by a prominent, heavy thickening.

*Pyramidosporites cyathodes* Segroves 1967
Holotype: Segroves 1967; pl. 1, fig. 14; size 95 µm

Locality: Bore No. 4.93 feet, Woolaga Creek, Perth Basin, Western Australia
Horizon and Age: Wagina Sandstone, Late Permian
Diagnostic Features: Size 74-105 µm, spore originally spheroidal; exine 2-4 µm thick, sometimes punctate, often with secondary pitting, and many folds.
Genus Retitriletes Hamm en ex Pierce 1961
Type Species: Retitriletes globosus Pierce 1961
Locality: Minnesota, USA
Horizon and Age: Early Late Cretaceous
Diagnostic Features: Triangular spore with convex-concave sides; trilete rays up to equator; exine beset with reticulum.

Retitriletes globosus Pierce 1961
Holotype: Pierce 1961; pl. 1, fig. 14; size 39 µm

Genus Retusotriletes Naumova 1953
Type Species: Retusotriletes simplex Naumova 1953
Locality: Kaluga-Gebiet, UdSSR
Horizon and Age: Upper Givetien, Middle Devonian
Diagnostic Features: Subtriangular to circular spore; trilete distinct, ray ends forming imperfect to complete curvatures; exine schagrinate.

Retusotriletes simplex Naumova 1953
Holotype: Naumova 1953; pl. 2, fig. 9; size 30 µm

Genus Rugulatisporites Pflüg and Thomson in Thomson and Pflüg 1953
Type Species: Rugulatisporites quintus Pflüg and Thomson in Thomson and Pflüg 1953
Locality: Braunkohle der Ville, Germany
Horizon and Age: Chatt-Aquitan, Tertiary
Diagnostic Features: Circular spore; trilete faint, rays indistinct; exine with small muri and irregular or broken warts.

Rugulatisporites quintus Pflüg and Thomson in Thomson and Pflüg 1953
Holotype: Thomson and Pflüg 1953; pl. 2, fig. 46; size 72 µm

Genus Scabratisporites Visscher 1966
Type Species: Scabratisporites scabratus Visscher 1966
Locality: Boring 31, K.N.Z., Depth 405.50 m, Hengelo, The Netherlands
Horizon and Age: Upper Bunter, Early Triassic
Diagnostic Features: Circular spore; trilete mark distinct, rays extend 2/3 of radius; exine ± 1 µm thick, ornamented with more or less regularly distributed scabrae.

Scabratisporites scabratus Visscher 1966
Holotype: Visscher 1966; pl. 5, fig. 4; size 48 µm
Archana Tripathi, Vijaya and Ram-Awatar

**Genus Subverrusporis** Kar 1970  
Type Species: **Subverrusporis rudis** Kar 1970  
Locality: Bore-core No. RE9, depth 82.5 m, Raniganj Coalfield, West Bengal, India  
Horizon and Age: Panchet Formation, Early Triassic  
Diagnostic Features: Triangular-subtriangular spore; trilete faint, rays extend 2/3 of radius; exine thin, subverrucose.

**Subverrusporis rudis** Kar 1970  
Holotype: Kar 1970; pl. 2, fig. 48; size 98 µm; BSIP Slide No. 3473

**Genus Tigrisporites** Klaus 1960  
Type Species: **Tigrisporites halleinis** Klaus 1960  
Locality: Sammlung Geologische Bundesanstalt, Wien, Austria  
Horizon and Age: Keuper, Late Triassic  
Diagnostic Features: Size 48-60 µm; exine 1-2 µm thick, beset with 1.5 µm wide x up to 10 µm long rugulae all over surface.

**Tigrisporites halleinis** Klaus 1960  
Holotype: Klaus 1960; pl. 31, fig. 28; 55-60 µm

**Genus Todisporites** Couper 1958  
Type Species: **Todisporites major** Couper, 1958  
Locality: Yorkshire, Grishorpe Beds, UK  
Horizon and Age: Bajocian, Middle Jurassic  
Diagnostic Features: ± Spherical spore; trilete rays up to equator; exine thin, finely scabrate.

**Todisporites major** Couper 1958  
Holotype: Couper 1958; pl. 16, fig. 6; size 70 µm

**Genus Trilites** Cookson ex Couper emend. Dettmann 1963  
Type Species: **Trilites tuberculiformis** Cookson 1947  
Locality: Kerguelen, Archipelago  
Horizon and Age: Tertiary
Atlas of Spores and Pollen from the Triassic Succession of India

Diagnostic Features: Triangular spore; trilete distinct; exine differentially thickened in equatorial and radial regions, proximal contact area smooth to scabrate, distally sculptured with elongated verrucae, rugulae.

**Trilites tuberculiformis** Cookson 1947
Holotype: Cookson 1947; pl. 16, figs. 61; size 63 µm

Locality: Kerguelen, Archipelago
Horizon and Age: Tertiary
Diagnostic Features: Size 42-59 x 31-39 µm; concavely triangular; trilete rays 3/4 of radius; exine 2-3 µm thick, in interradial region 4 µm thick, rugulae to verrucae 3 µm wide x 3-10 µm long.

**Genus Triplexisporites** Foster 1979
Type Species: *Triplexisporites (Tigrisporites) playfordii* de Jersey and Hamilton 1967
Locality: D.R.D.9, 305 ft. 5 in, Bowen Basin, Queensland, Australia
Horizon and Age: Moolayember Formation, Middle Triassic
Diagnostic Features: Triangular spore with slightly concave sides; trilete mark distinct, rays elevated, extend up to 3/4 of radius, exine sculptured with radially arranged rugulae, originate from proximal inter-radial areas, continue to distal face, may bifurcate and anastomose occasionally.

*Triplexisporites playfordii* de Jersey and Hamilton 1967
Holotype: de Jersey and Hamilton 1967; pl. 5, fig. 5; size 41 µm

Locality: D.R.D.9, 305 ft. 5 in, Bowen Basin, Queensland, Australia

**Genus Undulatisporites** Pflüg in Thomson and Pflüg 1953
Type Species: *Undulatisporites microcutis* Pflüg in Thomson and Pflüg 1953
Locality: Wehmingen bei Sarstedt, Hannover, Germany
Horizon and Age: Dan (?) – Palaeocene
Diagnostic Features: Broadly triangular spore; trilete mark distinct, rays undulated reaching up to 3/4 of radius; body surface highly folded, exine scabrate.

*Undulatisporites microcutis* Pflüg in Thomson and Pflüg 1953
Holotype: Pflüg in Thomson and Pflüg 1953; pl. 1, fig. 81; size 30 µm

Locality: Wehmingen bei Sarstedt, Hannover, Germany
Horizon and Age: Dan (?) – Paleocene
Diagnostic Features: Size 30-50 µm; exine 3 µm thick, surface highly undulated.

**Genus Uvaesporites** Döring 1965
Type Species: *Uvaesporites glomeratus* Döring 1965
Locality: Westmecklenburg, Werle, Germany
Horizon and Age: Wealden, Early Cretaceous
Diagnostic Features: Broadly circular spore; trilete distinct; proximally flat, distally weak area where element indiscriminately forming kidney shape bunch, irregular.

*Uvaesporites glomeratus* Döring 1965
Holotype: Döring 1965; pl. 9, figs. 1-4; size 47 µm

Horizon and Age: Moolayember Formation, Middle Triassic
Diagnostic Features: Size 20-41 µm; proximal and distal surfaces ornamented with numerous sub-parallel, low rugulae, ± 0.5 µm high and wide.
Locality: Westmecklenburg, Werle, Germany  
Horizon and Age: Wealden, Early Cretaceous  
Diagnostic Features: Broadly triangular; trilete rays thick lipped, extend up to equator; exine beset with irregular shaped, big elements 2-20 µm in diameter.

**Genus Verrucosisporites** Ibrahim emend. Smith 1971  
Type Species: *Verrucosisporites verrucosus* Ibrahim *in* Potonié, Ibrahim and Loose 1932  
Locality: Agir Seam, Wewhofen Colliery, Ruhr Coalfield, Germany  
Horizon and Age: Westfal B/C, Late Carboniferous  
Diagnostic Features: Circular to roundly triangular spore; trilete simple, ray-length variable 1/2 to full radius; exine pre-dominantly verrucate, but may include rugulae, coni, size reduced in contact area.

*Verrucosisporites verrucosus* Ibrahim 1932  
Holotype: Ibrahim *in* Potonié, Ibrahim and Loose 1932; pl. 15, fig. 17; size 65.5 x 77.0 µm

Locality: North - western branch of Nonia Nala, east of Kumarpur, District Burdwan, West Bengal, India  
Horizon and Age: Panchet Formation, Early Triassic  
Diagnostic Features: Size 50-90 µm; circular; exine 4 µm thick, verrucose, verrucae 3-8 µm big, irregularly folded.

*Verrucosisporites densus* Bharadwaj and Tiwari 1977  
Holotype: Bharadwaj and Tiwari 1977; pl. 3, fig. 33; size 100 µm; Slide No. BSIP 5/1 - 4669

Locality: Borheole NCRD-6, sample no. 5, depth 86 m, Raniganj Coalfield, West Bengal, India  
Horizon and Age: Panchet Formation, Early Triassic  
Diagnostic Features: Size 70-140 µm; triangulo-circular; ray lips slightly thickened; exine with massive verrucae all over, 3-6 high x 8-12 wide µm, partially fused, dark brown and compact in distribution.

*Verrucosisporites kazigaonensis* Tripathi, Tiwari and Kumar 1990  
Holotype: Tripathi, Tiwari and Kumar 1990; pl. 1, fig. 7; size 61.5 µm; Slide No. BSIP 8474

Locality: Borheole RJR-2, sample no. 41, depth 441.40-441.90 m, near Kazigaon, Rajmahal Basin, Bihar, India  
Horizon and Age: Dubrajpur Formation, Late Triassic
Diagnostic Features: Size 61.5-71.0 µm; trilete rays thick-lipped 1-2 µm wide, wavy; exine 2-3 µm thick, with tubercles 3-5 µm high x 7-11 µm wide and verrucae 1-3 µm, at places low verrucae, fuse to form a rugulate pattern.

Verrucosisporites surangei Maheshwari and Banerji 1975
Holotype: Maheshwari and Banerji 1975; pl. 2, fig. 23; size 77 µm; Slide No. BSIP 4590-9

Locality: North-western branch of Nonia Nala, East of Kumarapur, District Burdwan, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 60-90 µm; exine verrucose, verrucae comparatively robust at proximal apical areas.

Verrucosisporites triassicus Bharadwaj and Tiwari 1977
Holotype: Bharadwaj and Tiwari 1977; pl. 2, fig. 31; size 110 µm; Slide No. BSIP 5/3 - 4671

Locality: Borehole NCRD-6, sample no. 5, depth 86 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 65-88 µm; exine verrucose, verrucae closely packed with 2-3 µm long conically rounded verrucae all over except around the apical region.

Genus Zebrasporites Klaus 1960
Type Species: Zebrasporites kahleri Klaus 1960
Locality: Bleiberg in Karnten, Germany
Horizon and Age: Ostalpine, Triassic
Diagnostic Features: Triangular spore with perine, convex sides; trilete distinct, rays up to equator; proximally smooth, distal face with approximately rounded beaded thick ribs (rugae).

Zebrasporites kahleri Klaus 1960
Holotype: Klaus 1960; pl. 30, fig. 18-20; size 32 µm

Genus Angulisporites Bhardwaj 1954
Type Species: Angulisporites splendidus Bhardwaj 1954
Locality: Pfalz, Labachgrube bei Breitenbach, Germany
Horizon and Age: Stephanian C, Late Carboniferous
Diagnostic Features: Cingulate, broadly triangular spore; trilete mark indistinct, rays thin, extend up to equator; exine sculptured with grana.

Angulisporites splendidus Bhardwaj 1954
Holotype: Bhardwaj 1954; fig. 3; size 84 µm

Localities: Pfalz, Labachgrube bei Breitenbach, Germany
Horizon and Age: Stephanian C, Late Carboniferous
Diagnostic Features: Size 70-90 µm; body faint, 50-70 µm; exine very finely granulose, less than 0.5 µm in diameter.

*Angulisporites triassicus* Venkatachala and Rawat 1978
Holotype: Venkatachala and Rawat 1978, pl. 2, fig. 40; size 50 µm
Locality: Purnea Basin, Bihar, India
Horizon and Age: Early Triassic
Diagnostic Features: Size 45-55 µm; cingulum 5 µm wide.

**Genus Annulispora** de Jersey 1959
Type Species: *Annulispora* (Sporites) *folliculosa* (Rogalska) de Jersey 1959
Locality: Blanowice, Silesia, Poland
Horizon and Age: Liassic, Early Jurassic
Diagnostic Features: Cingulate, circular to roundly triangular spore; trilete mark distinct, rays extend up to 2/3 of radius; exine smooth or faintly rough; on distal face thickened subcircular ring with sharp inner boundary, outer margin gradually demarcated.

*Annulispora folliculosa* (Rogalska) de Jersey 1959
Holotype: Rogalska 1954; pl. 12, fig. 8
Locality: Blanowice, Silesia, Poland
Horizon and Age: Liassic, Late Triassic
Diagnostic Features: Size range 20-48 µm; exine 2-3 µm thick; distal subcircular ring 2-5 µm wide, inner diameter of ring 7-17 µm.

**Genus Antulsporites** Archangelsky and Gamserro 1966
Type Species: *Antulsporites (Heliosporites) baculatus* Archangelsky and Gamserro 1966
Locality: Santa Cruz, Argentina
Horizon and Age: Early Cretaceous
Diagnostic Features: Cingulate, subtriangular spore; trilete distinct, rays extend 2/3 of radius; exine thick, stratified, proximally reduced sculpture, on distal face mixed ornament of baculae, spinae and verrucae.

*Antulsporites baculatus* Archangelsky and Gamserro 1966
Holotype: Archangelsky and Gamserro 1966; pl. 1, figs. 12-14; size 36 µm
Locality: Santa Cruz, Argentina
Horizon and Age: Early Cretaceous
Diagnostic Features: Size 35.2-40 µm; exine 1 µm thick, beset with bacula, element base polygonal to irregular, 1.6-4.8 µm high x 2.8-4.3 µm broad; cingulum 2.4-5 µm thick.

*Antulsporites beharensis* Venkatachala and Rawat 1978
Holotype: Venkatachala and Rawat 1978, pl. 1, fig. 20; size 30 µm
Locality: Purnea Basin, Bihar, India
Horizon and Age: Early Triassic
Diagnostic Features: Size 25-35 µm; exine sculptured with 1-2 µm wide verrucae on distal face forming pseudoreticulum; cingulum 3 µm wide.

**Genus Aequitriradites** Delcourt and Sprumont 1961
Type Species: *Aequitriradites dubius* Delcourt and Sprumont emend. Delcourt, Dettmann and Hughes 1963
Locality: Hainaut, Belgium
Horizon and Age: Wealdien, Early Cretaceous
Diagnostic Features: Cingulate, subtriangular spore; trilete mark faintly represented, prominent in sub-equatorial region, rays extend in to zona; exine variously sculptured with spines, coni, verrucae on both faces; distally irregular hilum present due to exinal breakdown.

*Aequitriradites dubius* Delcourt and Sprumont emend. Delcourt, Dettmann and Hughes 1963
Holotype: Delcourt and Sprumont 1955; pl. 3, fig. 7; size 125 µm
Localities: Hainaut, Belgium
Horizon and Age: Wealdien, Early Cretaceous
Diagnostic Features: Size 60-125 µm, trilete mark
distinct, rays prominent reaching up to zona peri-
phery; zona broad, radially oriented ridges on
zona in inter ray area.

Genus Camarozonosporites Potonié emend. Klaus 1960
Type Species: Camarozonosporites (Rotaspora) cre-
taceous (Weyland and Kreiger) Potonié 1956
Locality: Aachen, Basiston, Germany
Horizon and Age: Middle Senomanian, Cretaceous
Diagnostic Features: Cingulate, circular spore; trilete
distinct, rays 2/3 of equator; exine proximally finely
scabrate, distally equatorially thick with strong
rugae.

Camarozonosporites cretaceous (Weyland and
Kreiger) Potonié emend. Klaus 1960
Holotype: Weyland and Kreiger 1953; pl. 3, fig. 27;
size 25 µm

Localities: Aachen, Basiston, Germany
Horizon and Age: Middle Senomanian, Cretaceous
Diagnostic Features: Size 20-28 µm; trilete rays widely
open; rugae prominently visible.

Genus Cingulizonates Dybova and Jachowitz
emend. Butterworth, Jansonius, Smith and
Staplin 1964
Type Species: Cingulizonates tuberosus Dybova and
Jachowitz 1957
Locality: Silesian Coal Measures
Horizon and Age: Carboniferous
Diagnostic Features: Convexly triangular; size 60-65
µm; cingulum tapering into zona, uniformly wide.

Cingulizonates indicus Kumaran and Maheshwari
1980
Holotype: Kumaran and Maheshwari 1980; pl. 4, fig.
16; size 63 µm; Slide No. BSIP 5921

Localities: Eastern bank of Janar Nala about 2 km
south-east of Bijouri, District Shahdol, Madhya
Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 63-78 µm; zona 6-10 µm
broad, infragranulate having 5 µm wide vacuoles
in innermost region; central body distally sculp-
tured with verrucae, 2-4 µm broad x1.5 µm high,
coni, bacula up to 6 µm high.

Cingulizonates verrucosus Kumaran and Maheshwari
1980
Holotype: Kumaran and Maheshwari 1980; pl. 4, fig.
21; size 70 µm; Slide No. BSIP 5953

layered, inner body thin, proximally smooth,
equatorially cingulate, cingulated zone vacuolate,
tapering to zona.

Cingulizonates tuberosus Dybova and Jachowitz
1957
Holotype: Dybova and Jachowitz 1957; pl. 53, fig. 1;
size 60 µm
Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India

Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 63-70 µm; zona 4-8 µm broad, hyaline, intragranulate with vacuoles of 1 µm diameter in innermost region; distally densely sculptured with verrucae, sometimes puncta and coni also seen near body equator, 1-2 µm high x 1-4 µm broad, comparatively robust at body equator.

**Genus Cingutritetes** Pierce emend. Dettmann 1963

Type Species: *Cingutritetes congruens* Pierce 1961
Locality: Minnesota, USA
Horizon and Age: Early Late Cretaceous
Diagnostic Features: Broadly biconvex, subcircular spore; trilete rays extended 3/4 of radius; exine proximally smooth, cingulum wide, radially striated; thickened circular area present on distal face.

*Cingutritetes congruens* Pierce 1961
Holotype: Pierce 1961; pl. 1, fig. 1; size 32 µm

Locality: Minnesota, USA
Horizon and Age: Early Late Cretaceous
Diagnostic Features: Broadly subtriangular, size 30-35 µm; trilete rays extend only 1/2 of radius; associated with filmsy folds; cingulum uniformly wide, on distal face thickened circular area present.

**Genus Densoisporites** Weyland and Krieger emend. Dettmann 1963

Type Species: *Densoisporites velatus* Weyland and Krieger 1953
Locality: Aachener, Baniston
Horizon and Age: Senonian, Cretaceous
Diagnostic Features: Cingulate, broadly rounded spore; trilete distinct, rays 2/3 of radius, thin or slightly thick lipped, ending with broadened and thickened ends, forming curvature around contact-area; exine two layered, cavate, outer sculptured layer, loosely enveloping, proximally attached to thinner inner layer, equatorially thickened with finely patterned surface.

*Densoisporites velatus* Weyland and Krieger 1953
Holotype: Weyland and Krieger 1953; pl. 4, figs. 12-14; size 35 µm

Locality: Aachener, Baniston
Horizon and Age: Senonian, Cretaceous
Diagnostic Features: Size 25-35 µm; roundly triangular; rays 2/3 of radius; body equatorially 2-3 µm thick, cingulum 8 µm wide radially.

*Densoisporites contactus* Bharadwaj and Tiwari 1977
Holotype: Bharadwaj and Tiwari 1977; pl. 2, fig. 19; size 64 µm; Slide No.BSIP 5/3-4671

Locality: Borehole NCRD-6; Lab. sample no. 5, depth 86 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 52-73 µm; cingulum 3-6 µm wide.

**Genus Densosporites** Berry emend. Potonié and Kremp 1954
Type Species: *Densosporites covensis* Berry 1937
Locality: Rhea County, Tennessee, USA
Horizon and Age: Pennington Kohle
Diagnostic Features: Cingulate, broadly triangular spore; trilete mark distinct, rays extend up to cingulum; exine thickness vary from polar area towards equator, massive cingulum, partly thinning divides into two zones.

*Densosporites covensis* (Berry) Potonié and Kremp 1954
Holotype: Potonié and Kremp 1954; fig. 57; size 32.5 \( \mu m \)

Locality: Rhea County, Tennessee, USA
Horizon and Age: Pennington Kohle
Diagnostic Features: Broadly triangular, size 30-35 \( \mu m \); trilete ray reaching up to equator; cingulum tapering into narrow zona.

**Genus** *Distalanulisporites* Klaus 1960
Type Species: *Distalanulisporites punctus* Klaus 1960
Locality: Sammlung Geologische Bundesanstalt, Wien, Austria
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Cingulate, rounded to broadly triangular spore; trilete mark distinct, rays extend more than half of radius, forming indistinct curvature; exine granulate to punctate, centrally placed ring on distal face.

*Distalanulisporites punctus* Klaus 1960
Holotype: Klaus 1960; pl. 28, fig. 8; size 78 \( \mu m \)

Locality: Sammlung Geologische Bundesanstalt, Wien, Austria
Horizon and Age: Keuper, Late Triassic

**Genus** *Duplexisporites* Deák emend. Playford and Dettmann 1965
Type Species: *Duplexisporites generalis* Deák 1962
Locality: Hungary
Horizon and Age: Aptian, Early Cretaceous
Diagnostic Features: Convexly subtriangular spore; trilete distinct, rays usually lipped; exine sculptured distally and equatorially with muri to form irregular reticulum on proximal face tangential murus on equatorial margin; cingulum subdued due to reticulation.

*Duplexisporites generalis* Deák 1962
Holotype: Deák 1962; pl. 20; fig. 9; size 45 \( \mu m \)

Locality: Hungary
Horizon and Age: Aptian, Early Cretaceous
Diagnostic Features: Size 45-50 \( \mu m \); trilete rays bordered with thin lips, extend 3/4 of radius; exine 1-2 \( \mu m \) thick, sculptured with 3-4 \( \mu m \) wide and low muri.

**Genus** *Foraminisporis* Krutzsch 1959
Type Species: *Foraminisporis foraminis* Krutzsch 1959
Locality: Geiseltal, Germany
Horizon and Age: Eocene
Diagnostic Features: Cingulate, ± circular-biconvex spore; trilete rays up to margin with crenulate ends; exine thick, two layered, inner layer infrapunctate, outer layer narrowly sculptured with ± conical to elongated warts of varied shape and size, overlap scarcely on proximal face, foraminate in nature.

*Foraminisporis foraminis* Krutzsch 1959
Holotype: Krutzsch 1959; pl. 19, figs. 203-206; size 45 \( \mu m \)
Genus Indotriradites Tiwari 1964
Type Species: Indotriradites korbaensis Tiwari 1964
Locality: Borehole G-2, 208 (II Seam) E, Korba Coalfield, Madhya Pradesh, India
Horizon and Age: Barakar Formation, Early Permian
Diagnostic Features: Zonate, roundly triangular spore; trilete mark well defined, rays continuing to extend beyond the body margin into the flange, mostly in the form of folds; exine cavate, distinct inner body, and restricted ornament of coni or spines on distal face, broad flange.

Indotriradites korbaensis Tiwari 1964
Holotype: Tiwari 1964; pl. 1, fig. 4; size 71 µm

Locality: Borehole NCRD-6, Lab sample no. 7, depth 123.5 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 67-80 µm; flange 5-8 µm wide; central body 50-60 µm; distal processes spino-mamillate, 1.5 to 5 µm long x 2-5 µm wide at base, with round bulbous base and long narrow apex.

Genus Kraeuselisporites Leschik 1955
Type Species: Kraeuselisporites dentatus Leschik 1955
Locality: Neuewelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Zonate, broadly triangular spore; trilete distinct, ray reaching up to central body only; exine two layered, outer membranous zone; central body on distal face punctate with strong coni, apiculae and spines.

Kraeuselisporites dentatus Leschik 1955
Holotype: Leschik 1955, pl. 4, fig. 21; size 49 µm

Locality: Neuewelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Exine proximally smooth, 1.5 µm thick, sculptural elements 3-5 µm long x 2 µm wide; zona 7 µm broad.

Genus Limatulasporites Helby and Foster in Foster 1979
Type Species: Limatulasporites limatus (Playford) Helby and Foster in Foster 1979
Locality: Poatina, Tasmania
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Horizon and Age: Tiers Formation, Late Triassic
Diagnostic Features: Subcircular to roundly subtriangular, cingulate spore; trilete mark distinct, rays reaching up to inner margin of cingulum with straight to sinuous labra ending in curvaturae; exine thin, bearing low labra or other apiculate sculpture in contact area, elsewhere laevigate; cingulum ± uniformly thick.

Limatulasporites limatus (Playford) Helby and Foster in Foster 1979
Holotype: Playford 1965; pl. 8, fig. 17; size 41 µm
Locality: Poatina, Tasminia
Horizon and Age: Tiers Formation, Late Triassic
Diagnostic Features: Size 36-47 µm; grana uniformly distributed, 0.5-1 µm in diameter; cingulum 2-6 µm wide.

Genus Lundbladispora Balme emend. Playford 1965
Type Species: Lundbladispora willmotti Balme 1963
Locality: Kockatea Creek No.19 Bore, 139-190 ft, Upper Greenough River area (sample 43305), Western Australia
Horizon and Age: Kockatea Shale, Early Triassic
Diagnostic Features: Broadly triangular spore; trilete, rays extending up to equator; exine cavate, finely structured enclosing a thin walled inner body; exoexine scabrate, spongy with a narrow equatorial thickening, exine beset with spines, coni, or grana; considerably reduced on the proximal surface.

Lundbladispora willmotti Balme emend. Playford 1965
Holotype: Balme 1963; pl. 5, figs 1-2; size 78 µm
Locality: Kockatea Creek No.19 Bore, 139-190 ft, Upper Greenough River area (sample 43305), Western Australia
Horizon and Age: Kockatea Shale, Early Triassic
Diagnostic Features: Size 71-86 µm; cingulum 4-6 µm thick; distal face and equator sculptured with 1-3 µm broad and long spines and coni.

Lundbladispora baculata Bharadwaj and Tiwari 1977
Holotype: Bharadwaj and Tiwari 1977; pl. 3, fig. 37; size 102 µm; Slide No. BSIP 5/3 – 4671
Locality: Borehole NCRD-6; Lab. sample no. 5, depth 86 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation; Early Triassic
Diagnostic Features: Size 80-120 µm; circulo-triangular spore; distal face showing big, baculate or sub-baculate, finger-shaped to pila-like, 3-9 µm long x 3-6 µm wide processes.

Lundbladispora bullata Venkatachala and Rawat 1978
Holotype: Venkatachala and Rawat 1978; pl. 1, fig. 8; size 50 x 60 µm
Locality: Purnea Basin, Bihar, India
Horizon and Age: Early Triassic
Diagnostic Features: Size 55-75 µm; exine beset with gemmae, each element 3 µm in diameter, irregularly distributed; cingulum 3 µm wide.

Lundbladispora densispinosa Bharadwaj and Tiwari 1977
Holotype: Bharadwaj and Tiwari 1977; pl. 1, figs. 7-8; size 70 µm; Slide No. 5/3 - 4671
Localities and Environmental Settings

**Lundbladispora microconata** Bharadwaj and Tiwari 1977
Holotype: Bharadwaj and Tiwari 1977; pl. 1, fig. 10; size 68 µm; Slide No. 7/1 - 4673

Locality: Borehole NCRD-6, Lab. sample no. 7, depth 123.5 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 65-80 µm; convexo-triangular with broadly rounded angles; central body 41-51 µm, bacula short and rare, 1 x 1 µm coni.

**Lundbladispora recurvata** Venkatachala and Rawat 1978
Holotype: Venkatachala and Rawat 1978; pl. 1, fig. 10; size 50 µm

Locality: Purneua Basin, Bihar, India
Horizon and Age: Early Triassic
Diagnostic Features: Size 60-62 µm; exine sculptured with densely spaced spines having bulbous base, 1-5 µm in diameter.

**Lundbladispora raniganjensis** Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 1, fig. 3; size 60 µm; Slide No. BSIP 5640

Locality: Borehole, RD-1, sample no. 4, depth 532.8 m; Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Size 53-76 µm; spines with bulbose bases having beak-like elongated apical portion, few coni, processes 1-3 µm long x 2-3 µm wide; cingulum thick, ± 4-8 µm wide; inner body 38-66 µm without papillae.

**Lundbladispora reticulata** Tiwari and Rana 1980
Holotype: Tiwari and Rana 1980; pl. 1, figs. 7, 8; size 78 µm; Slide No. BSIP 5555

Locality: Borehole RNM-4, sample no. 5, depth 59 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Size 60-80 µm; cingulum 10-20 µm wide, spines 6-15, massive, finger-shaped or conical processes, 3-10 µm long x 3-6 µm wide.

**Lundbladispora warii** Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 1, fig. 4; size 86 µm; Slide No. BSIP 5639

Locality: Borehole RD-1, sample no. 5, depth 600.58 m, Raniganj Coalfield, West Bengal, India
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Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 84 - 87 µm; subtriangular; trilete rays prominent, 4 µm thick laesurae; exine on distal face having 4-10 µm wide x 4-7 µm high massive wart-like, rounded, flat-topped to irregular processes; cingulum thickened unevenly with partially fused warts.

Genus Lycospora Schopf, Wilson and Bentall emend. Potonié and Kremp 1954
Type Species: Lycospora (Cirratriradites) micro-papillatus Schopf, Wilson and Bentall 1944
Locality: What Cheer, Keokuk County, Iowa, USA
Horizon and Age: Des Moines Series, Westfal
Diagnostic Features: Cingulate, subcircular spore; trilete distinct, rays extended up to flange; exine two layered, granulose to infragranulose.

Holotype: Wilson and Coe 1940; pl. 1, fig. 6; size 15 µm

Locality: What Cheer, Keokuk County, Iowa, USA
Horizon and Age: Des Moines Series, Westfal
Diagnostic Features: Size 15-16 µm; no frills on equatorial flange; exine micropapillate.

Genus Muerrigerisporis Krutzsch 1963
Type Species: Muerrigerisporis (Cingulatisporites) muerrigeri Pfanzl in Murriger and Pfanzl 1955
Locality: Hessen, Germany
Horizon and Age: Oligocene
Diagnostic Features: Cingulate, broadly triangular spore; trilete distinct, spike on proximal and distal face irregular, assymetrical and diffused circumstancially.

Muerrigerisporis muerrigeri Pfanzl 1955
Holotype: Pfanzl 1955; pl. 5, figs. 4a-b; size 50 µm

Locality: Hessen, Germany
Horizon and Age: Oligocene
Diagnostic Features: Broadly circular; size 45-55 µm; spike 4-6 µm.

Genus Nevesisporites de Jersey and Paten 1964
Type Species: Nevesisporites vallatus de Jersey and Paten 1964
Locality: Durabilla, West Queensland, Australia
Horizon and Age: Jurassic
Diagnostic Features: Cingulate, circular to subcircular spore; trilete distinct, rays extend up to cingulum; exine equatorially thick, smooth or faintly rough on distal face, proximally sculptured with granules, verrucae, spinules.

Nevesisporites vallatus de Jersey and Paten 1964
Holotype: de Jersey and Paten 1964; pl. 5, figs. 11, 12; size 40 µm

Locality: Durabilla, West Queensland, Australia
Horizon and Age: Jurassic
Diagnostic Features: Size 35-47 µm; cingulum 2-3 µm wide; exine granulate, grana 0.5-1.5 µm grading into bacula 2 x 1 µm.

Genus Polycingulatisporites Simoncsics and Kedves emend. Playford and Dettmann 1965
Type Species: Polycingulatisporites circulus Simoncsics and Kedves 1961
Locality: Urkut, Hungary
Horizon and Age: Late Jurassic – Early Cretaceous
Diagnostic Features: Cingulate, radial spore; trilete distinct, rays simple or lipped; exine smooth to scabrate; distal-face with a circumpolar ridge which concentrically encircles a polar or sub-polar thickening.

Polycingulatisporites circulus Simoncsics and Kedves emend. Playford and Dettmann 1965
Holotype: Simoncsics and Kedves 1961; pl. 6, figs. 1-6
Archana Tripathi, Vijaya and Ram-Awatar

Locality: Urkut, Hungary
Horizon and Age: Late Jurassic to Early Cretaceous
Diagnostic Features: Size 35-50 µm; equatorial thickening and circumpolar ridge present on distal face.

**Genus** *Pustulatisporites* Potonié and Kremp 1954
Type Species: *Pustulatisporites pustulatus* Potonié and Kremp 1954
Locality: Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Late Carboniferous
Diagnostic Features: Cingulate, subcircular spore; trilete indistinct due to sculpture; exine beset with large, discrete, verruca like sculpture, flat topped on equator and distal face, proximally scabrate.

*Pustulatisporites pustulatus* Potonié and Kremp 1954
Holotype: Potonié and Kremp 1954; pl. 20, fig. 93; size 66 µm

Locality: Flöz Ägir, Germany
Horizon and Age: Westphalian B/C, Late Carboniferous
Diagnostic Features: Size 65-70 µm; exine folded along equator, verrucae sub-crescentric, ± 5 µm high x 8-10 µm basal diameter.

**Genus** *Rajmahalispora* Tiwari, Tripathi and Kumar 1984
Type Species: *Rajmahalispora rugulata* Tiwari, Tripathi and Kumar 1984
Locality: Borehole RJR-2, sample no. 108, depth 836-842 m, Rajmahal Basin, Bihar, India
Horizon and Age: Dubrajpur Formation, Late Triassic
Diagnostic Features: Size 62 x 70 µm; trilete rays appearing to exhibit area contagionis at their ends, hence at times a notched condition simulated; exine proximally as well as distally regulate, regulae dense, of various shapes and sizes, straight, curved or wavy, simple or bifurcated, 3 to 2 µm in length and 2 to 3 µm in width; cingulum 2.5 - 8 µm wide.

*Rajmahalispora rugulata* Tiwari, Tripathi and Kumar 1984
Holotype: Tiwari, Tripathi and Kumar 1984; pl. 1, figs. 1-3; size 69.5 µm; Slide No. BSIP 8089

Locality: Borehole RJR-2, sample no. 108, depth 836-842 m, Rajmahal Basin, Bihar, India
Horizon and Age: Dubrajpur Formation, Late Triassic

Diagnostic Features: Cingulate, triangular to subcircular spore; trilete mark distinct, rays with thin lips, slightly elevated, sinuous, reaching up to outer margin of cingulum; exine, rugulate, sometimes anastomose to form reticulation; central body distinct; cingulum smooth, unstructured, usually denser towards the peripheral region.

*Rajmahalispora reticulata* Tiwari, Tripathi and Kumar 1984
Holotype: Tiwari, Tripathi and Kumar 1984; pl. 1, figs. 8, 9; size 59 µm; Slide No. BSIP 8087

Locality: Borehole RJR-2, sample no. 108, depth 836-842 m, Rajmahal Basin, Bihar, India
Horizon and Age: Dubrajpur Formation, Late Triassic

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Diagnostic Features: Size 59-67 µm; exine proximally and distally rugulate, some rugulae anastomose to form incomplete to complete reticulum, rugulae 0.6-4 µm wide and 1-3 µm high; cingulum well-defined, 2.5-4.5 µm wide; limbus-like equatorial thickening less than 1 µm thick.

*Rajmahalispera triassicus* Tiwari, Tripathi and Kumar 1984

Holotype: Tiwari, Tripathi and Kumar 1984; pl. 1, fig. 6; size 68 µm; Slide No. BSIP 8088

Locality: Borehole RJR-2, sample no. 108, depth 836-842 m, Rajmahal Basin, Bihar, India

Horizon and Age: Dubrajpur Formation, Late Triassic

**Rajmahalispera triassicus** Tiwari, Tripathi and Kumar 1984

*Holotype:* Tiwari, Tripathi and Kumar 1984; pl. 1, fig. 6; size 68 µm; Slide No. BSIP 8088

Locality: Borehole RJR-2, sample no. 108, depth 836-842 m, Rajmahal Basin, Bihar, India

Horizon and Age: Dubrajpur Formation, Late Triassic

**Genus Reticulatisporites** (Ibrahim) Potonié and Kremp 1954

*Type Species:* *Reticulatisporites reticulatus* Ibrahim 1933

Locality: Flöz Ägir, Germany

Horizon and Age: Westphalian, B/C, Carboniferous

Diagnostic Features: Size 77-84.5 x 73-100 µm; 2-4 µm wide membranous perisporial thickening around body, reticulum, coarse, lumen 15-23 µm in diameter, muri 3 µm thick.

**Genus Rewanispora** de Jersey 1970

*Type Species:* *Rewanispora foveolata* de Jersey 1970

Horizon and Age: Rewan Formation, Early Triassic

Locality: Bowan Basin, Australia

Diagnostic Features: Circular to convexly sub-triangular spore; trilete distinct, rays extending almost up to equator; exine two layered, intine thin, proximally smooth to finely sculptured, on distal face foveolate to verruculate of variable shape and size, cingulum uniform in thickness.

**Genus Reticulatisporites** (Ibrahim) Potonié and Kremp 1954

*Type Species:* *Reticulatisporites reticulatus* Ibrahim 1933

Locality: Flöz Ägir, Germany

Horizon and Age: Westphalian, B/C, Carboniferous

Diagnostic Features: Cingulate, roundly triangular spore; trilete distinct, rays extend 2/3 of radius; exine with differentially thickened cingulum, peripheral band of thickening in inter-radial part; on distal face with network of muri.

**Genus Ringosporites** Tiwari and Rana 1981

*Type Species:* *Ringosporites ringus* Tiwari and Rana 1981

Locality: Borahole RD-I, sample no. 5, depth 600.58 m, Raniganj Coalfield, West Bengal, India

Horizon and Age: Panchet Formation, Early Triassic

Diagnostic Features: Circular, subcircular to circulo-triangular spore; trilete mark distinct, ray-ends mostly forming curvatures; exine laevigate on proximal as well as distal side; on distal face equatorial cingulum, a circumpolar and polar radial thickening.

**Genus Reticulatisporites** (Ibrahim) Potonié and Kremp 1954

*Type Species:* *Reticulatisporites reticulatus* Ibrahim 1933

Locality: Flöz Ägir, Germany

Horizon and Age: Westphalian, B/C, Carboniferous

Diagnostic Features: Size 77-84.5 x 73-100 µm; 2-4 µm wide membranous perisporial thickening around body, reticulum, coarse, lumen 15-23 µm in diameter, muri 3 µm thick.

**Genus Rewanispora** de Jersey 1970

*Type Species:* *Rewanispora foveolata* de Jersey 1970

Horizon and Age: Rewan Formation, Early Triassic

Locality: Bowan Basin, Australia

Diagnostic Features: Circular to convexly sub-triangular spore; trilete distinct, rays extending almost up to equator; exine two layered, intine thin, proximally smooth to finely sculptured, on distal face foveolate to verruculate of variable shape and size, cingulum uniform in thickness.

**Genus Reticulatisporites** (Ibrahim) Potonié and Kremp 1954

*Type Species:* *Reticulatisporites reticulatus* Ibrahim 1933

Locality: Flöz Ägir, Germany

Horizon and Age: Westphalian, B/C, Carboniferous

Diagnostic Features: Size 77-84.5 x 73-100 µm; 2-4 µm wide membranous perisporial thickening around body, reticulum, coarse, lumen 15-23 µm in diameter, muri 3 µm thick.

**Genus Rewanispora** de Jersey 1970

*Type Species:* *Rewanispora foveolata* de Jersey 1970

Horizon and Age: Rewan Formation, Early Triassic

Locality: Bowan Basin, Australia

Diagnostic Features: Circular to convexly sub-triangular spore; trilete distinct, rays extending almost up to equator; exine two layered, intine thin, proximally smooth to finely sculptured, on distal face foveolate to verruculate of variable shape and size, cingulum uniform in thickness.

**Genus Reticulatisporites** (Ibrahim) Potonié and Kremp 1954

*Type Species:* *Reticulatisporites reticulatus* Ibrahim 1933

Locality: Flöz Ägir, Germany

Horizon and Age: Westphalian, B/C, Carboniferous

Diagnostic Features: Size 77-84.5 x 73-100 µm; 2-4 µm wide membranous perisporial thickening around body, reticulum, coarse, lumen 15-23 µm in diameter, muri 3 µm thick.

**Genus Rewanispora** de Jersey 1970

*Type Species:* *Rewanispora foveolata* de Jersey 1970

Horizon and Age: Rewan Formation, Early Triassic

Locality: Bowan Basin, Australia

Diagnostic Features: Circular to convexly sub-triangular spore; trilete distinct, rays extending almost up to equator; exine two layered, intine thin, proximally smooth to finely sculptured, on distal face foveolate to verruculate of variable shape and size, cingulum uniform in thickness.
Archan Tripathi, Vijaya and Ram-Awatar

Locality: Borehole RD-I, sample no. 5, depth 600.58 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 26-40 µm; sub-equatorial thickening 3-4 µm wide, distally situated immediately along the equatorial region, one annular ring 3-5 µm wide on distal face.

**Genus Simeonospora** Balme 1970
Type Species: *Simeonospora khlonovae* Balme 1970
Locality: U.W.-A. 57828, Field no K 12-6, Landa Pusha, Surghar Range, West Pakistan
Horizon and Age: Mianwali Formation, Early Triassic
Diagnostic Features: ± Circular spore; trilete distinct, rays with strongly defined sunken areas; exine fairly thick as false equatorial rim; contact area sculptured with flattened rugulae and verrucae.

*Simeonospora khlonovae* Balme 1970
Holotype: *Simeonospora khlonovae* Balme 1970, pl. 2, fig. 3; size 65 µm

Locality: U.W.-A. 57828, Field no K 12-6, Landa Pusha, Surghar Range, West Pakistan
Horizon and Age: Mianwali Formation, Early Triassic
Diagnostic Features: Size 65-73 µm; contact area rounded to pentagonal; exine 3-5 µm thick, laevigate out side of contact area, low rugulae on distal face, sculptural elements 0.5-2 µm in diameter.

**Genus Spinotriletes** Mädler 1964
Type Species: *Spinotriletes echinoides* Mädler 1964
Locality: Jena, Thuriangia, Germany
Horizon and Age: Oberer Bunsandstein, Early Triassic
Diagnostic Features: Broadly circular spore; trilete distinct, ray ends forming contact area; exine flanged, sculptured with coni of varied shape and size.

*Spinotriletes echinoides* Mädler 1964
Holotype: Mädler 1964; pl. 1, fig. 12; size 80 µm

Locality: Jena, Thuriangia, Germany
Horizon and Age: Oberer Bunsandstein, Early Triassic
Diagnostic Features: Size 60-80 µm; coni 4 µm high and wide, 35 in number all over the body.

**Genus Taurocosporites** Stover 1962 emend. Playford and Dettmann 1965
Type Species: *Taurocosporites segmentatus* Stover 1962
Locality: Prince Georges County, Maryland, USA
Horizon and Age: Early Cretaceous
Diagnostic Features: Cingulate, radial broadly subtriangular spore; trilete distinct, rays simple or lipped, a ring-like subequatorial ridge on the distal surface concentrically surrounds a distal polar thickening; proximal exine conspicuously sculptured.

*Taurocosporites segmentatus* Stover 1962
Holotype: Stover 1962; pl. 1, fig. 1; size 44 µm

Locality: Prince Georges County, Maryland, USA
Horizon and Age: Early Cretaceous
Diagnostic Features: Size 40-48 µm; trilete ray thick lipped; exine 2-4 µm thick sculptured with segmented elements of medium size.
Genus *Tethysispora* Vijaya and Tiwari in Vijaya, Kumar, Singh and Tiwari 1988
Type Species: *Tethysispora unica* Vijaya and Tiwari in Vijaya, Kumar, Singh and Tiwari 1988
Locality: Sample No. 1, Kalapani Limestone, Malla Johar area, Tethys Himalaya, India
Horizon and Age: Kalapani Limestone Formation, Middle Triassic
Diagnostic Features: Triangular to broadly subtriangular, zonate spore; trilete mark distinct, rays thick lipped, extend up to zona; exine equatorially 1-2 μm thick, proximally micropunctate, on distal face coni, mammoid-shape spines which become bigger and denser at equator; zona thin, associated with ridges.

*Tethysispora unica* Vijaya and Tiwari in Vijaya, Kumar, Singh and Tiwari 1988
Holotype: Vijaya and Tiwari in Vijaya, Kumar, Singh and Tiwari 1988; pl. 2, fig. 1; size 65 x 65 μm; Slide No. BSIP 9499

Locality: Sample No. 1, Kalapani Limestone, Malla Johar area, Tethys Himalaya, India
Horizon and Age: Kalapani Limestone Formation, Middle Triassic
Diagnostic Features: Size 46-75 μm; central body 38-50 μm, ornamentation on distal face coni 1.5-2 μm long x 1-2 μm wide and spines 3-7 μm long x 1-2 μm wide; zona 5-17 μm wide.

Genus *Tikisporites* Kumaran in Kumaran and Maheshwari 1980
Type Species: *Tikisporites balmei* Kumaran in Kumaran and Maheshwari 1980
Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Cingulate, triangular to subtriangular spore; trilete mark distinct, rays 2/3 of spore radius or reaching up to central body margin; central body triangular to sub-triangular, exine 2-3 μm thick, distally laevigate and often with kyrtomic folds, proximally laevigate to infrapunctate; cingulum 5-10 μm wide.

*Tikisporites balmei* Kumaran in Kumaran and Maheshwari 1980
Holotype: Kumaran in Kumaran and Maheshwari 1980; pl. 5, fig. 7; size 84 μm, Slide No. BSIP 6002

Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 75-90 μm; cingulum 5-8 μm; central body exine 1-2 μm thick.

*Tikisporites complicatus* Kumaran in Kumaran and Maheshwari 1980
Holotype: Kumaran in Kumaran and Maheshwari 1980; pl. 5, fig. 11; size 90 μm; Slide No. BSIP 5955

Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, Shahdol District, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 80-100 µm; central body triangular to subtriangular, exine 2-3 µm thick, both proximally and distally laeveolate; distally with regular or irregular, 5-15 µm broad, inter-radial folds, often continue around apices, cingulum 3-8 µm broad, wavy or regular.

**STRIATE BISACCATE POLLEN**

**Genus Faunipollenites** Bharadwaj emend. Tiwari, Srivastava, Tripathi and Vijaya 1989

Type Species: *Faunipollenites varius* Bharadwaj 1962

Locality: Samla Seam, Samla-Kendra Colliery, East Raniganj Coalfield, West Bengal, India

Horizon and Age: Raniganj Formation, Late Permian

Diagnostic Features: Bisaccate, bilateral haploxylonoid pollen; central body ill defined, exine inframicroreticulate, simple or forked horizontal striations on proximal face; distal sulcus uniformly wide, ill defined.

*Faunipollenites varius* Bharadwaj 1962

Holotype: Bharadwaj 1962; pl. 18, fig. 230 (not traceable); size 106 µm

Lectotype: Bharadwaj 1962; pl. 18, fig. 232; size 64 x 106 µm; Slide No BSIP 9903

Locality: Samla Seam, Samla-Kendra Colliery, East Raniganj Coalfield, West Bengal, India

Horizon and Age: Raniganj Formation, Late Permian

Diagnostic Features: Horizontally oval; size 60-160 x 70-45 µm; 6-8 horizontal striations, unforked.

*Faunipollenites gopadensis* Bharadwaj and Srivastava 1969

Holotype: Bharadwaj and Srivastava 1969; pl. 26, fig. 42; size 130 x 107.5 µm; Slide No. BSIP 3199-2

Locality: Lunda, after the fall (about 2-1/2 ft thick bed), South of Albertville, Congo, Africa

**Genus Gondwanipollenites** Bose and Maheshwari emend. Maheshwari and Banerji 1975

Type Species: *Gondwanipollenites congoensis* Bose and Maheshwari 1968

Locality: Lunda, after the fall (about 2-1/2 ft thick bed), South of Albertville, Congo, Africa

Horizon and Age: Lukuga Series, Early Permian

Diagnostic Features: Bisaccate, bilateral, usually diploxylonoid pollen; central body distinct, variable in shape, exine inframicroreticulate, simple or forked horizontal striations on proximal face, with or without cross-connections; sacci hemispherical to sub-spherical, distal attachment full length, straight or convex, sometimes associated with arcuate folds.

*Gondwanipollenites congoensis* Bose and Maheshwari 1968; pl. 19, fig. 1; size 192 µm

Locality: Lunda, after the fall (about 2-1/2 ft thick bed), South of Albertville, Congo, Africa

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Horizon and Age: Lukuga Series, Early Permian
Diagnostic Features: Diploxyylonoid; size 192-217 µm; central body circular, 92-112 x 102-105 µm, proximally 6-11 simple or branched striations; very narrow sulcus.

Gondwanipollenites bengalensis Maheshwari and Banerji 1975
Holotype: Maheshwari and Banerji 1975; pl. 5, fig. 73; size 55 x 87.5 µm; Slide No. BSIP 4573-47
Locality: North-western branch of Nonia Nala, East of Kumarpur, District Burdwan, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Diploxyylonoid; size 80-95 µm, central body circular to vertically oval, 38-57 x 40-53 µm, proximally bearing 6-8 horizontal, simple or forked striation; distal saccus-free-area 20-35 µm wide.

Gondwanipollenites multistriatus Banerji and Maheshwari 1975
Holotype: Banerji and Maheshwari 1975; pl. 3, fig. 31; size 110 µm; Slide No. BSIP 4693-5
Locality: South bank of Sukri River, 0.8 km from Kaima, Auranga Coalfield, Bihar, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Bisaccate bilateral, diploxyylonoid pollen; central body circular to oval, exine finely reticulate, proximal surface with 8-12 ribs oriented in long axial direction, slightly taper towards end; sacchi reniform; distal surface with 6 to 10 ribs oriented at right angles to the proximal, tapered at ends; distal sulcus obscure to distinct.

Hamiapollenites saccatus Wilson 1962
Holotype: Wilson 1962; pl. 3, fig. 7; size 43.7 x 71.3 µm
Locality: Flowerpot Shale, Greer County, USA
Horizon and Age: Flowerpot Formation, Permian
Diagnostic Features: Size 47-75 µm; central body 31-47 µm long, 30-36 µm wide; sacchi 8-24 µm long, 25-30 µm wide.

Lahirites Bharadwaj 1962
Type Species: Lahirites raniganjensis Bharadwaj 1962
Locality: Dobrana Seam, North Chora Colliery, East Raniganj Coalfield, India
Horizon and Age: Raniganj Formation, Late Permian
Diagnostic Features: Bisaccate, bilateral, diploxyylonoid pollen; central body circular to oval, exine infrapunctate to laevigate, horizontal striations on proximal face, occasionally with vertical partitions; distal saccus-free-area wide.

Lahirites raniganjensis Bharadwaj 1962
Holotype: Bharadwaj 1962; pl. 12, fig. 172; size 114 µm
Archna Tripathi, Vijaya and Ram-Awatar

Locality: Dobrana Seam, North Chora Colliery, East Raniganj Coalfield, West Bengal, India
Horizon and Age: Raniganj Formation, Late Permian
Diagnostic Features: Size 120-140 x 65-80 µm; central body circular, exine infrapunctate, 7-9 horizontal striations with many vertical partitions.

Lahirites triassicus Bharadwaj and Tiwari 1977
Holotype: Bharadwaj and Tiwari 1977; pl. 7, fig. 78; size 100 x 60 µm, central body 62 X 50 µm; Slide No. BSIP 5/3 – 4671
Locality: Borehole NCRD-6, sample no. 5, depth 86 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic: Size 100-120 x 58-68 µm; central body subcircular to horizontally elongate with flat ends laterally, 6-9 striations on proximal face; distal saccus-free-area straight, 20-30 µm wide.

Genus Rhizomaspora Wilson 1962
Type Species: Rhizomaspora radiata Wilson 1962
Locality: Flowerpot Shale, Greer County, USA
Horizon and Age: Flowerpot Formation, Permian
Diagnostic Features: Bisaccate, monosaccoid to diploxylonoid pollen; central body distinct, bears smooth or minutely pitted radiating ribs; saccus reniform, proximally equatorially attached, distally deeply inserted on central body; sulcus narrow.

Rhizomaspora radiata Wilson 1962
Holotype: Wilson 1962; pl. 2, fig. 7; size 157.6 x 118.2 µm
Locality: Flowerpot Shale, Greer County, USA
Horizon and Age: Flowerpot Formation, Permian
Diagnostic Features: Size 140-170 x 80-85 µm; central body 70-82 x 108-120 µm, exine 2 µm thick, infrareticulate, irregularly, radially oriented striations.

Rhizomaspora biharia Banerji and Maheshwari 1975
Holotype: Banerji and Maheshwari 1975; pl. 3, fig. 39; size 84 µm; Slide No. BSIP 4699-1
Locality: South bank of Sukri River, 0.8 km from Kaima, Auranga Coalfield, Bihar, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Diploxylonoid; size 80-98 µm long; central body vertically oval, 36-42 µm, proximally with warty projections of irregular shape and size; sacci reniform, 35-66 µm high; distal saccus-free-area biconvex, generally associated with folds.

Rhizomaspora triassica Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 5, fig. 65; size 120.0 x 89.5 µm; Slide No. BSIP 5629
Locality: Borehole RD-l, sample no. 4, depth 532.48 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Diploxylonoid with big sacci; central body subcircular to oval, 57 x 54 µm in holotype, thin, bearing reticuloid striations on the proximal face; laterally sacci close to each other, saccus reticulation coarse with 2-3 µm wide meshes, thick muri; distal saccus-free-area narrow.

Genus Striapollenites Bharadwaj 1962
Type Species: Striapollenites saccatus Bharadwaj 1962
Striapollenites saccatus Bharadwaj 1962
Holotype: Bharadwaj 1962; pl. 21, fig. 273; size 120 x 72 µm, central body 72 x 44 µm

Striapollenites monosaccoides Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 4, fig. 56; size 96 x 84 µm, central body 66 µm; Slide No. BSIP 5641

Striatites sewaridii (Virkki) Pant 1955
Holotype: Virkki 1937; text-fig. 2A; size 57 µm

Striatites levistriatus Bharadwaj and Tiwari 1977
Holotype: Bharadwaj and Tiwari 1977; pl. 6, fig. 72; size 110 x 60 µm; Slide No. BSIP 5/3-4671

Striatites panchetensis Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 6, fig. 94; size 72 x 48 µm; Slide No. BSIP 5643

Genus Striatites Pant emend. Bharadwaj 1962

Type Species: Striatites (Pityosporites) sewaridii (Virkki) Pant 1955
Locality: N.S.W., New Castle, Australia
Horizon and Age: Permo-Carboniferous
Diagnostic Features: Bisaccate, bilateral diploxylonoid pollen; central body oval to circular, exine verrucose, equatorially thick, horizontal striations simple or branched on proximal face with or without vertical partition; distal saccus-free-area furrow like.
Locality: Borehole RD-1, sample no. 5, depth 600.58 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 72-108 µm; central body ± circular, 44-65 µm, 5-7 horizontal striations on proximal face, tendency towards taeniae formation at places; sacci narrow, laterally connected by 1-2 µm wide strip.

**Striatoabietites sidhiensis** Bharadwaj and Srivastava 1969
Holotype: Bharadwaj and Srivastava 1969; pl. 25, figs. 18,19; size 127.5 x 65 µm; Slide No. BSIP 3207-4

Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Size 92-127 x 60-85 µm; central body subcircular to vertically oval, 9-10 striations with vertical partitions; sulcus 10-15 µm wide.

**Genus Striatoabietites** Sedova emend. Hart 1964
Type Species: *Striatoabietites brickii* Sedova 1956
Locality: USSR
Horizon and Age: Kazanian-Kungurian, Permian
Diagnostic Features: Bisaccate, diploxylonoid pollen; central body rounded to spherical; exine inframicroreticulate with many horizontal striations, some may be branched, short germinal furrow in between striations on proximal face; sacci hemispherical to semicircular, saccus intrareticulation coarse; sulcus distinct, wide and straight.

**Striatoabietites brickii** Sedova 1956
Holotype: Sedova 1956; pl. 41, fig. 5; size 120.6 x 71.7 µm

Locality: USSR
Horizon and Age: Kazanian-Kungurian, Permian
Diagnostic Features: Size 99.2-130 µm; central body subcircular, 55.7-71.7 µm, 6 or more horizontal striations; sulcus 20-35 µm wide.

**Genus Striatopiceites** Sedova 1956
Type Species: *Striatopiceites suchonensis* Sedova 1956
Locality: USSR
Horizon and Age: Kazanian, Permian
Diagnostic Features: Bisaccate, haploxylonoid pollen; central body indistinct, vertically oval; exine inframicroreticulate with many horizontal striations; sacci less than hemispherical, saccus intrareticulation medium; sulcus indistinct.

**Striatopiceites suchonensis** Sedova 1956
Holotype: Sedova 1956; pl. 41, fig. 7; size 83 – 110 µm

Locality: USSR
Horizon and Age: Kazanian, Permian
Diagnostic Features: Size 80-115 µm; zone of saccus attachment accompanied by narrow folds; sulcus 10-15 µm wide.

**Striatopiceites clarus** Kar 1970
Holotype: Kar 1970; pl. 2, fig. 40; size 72 x 64 µm; Slide No. BSIP 3470
Genus Striatopodocarpites Soritschewa and Sedova

Type Species: Striatopodocarpites (Taeniaesporites) antiquus Leschik 1956

Horizon and Age: Panchet Formation, Early Triassic

Diagnostic Features: Size 65-95 x 40-70 µm; central body ill-defined, vertically oval, exine inframicroreticulate, 6-12 horizontal striations; sacci hemispherical, distal attachment distinct and straight.

Locality: Bore-core No. RE9, depth 83 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic

Striatopodocarpites antiquus (Leschik) Soritschewa and Sedova 1954

Holotype: Leschik 1956; pl. 22, fig. 4; size 140 µm

Locality: Neuhof bei Fulda, Germany
Horizon and Age: Zechstein, Late Permian

Diagnostic Features: Bisaccate, bilateral diploxyloind pollen; central body circular to vertically oval, exine infra-microreticulate, number of horizontal striations on proximal face; saccus distally inclined leaving wide saccus-free-area.

Striatopodocarpites dubrajpurensis Tripathi, Tiwari and Kumar 1990

Holotype: Tripathi, Tiwari and Kumar 1990; pl. 3, fig. 10; size 91 x 71 µm; Slide No. BSIP 9323

Locality: Sample No. 1, Kalapani Limestone, Malla Johar area, Tethys Himalaya, India
Horizon and Age: Kalapani Limestone Formation, Middle Triassic

Diagnostic Features: Size 42-46 x 78-80 µm; exine 1 µm thick, 10-22 striations, no vertical partitions; sacci auriculate laterally 10-20 µm apart, distally inclined; sulcus 15-25 µm wide.

Striatopodocarpites auriculatus Vijaya and Tiwari in Vijaya, Kumar, Singh and Tiwari 1988

Holotype: Vijaya and Tiwari 1988; pl. 5, fig. 1; size 46 x 80 µm; Slide No. BSIP 9499

Locality: Sample No. 1, Kalapani Limestone, Malla Johar area, Tethys Himalaya, India
Horizon and Age: Kalapani Limestone Formation, Middle Triassic

Diagnostic Features: Size 101 x 140 µm; central body oval, bearing 15-21 striations; exine 10-22 striations, no vertical partitions; sacci auriculate laterally 10-20 µm apart, distally inclined; sulcus 15-25 µm wide.

Striatopodocarpites nidpurensis Bharadwaj and Srivastava 1969

Holotype: Bharadwaj and Srivastava 1969; pl. 25, fig. 32; size 105 x 85 µm; Slide No. BSIP 3206

Locality: Borehole RJR-2, sample No.32, depth 398.20-398.99 m, near Kazigaon, Rajmahal Basin, Bihar, India
Horizon and Age: Dubrajpur Formation, Late Triassic

Diagnostic Features: Size 91-126 x 57-67.5 µm; central body circular, bearing 15-21 striations; sacci intrareticulation coarse, muri thick, lumen 3-6 µm in diameter; distal sulcus 15-30 µm wide.
Archana Tripathi, Vijaya and Ram-Awatar

**Locality:** Nidpur, Sidhi District, Madhya Pradesh, India
**Horizon and Age:** Nidhpur, Early Triassic
**Diagnostic Features:** Size 87.5-130 x 40-85 µm; central body rhomboidal, 45-75 x 40-70 µm, 7-9 horizontal striations; saccus pitcher-shaped; sulus 5-15 µm wide.

**Genus** Strotersporites Wilson 1962
**Type Species:** Strotersporites communis Wilson 1962
**Locality:** Flowerpot Shale, Greer County, USA
**Horizon and Age:** Flowerpot Formation, Permian
**Diagnostic Features:** Bisaccate, bilateral diploxylonid pollen; central body distinct, exine laevigate or granular, 10-14 horizontal striations on proximal face, a rupture or striae present in the mideal rib; sacci reniform; sulus obscure.

**Strotersporites communis** Wilson 1962
**Holotype:** Wilson 1962; pl. 2, fig. 1; size 157.5 µm

**Locality:** Flowerpot Shale, Greer County, USA
**Horizon and Age:** Flowerpot Formation, Permian
**Diagnostic Features:** Size 120-185 µm; central body 65-80 µm, proximally ornamented with 10-14 flat ridges, often bifurcate, exine finely pitted; sacci reniform.

**Strotersporites raniganjensis** Kar 1970
**Holotype:** Kar 1970; pl. 2, fig. 37; size 80 x 44 µm, Slide No. BSIP 3478

**Locality:** Bore-core no. RE 9, depth 84 m, Raniganj Coalfield, West Bengal, India
**Horizon and Age:** Panchet Formation, Early Triassic
**Diagnostic Features:** Size 60-90 x 50-78 µm; central body mostly vertically oval, 6-13 horizontal striations.

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**NONSTRIATE BISACCATE POLLEN**

**Genus** Accinctisporites Leschik 1955
**Type Species:** Accinctisporites ligatus Leschik 1955
**Locality:** Neuwelt bei Basel, Switzerland
**Horizon and Age:** Keuper, Late Triassic
**Diagnostic Features:** Circular to oval, bisaccate pollen; central body flat, exine thick, indistinctly sculptured, radially 12 µm wide and parallel encroachment of saccus on body.

**Accinctisporites ligatus** Leschik 1955
**Holotype:** Leschik 1955; pl. 6, fig. 17; size 50 x 42 µm

**Locality:** Neuwelt bei Basel, Switzerland
**Horizon and Age:** Keuper, Late Triassic
**Diagnostic Features:** Circular; central body occupies major part of grain; exine 1.5 µm thick; saccus encroachment around body radially, 12 µm wide.

**Genus** Alisporites Daugherty emend. Jansonius 1971
**Type Species:** Alisporites opii Daugherty 1941
**Locality:** Versteinerter Wald National Monument, Arizona, USA
**Horizon and Age:** Chinle Formation, Late Jurassic
**Diagnostic Features:** Spherical to ovate, bisaccate pollen; central body distinct, vertically oval, exine inframicroreticulate; sacci ± reniform, saccus infrareticulation fine to medium; distal saccus-free area narrow.

**Alisporites opii** Daugherty emend. Jansonius 1971
**Holotype:** Daugherty 1941; pl. 34, fig. 2; size 80 x 100 µm
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Alisporites asansolensis Maheshwari and Banerji 1975
Holotype: Maheshwari and Banerji 1975; pl. 3, fig. 47; size 67 x 90 µm; Slide No. BSIP 4574-16
Locality: Versteinerter Wald National Monument, Arizona, USA
Horizon and Age: Chinle Formation, Late Jurassic
Diagnostic Features: Size 100-200 x 60-80 µm; central body oval to circular, 50-75 µm; exine 2 µm thick.

Alisporites damudicus Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 6, fig. 90; size 90 x 97.5 µm; Slide No. BSIP 5631
Locality: North-western branch of Nonia Nala, East of Kumarpur, District Burdwan, West Bengal
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 70-108 µm; central body subcircular, 52-60 µm, exine thin, sparsely punctate, usually thickened along periphery; sacci leathery, intrareticulation with thin muri; saccus-free-area often biconvex.

Alisporites grmobus Bharadwaj and Tiwari 1977
Holotype: Bharadwaj and Tiwari 1977; pl. 7, fig. 86; size 85 x 75 µm; Slide No. BSIP 7/1 – 4673
Locality: Borahole NCRD-6, sample no 7, depth 123.50 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 75-115 x 47-74 µm; circular to sub-oval; central body thin, vertically oval with round ends, exine finely inframicroreticulate; saccus intrareticulation coarse; distal sulcus 8-12 µm wide.

Alisporites indicus Bharadwaj and Srivastava 1969
Holotype: Bharadwaj and Srivastava 1969; pl. 28, fig. 78; size 65 x 47.5 µm; Slide No. BSIP 1943-9
Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Size 42-87.5 µm; central body vertically oval, with broad or truncate ends, exine inframicroreticulate; sacci coarsely intrareticulate; sulcus uniformly broad with thickened edges without median groove.

Alisporites ovalis Kumar 1973
Holotype: Kumar 1973; pl. 5, fig. 112; size 89 x 61.5 µm; Slide No. BSIP 3421/2
Locality: Borahole RD-I, sample no. 4, depth 532.48 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Size 60-97.5 µm; subcircular pollen with notched lateral sides; central body apparently vertically oval, thin, without a marked out line.
Locality: Harad River, near Hathnapur, Narsinghpur District, Madhya Pradesh, India
Horizon and Age: Jabalpur Formation, Jurassic
Diagnostic Features: Size 60-112 x 52.5-65 µm; central body broadly oval, exine 1.5 µm thick; sacculus intrareticulation coarse.

Genus Angustisulcites Freudenthal emend. Visscher 1966
Type Species: Angustisulcites klausi Freudenthal 1964
Locality: Hengelo Salt deposit, south of the city Hengelo, Oerijssel, The Netherlands
Horizon and Age: Upper Bunter, Early Triassic
Diagnostic Features: Diploxyylonoid, bisaccate pollen; central body oval to rhombic, equatorially thickened, asymmetrical trilete mark on proximal face, two longitudinal sutures situated equatorially; distal sulcus wide associated with folds.

Angustisulcites klausi Freudenthal 1964
Holotype: Freudenthal 1964; pl. 2, fig. 6; size 46 x 74 µm

Locality: Hengelo salt deposit, south of the city Hengelo, Oerijssel, The Netherlands
Horizon and Age: Upper Bunter, Early Triassic
Diagnostic Features: Size 57-95 µm; central body rhombic, exine 3-4.5 µm thick; sacci laterally interconnected; distal sulcus biconvex.

Genus Ashmoripollis Helby 1987
Type Species: Ashmoripollis reducta Helby 1987
Locality: Briagadier Beds, Carnarvon Basin, Well NR5, 2922 m depth, North-western Australia
Horizon and Age: Rhaetian to basal Hettangian, Late Triassic
Diagnostic Features: Size 43-81 x 41-72 µm; body exine very finely inframicroreticulate; sulcus (leptoma) bounded by labra, up to 7 µm wide, sulcus width vary up to 15 µm in the middle part.

Ashmoripollis reducta Helby 1987
Holotype: Helby 1987; fig. 1A; size 59 x 55 µm

Locality: Briagadier Beds, Carnarvon Basin, Well NR5, 2922 m depth, North-western Australia
Horizon and Age: Rhaetian to basal Hettangian, Late Triassic
Diagnostic Features: Bisaccate vertically oval pollen, sacci reduced to crescent shaped rim, with inflation usually confined to a small mamillate protrusion in the mid equatorial portion of each saccus; distal surface of body marked by labrate saccus free area (leptoma).

Brachysaccus ovalis Mädler 1964
Holotype: Mädler 1964; pl. 3, fig. 5; size 166 x 128 µm

Locality: Jena, Thuringia, Germany
Horizon and Age: Upper Buntsandstein, Early Triassic
Diagnostic Features: Size 140-166 µm high x 128-130 µm wide; central body exine thick and fragile
giving a columellate appearance at the margin; sulcus 9-14 µm wide.

**Brachysaccus indicus** Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 7, fig. 2; size 100 µm; Slide No. BSIP 5969

Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 100-115 µm long x 92-100 µm broad; exine about 2 µm thick, with fine intrareticulum; sulcus 4-6 µm wide, extending full length of central body.

**Brachysaccus triassicus** Tripathi, Tiwari and Kumar 1990
Holotype: Tripathi, Tiwari and Kumar 1990; pl. 2, fig. 16; size 87.5 x 92.5 µm; Slide No. BSIP 8472

Horizon and Age: Dubrajpur Formation, Late Triassic
Diagnostic Features: Size 92.5-120 µm long x 85-115 µm broad, broadly oval; central body outline generally distinct, sometimes obscure; sulcus 10-25 µm wide and full length.

**Genus Caytonipollenites** Couper 1958
Type Species: *Caytonipollenites (Pityosporites) pallidus* (Reissenger) Couper 1958
Locality: Germany
Horizon and Age: Liassic, Early Jurassic
Diagnostic Features: Bisaccate haploxylonoid pollen; central body oval, exine thin, scabrate to smooth; sacci slightly inclined towards inner side on distal face; sulcus straight, full length.

**Caytonipollenites pallidus** (Reissenger) Couper 1958
Holotype: Reissinger 1938; not figured

Locality: Germany
Horizon and Age: Liassic, Early Jurassic
Diagnostic Features: Size 20-38 µm; exine 0.5-0.75 µm thick.

**Genus Cedripites** Wodehouse 1933
Type Species: *Cedripites eocenicus* Wodehouse 1933
Locality: Colorado, USA
Horizon and Age: Green River Formation, Eocene
Diagnostic Features: Bisaccate pollen; central body 46 µm, exine finely inframicroreticulate to granulate, a ridge appear around equator; sacci large flaccid, loosely enveloping very close on proximal face.

**Cedripites eocenicus** Wodehouse 1933
Holotype: Wodehouse 1933; pg. 489, fig. 13; size 51-56 µm

Locality: Colorado, USA
Horizon and Age: Green River Formation, Eocene
Diagnostic Features: Size 50-60 µm; central body 45-60 µm, exine 1 µm thick; sacci large, enclosing major part of the central body.

**Genus Colpectopollis** Pflüg emend. Visscher 1966
Type Species: *Colpectopollis occupatus* Pflüg 1953
Locality: Wehmingen bei Sarstedt, Hannover, Germany
Horizon and Age: Liassic, Early Jurassic
Diagnostic Features: Bilateral, elliptical bisaccate haploxylonoid pollen; central body oval, exine thick; sacci less than hemispherical, laterally interconnected; sulcus on distal face indistinct, fusiform.

Colpectopollis occupatus Pflug 1953
Holotype: Pflug 1953; pl. 17, figs. 7-9; size 25 µm
Locality: Wehmingen bei Sarstedt, Hannover, Germany

Horizon and Age: Liassic, Early Jurassic
Diagnostic Features: Size 20-30 µm; germinal crest on central body proximally; sacci rudimentary.

Genus Cristatisaccus Mädler 1964
Type Species: Cristatisaccus margaritatus Mädler 1964
Locality: Jena, Thuringia, Germany
Horizon and Age: Oberer Buntsandstein, Early Triassic
Diagnostic Features: Bisaccate pollen; central body high, margin with perforated papillae or rugulae, wide ridge around body equator; sulcus wide and full length.

Cristatisaccus margaritatus Mädler 1964
Holotype: Cristatisaccus margaritatus Mädler 1964; pl. 4, fig. 8; size 78 µm
Locality: Jena, Thuringia, Germany
Horizon and Age: Oberer Buntsandstein, Early Triassic
Diagnostic Features: Size 26 x 38 µm; central body vertically oval, 14 µm broad ridge quatorially; distal sulcus 10-15 µm wide.

Genus Cuneatisporites Leschik 1955
Type Species: Cuneatisporites radialis Leschik 1955
Locality: Neuewelt, bei Basal, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Diploxylonoid, bisaccate pollen; central body oval to round, exine finely inframicroreticulate; sacci more than hemispherical, laterally connected; sulcus wide, biconcave, associated with semilunar folds.

Cuneatisporites radialis Leschik 1955
Holotype: Leschik 1955; pl. 10, fig. 6; size 70 x 120 µm
Locality: Neuewelt, bei Basal, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Central body oval, exine 2 µm thick, finely granulose.

Cuneatisporites mirabilis Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 6, fig. 85; size 96 x 56.5 µm; Slide No. BSIP 5638
Locality: Borehole RD-1, sample no. 5, depth 600.58 m; Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 96 x 54 µm; slightly diploxylonoid; central body big, subcircular, exine finely inframicroreticulate; sacci hemispherical zone of saccus attachment associated with semilunar folds; distal sulcus slightly biconvex, 32 µm wide.

Genus Cyclosaccus Mädler 1964
Type Species: Cyclosaccus podocarpoides Mädler 1964
Locality: Harz Mountain, 123 km NW Jena, Germany
Horizon and Age: Unterer Keuper, Late Triassic
Cyclosaccus podocarpoides Mädler 1964
Holotype: Mädler 1964; pl. 12, fig. 10; size 83 µm
Locality: Harz Mountain, 123 km NW Jena, Germany

Horizon and Age: Unterer Keuper, Late Triassic
Diagnostic Features: Size 68-76 µm; central body subcircular, exine 2 µm thick; sulcus ill-defined.

Genus Falcisporites Leschik emend. Klaus 1963
Type Species: Pityosporites zapfei Potonié and Klaus 1954
Locality: Alpinen Salzgebirges, Austria
Horizon and Age: Buntsandstein, Early Triassic
Diagnostic Features: Size 40-70 x 55-120 µm; central body vertically oval; distal sulcus with median groove.

Falcisporites minutisaccus Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 7, fig. 7; size 65 µm; Slide No. BSIP 5916
Locality: Eastern bank of Janar Nala about 2 km southeast of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 63-72 µm; central body distinct, vertically oval, 42-50 µm long, 35-40 µm broad; sacci small and less inflated; distal sulcus distinct, narrow and fusiform.

Genus Granosaccus Mädler 1964
Type Species: Granosaccus sulcatus Mädler 1964
Locality: Harz Mountain, Germany
Horizon and Age: Lower Keuper, Late Triassic
Diagnostic Features: Bisaccate, broadly circular to rounded pollen; central body big, circular to ovalish, exine thick, infragranulose to infrapunctate; sacci rudimentary, covering maximum part of body; distal sulcus narrow to wide.

Localities and horizons are described for each species, detailing their characteristics and locations.
Locality: Jaisalmer Basin, Western Rajasthan, India
Horizon and Age: Carnian, Late Triassic
Diagnostic Features: Generally in tetrad; size 42-51 x 19-24 µm; central body exceptionally large, exine ornamented with varied sculptural elements – gemma, pilā and verrucae along with 3 to 4 warts of sacci size, in between granulate; sacci bean or kidney shaped, 8-12 µm; distally placed, wide sulcus.

Genus Klausipollenites Jansonius 1962
Type Species: Pitiosporites schaubergeri Potonié and Klaus 1954
Locality: Salzberg Hallstatt, Austria
Horizon and Age: Buntsandstein, Early Triassic
Diagnostic Features: Bisaccate, bluntly oval pollen; central body oval, exine finely reticulate; sacci crescent to half circular, distally displaced, merging almost with central body outline.

Klausipollenites schaubergeri Potonié and Klaus 1954
Holotype: Potonié and Klaus 1954; pl. 10, fig. 7; size 40 x 65 µm

Locality: Locality: Salzberg Hallstatt, Austria
Horizon and Age: Buntsandstein, Early Triassic
Diagnostic Features: Size 25-70 µm; central body vertically oval, exine less than 1 µm thick with irregular reticulum; distal saccus wide.

Genus Krempipollenites Tiwari and Vijaya 1995
Type Species: Krempipollenites indicus Tiwari and Vijaya 1995
Locality: Borehole PGD-2, depth 358.50 m, Panagarh Basin, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Haploxylonoid, bisaccate horizontally oval pollen; central body distinct, exine finely inframicroreticulate; sacci bases distally merging with sexine, distal saccus-free area apparently wide and full-length of the body.

Krempipollenites indicus Tiwari and Vijaya 1995
Holotype: Tiwari and Vijaya 1995; pl. 13, fig. 1; size 44 x 66 µm; Slide No. BSIP 11459

Locality: Jena, Thuringia, Germany
Horizon and Age: Muschelkalk, Middle Triassic
Diagnostic Features: Central body 30 x 33 µm; sacci 18-20 x 20-46 µm; sulcus 2 µm wide.

Minutosaccus Mädler 1964
Type Species: Minutosaccus acutus Mädler 1964
Locality: Jena, Thuringia, Germany
Horizon and Age: Muschelkalk, Middle Triassic
Diagnostic Features: Diploxylonoid, bisaccate pollen; central body distinct, exine inframicroreticulate; sacci small less than hemisphere.

Minutosaccus acutus Mädler 1964
Holotype: Mädler 1964; pl. 7, fig. 7; size 46 µm

Locality: Jena, Thuringia, Germany
Horizon and Age: Muschelkalk, Middle Triassic
Diagnostic Features: Size 40-80 µm; sacci laterally connected, 1-2 µm wide; distal saccus 10-15 µm broad.

Genus Minutosaccus Mädler 1964
Type Species: Minutosaccus acutus Mädler 1964
Locality: Jena, Thuringia, Germany
Horizon and Age: Muschelkalk, Middle Triassic
Diagnostic Features: Diploxylonoid, bisaccate pollen; central body distinct, exine inframicroreticulate; sacci small less than hemisphere.

Minutosaccus indicus Tiwari and Vijaya 1995
Holotype: Tiwari and Vijaya 1995; pl. 13, fig. 1; size 44 x 66 µm; Slide No. BSIP 11459

Locality: Borehole PGD-2, depth 358.50 m, Panagarh Basin, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 40-80 µm; sacci laterally connected, 1-2 µm wide; distal saccus 10-15 µm broad.

Minutosaccus acutus Mädler 1964
Holotype: Mädler 1964; pl. 7, fig. 7; size 46 µm

Locality: Jena, Thuringia, Germany
Horizon and Age: Muschelkalk, Middle Triassic
Diagnostic Features: Central body 30 x 33 µm; sacci 18-20 x 20-46 µm; sulcus 2 µm wide.
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**Genus Nidipollenites** Bharadwaj and Srivastava 1969
Type Species: *Nidipollenites monoletus* Bharadwaj and Srivastava 1969
Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Size 107-127 x 60-109 µm; central body fusiform, exine thin, saccus intramicroreticulation medimuly coarse, distally saccus attachacement straight; sulcus 12.5-15 µm wide.

*Nidipollenites monoletus* Bharadwaj and Srivastava 1969
Holotype: Bharadwaj and Srivastava 1969; pl. 24, fig. 13; size 127.5 x 87.5 µm; Slide No. BSIP 3196-10
Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Size 45-65 µm; central body transversely elongate-oval to subcircular, exine 1-2 µm thick; sacci small, less inflated; distal sulcus 1-4 µm wide.

**Genus Ovalipollis** Krutzsch emend. Pocock and Jansonius 1969
Type Species: *Ovalipollis ovalis* Krutzsch 1955
Locality: Bohrung Altmarks, Germany
Horizon and Age: Liassic, Jurassic
Diagnostic Features: Longitudinally oval bisaccate pollen; central body rhomboish to oval, exine thin, infrangranulose; straight slit extend on distal face of body.

*Ovalipollis ovalis* Krutzsch 1955
Holotype: Krutzsch 1955; pl. 1, fig. 2; size 17 x 114.4 µm
Locality: Bohrung Altmarks, Germany
Horizon and Age: Liassic, Jurassic
Diagnostic Features: Horizontaly oval diploxylonoid pollen; central body subcircular, big, exine inframicroreticulate to microverucose; sacci more than hemispherical, proximally equatorially attached, on distal face pandently hanged.

**Genus Pinuspollenites** Raatz 1937
Type Species: *Pinuspollenites (Pollenits) labdacus* Potonié 1931
Locality: Vilde b. Köln, Beisslsgrube, Germany
Horizon and Age: (Oligocene) Miocene
Diagnostic Features: Horizontally oval diploxylonoid pollen; central body oval, proximally flat, two tenuitas 12-30 µm in diameter at polar ends on proximal face, distally a longitudinal furrow, 39-90 µm long, flanked by lips.

*Pinuspollenites labdacus* Raatz 1937
Lectogenotype: Potonié and Venitz 1934; pl. 2, fig. 25; size 72 µm
Locality: Vilde b. Köln, Beisslsgrube, Germany
Horizon and Age: (Oligocene) Miocene
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**Platysaccus papilionis** Potonié and Klaus 1954
Neotype: Potonié and Klaus 1954; pl. 10, fig. 12; size 106 µm

Locality: Salzberg Hallstatt, Austria
Horizon and Age: Late Permian
Diagnostic Features: Size 33-200 µm; central body circular, equatorially thickened; sacci with radial pattern around central body.

**Genus Plicatisaccus** Pautsch 1971
Type Species: *Plicatisaccus badius* Pautsch 1971
Locality: Trzciana bei Mielec, South Poland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Bisaccate, circular to broadly elliptical pollen; central body circular to oval, exine smooth to granular, indistinct to prominent, marginal crest around body; sacci attached not to full length of body height; sulcus wide.

*Podocarpidites ellipticus* Cookson 1947
Holotype: Cookson 1947; pl. 13, figs. 5-7; size 45-61 µm
Lectotype: Cookson 1947; pl.13, fig.6

*Podocarpeae pollenites* Thiergart 1949
Type Species: *Podocarpeae pollenites (Pollenites) trialatus* Thiergart 1949
Locality: Blatt Langenhagen, Germany
Horizon and Age: Dögger, Jurassic
Diagnostic Features: Size 70-110 µm; central body relatively small, 30-35 µm; exine ± 1 µm thick, infragranaulose; sacci widely separated on distal face.

*Podocarpeae pollenites* trialatus Thiergart 1949
Holotype: Thiertgart 1949; pl. 2, fig. 20; size 110 µm

*Podocarpeae pollenites* Thiergart 1949
Localy: Blatt Langenhagen, Germany
Horizon and Age: Dögger, Jurassic
Diagnostic Features: Bisaccate diploxyloid big pollen; central body broadly circular; sacci more than hemispherical, attached with shorter axis on body.
Podocarpidites alareticulosus Sah and Jain 1965
Holotype: Sah and Jain 1965; pl. 6, fig. 119; size 72 x 60 µm; Slide No. BSIP 28038-82/7
Locality: Kerguelen, Archipelago
Horizon and Age: Tertiary
Diagnostic Features: Size 29-42 x 26-40 µm; central body slightly angular, exine finely granular; sulcus 18 µm wide.

Podocarpidites grandis Sah and Jain 1965
Holotype: Sah and Jain 1965; pl. 6, fig. 115; size 68 x 120 µm; Slide No. BSIP 3110-62/7
Locality: Basko, Rajmahal Hills, Bihar, India
Horizon and Age: Rajmahal Formation, Jurassic
Diagnostic Features: Diploxyylonoid, size 112-130 x 70-100 µm; central body oblong; sacci much smaller than the body, intrareticulation coarse; distal sulcus wide.

Podocarpidites typicus Sah and Jain 1965
Holotype: Sah and Jain 1965; pl. 6, fig. 121; size 80 µm; Slide No. BSIP 28038-86/9
Locality: Basko, Rajmahal Hills, Bihar, India
Horizon and Age: Rajmahal Formation, Jurassic
Diagnostic Features: Size 60-80 µm; central body ± rounded or oblong; sacci smaller than body, flattened.

Podocarpidites rarus Singh, Srivastava and Roy 1964
Holotype: Singh, Srivastava and Roy 1964; pl. 8, fig. 103; Slide No. BSIP 1805
Locality: Umaia Bed, Trambu and Ghuneri (?), Kutch
Horizon and Age: Umaia Bed, Early Cretaceous
Diagnostic Features: Size 82-98 µm; central body subcircular to vertically oval, ± 66 µm, exine finely granulose; distal sulcus ± 18 µm.

Podocarpidites vermiculatus Kumar 1973
Holotype: Kumar 1973; pl. 6, fig. 126; size 65 x 36 µm; Slide No. BSIP 3421/2
Locality: Harad River, near Hathnapur, Narsinghpur District, Madhya Pradesh, India
Horizon and Age: Jabalpur Formation, Early Cretaceous
Diagnostic Features: Size 44-82.5 x 30-53 µm; central body roundly oval, exine thin, vermiculate.

**Genus Rimaesporites** Leschik 1955  
Type Species: *Rimaesporites potoniei* Leschik 1955  
Locality: Neuwelt bei Basal, Switzerland  
Horizon and Age: Keuper, Late Triassic  
Diagnostic Features: Bisaccate, laterally flattened oval pollen; sacci generally merge with central body on distal face, leaving narrow to wide sulcus.

*Rimaesporites potoniei* Leschik 1955

Type Species: Leschik 1955; pl. 10, fig. 7; size 140 x 100 µm  
Locality: Neuwelt bei Basal, Switzerland  
Horizon and Age: Keuper, Late Triassic  
Diagnostic Features: Size 115-125 µm; sacci on distal face leaving about 50 µm wide sulcus.

**Genus Sahnites** Pant emend. Tiwari and Singh 1984  
Type Species: *Sahnites (Pityosporites) gondwanensis* Mehta 1944  
Locality: Pali Bed, South Rewa Basin, Madhya Pradesh, India  
Horizon and Age: Panchet Formation, Early Triassic  
Diagnostic Features: Bisaccate, haploxylonoid pollen; central body vertically oval with flat-ends to rhomboid; exine inframicroreticulate, linear scar or distinct trilete mark of variable length on proximal face, distal saccus-free-area broad, straight to convex and associated with semilunar folds; sacci less than hemispherical, often continued laterally by a narrow strip.

*Sahnites gondwanensis* (Mehta) Pant emend. Tiwari and Singh 1984  
Holotype: Mehta 1944; pl. 1, fig. 1  
Neotype: Tiwari and Singh 1984; pl. 4, fig. 24; size 113.5 x 56 µm; Slide No. BSIP 8449

Sahmites panchetensis Tiwari and Singh 1984

Holotype: Tiwari and Singh 1984; pl. 6, figs. 51, 52; size 88 x 55 µm; Slide No. BSIP 8447

Locality: Borehole RAD-4, sample No 13, depth 377 m, Raniganj Coalfield, West Bengal, India  
Horizon and Age: Panchet Formation, Early Triassic  
Diagnostic Features: Diploxylonoid; size 50-100 x 35-60 µm; central body sub-oval to rhombic, 40-62 µm with 2-3 µm wide equatorial rim; on proximal face bi-trilete mark; sacci more than hemispherical, laterally not connected; distal sulcus 10-20 µm wide.

**Genus Samaropollenites** Goubin 1965  
Type Species: *Samaropollenites speciosus* Goubin 1965  
Locality: Sondages du Bassin, Morondava, Madagascar  
Horizon and Age: Middle Triassic  
Diagnostic Features: Bisaccate haploxylonoid pollen; central body oval to rhombic, exine infrapunctate; sacci distally inclined leaving narrow saccus-free-area.

*Samaropollenites speciosus* Goubin 1965  
Holotype: Goubin 1965; pl. 6, fig. 2; size 75 µm
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**Samaropollenites indicus** Misra, Prasad and Rawat 1996
Holotype: Misra, Prasad and Rawat 1996; pl. 2, fig. 2; size 50 x 40 µm

Locality: Jaisalmer Basin, Western Rajasthan, India
Horizon and Age: Carnian, Late Triassic
Diagnostic Features: Size 38-52 x 26-32 µm; central body transversely oval.

**Genus Satsangisaccites** Bharadwaj and Srivastava 1969
Type Species: **Satsangisaccites nidpurensis** Bharadwaj and Srivastava 1969
Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Bisaccate, haploxylonoid pollen; central body rhomboidal to vertically oval; sacci proximally attached, equatorially associated with semilunar fold; distal sulcus fusiform with a median groove extending its whole length.

**Satsangisaccites nidpurensis** Bharadwaj and Srivastava 1969
Holotype: Bharadwaj and Srivastava 1969; pl. 27, fig. 6; size 14.5 x 86.5 µm; Slide No. BSIP 3213-10 II

**Genus Scheuringipollenites** Tiwari 1973
Type Species: **Scheuringipollenites (Vesicaspora) maximus** (Hart) Tiwari 1973
Locality: Mchuchuma River Valley, coal 3 ft. above C.S. 12 of McKinlay, Lower Measures, K2, Ketewaka-Mchuchuma Coalfield, Tanganyika
Horizon and Age: Ecca Series (Karoo), Permian
Diagnostic Features: Bisaccate, haploxylonoid, circular to vertical or horizontally oval pollen; central body thin, mostly indistinct, rarely visible; sacci hemispherical, proximally encroaching the central body and apparently merging without any break, distal attachment mostly faint, close to one another may be accompanied by vertical folds, saccus infrareticulation fine to medium; distal sulcus not defined.

**Scheuringipollenites maximus** (Hart) Tiwari 1973
Holotype: Hart 1960; pl. 3, fig. 33; size 128 x 122 µm
Locality: Mchuchuma River Valley, coal 3 ft. above C.S. 12 of McKinlay, Lower Measures, K2, Ketewaka-Mchuchuma Coalfield, Tanganyika
Horizon and Age: Ecca Series (Karoo), Permian
Diagnostic Features: Circular to subcircular; size 70-150 µm along horizontal axis.

*Scheuringipollenites royi* (Bharadwaj and Srivastava) Tiwari 1973
Holotype: Bharadwaj and Srivastava 1969; pl. 28, fig. 71; size 52.5x50 µm; Slide No. BSIP 1894-8

Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Oval to subcircular; size 40-67.5 x 40-60 µm; central body oval; sacci intrareticulation coarse with small bacula within the meshes.

*Scheuringipollenites triassicus* (Bharadwaj and Srivastava) Tiwari 1973
Holotype: Bharadwaj and Srivastava 1969; pl. 28, fig. 69; size 102.5 x 102.5 µm; Slide No. BSIP 3215-1

Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Circular, size 80-102.5 x 75-102.5 µm; sacci intrareticulation with narrow muri and big meshes with fine bacula.

**Genus** *Staurosaccites* Dolby in Dolby and Balme 1976
Type Species: *Staurosaccites quadrifidus* Dolby in Dolby and Balme 1976
Locality: Onslow No.1 Well, core 7, sample at 1448.5 m, Carnarvon Basin, western Australia
Horizon and Age: Mungaroo Beds, Middle to Late Triassic
Diagnostic Features: Bisaccate, haploxylonoid, circular or slightly oval pollen; central body dissected into two equal halves by a single, sharply defined, narrow, transverse polar cleft, exine finely and densely columellate; sacci little inflated, saccus exoeine finely columellate and not clearly differentiated from that of central body exine; distal sulcus narrow, linear and full length of the central body, proximal cleft and sulcus form a rectilinear cross.

*Staurosaccites quadrifidus* Dolby in Dolby and Balme 1976
Holotype: Dolby in Dolby and Balme 1976; pl. 1, fig. 17; size 47-78 x 44-71 µm

Locality: Onslow No.1 Well, core 7, sample at 1448.5 m, Carnarvon Basin, Western Australia
Horizon and Age: Mungaroo Beds, Middle to Late Triassic
Diagnostic Features: Size 47-78 x 44-71 µm; central body equatorially about 10 µm thick, polar cleft 2-4 µm wide with weakly crenulated margin.

*Staurosaccites densus* Kumaran and Maheshwari emend. Tripathi, Tiwari and Kumar 1990
Holotype: Kumaran and Maheshwari 1980; pl. 8, fig. 1; size 100 µm; Slide No. BSIP 5980
Localities: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 100–120 µm, central body dense, circular conforming to overall shape, 55–75 µm; with 5 µm wide marginal rim, inner body outline indistinct with irregular folds, laevigate.

*Staurosaccites marginalis* Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 8, fig. 10; size 100 µ; Slide No. BSIP 5926

Localities: Eastern Bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 60–90 µm; central body distinct, horizontally oval to rhomboidal, 55–80 µm, leaving 2–5 µm wide body-free equatorial region, two taeniae formed by transverse polar clefts running transversely over central body.

*Staurosaccites ovalis* Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 8, fig. 11; size 98 µm; Slide No. BSIP 5951

Localities: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 90–100 µm; central body circular to rhomboidal, transparent, large and occupying almost the entire space of the pollen grain, leaving 3–10 µm wide body-free equatorial region.

*Staurosaccites minutus* Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 8, fig. 8; size 84 µm; Slide No. BSIP 5999

Localities: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Horizontally oval pollen, size 100–120 x 75–95 µm; central body horizontally oval, 65–90 x 50–63 µm, body exine thick with marginal rim.

*Staurosaccites tharipatharenisis* Kumaran in Maheshwari and Kumaran 1979
Holotype: Kumaran in Maheshwari and Kumaran 1979; pl. 5, fig. 9; size 70 µm; Slide No. BSIP 5670
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Localities: Son River Section, West of Tharipathar Village, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Circular to slightly rhomboidal, size 58-80 µm; central body conforming overall shape; sacchi compact.

**Genus Triadispora** Klaus 1964
Type Species: *Triadispora plicata* Klaus 1964
Localities: Kochendorf bei Heilbronn, Germany
Horizon and Age: Middle Muschelkalk, Middle Triassic
Diagnostic Features: Bisaccate, diploxyloïd pollen; central body oval, small smooth area developed around trilete mark on central body, exine infrapunctate to granulate; sacchi attachment sub-equatorial on proximal face, laterally continuous; sulcus subcircular.

*Triadispora plicata* Klaus 1964
Holotype: Klaus 1964; pl. 2, fig. 15; size 70 µm

Localities: Kochendorf bei Heilbronn, Germany
Horizon and Age: Middle Muschelkalk, Middle Triassic
Diagnostic Features: Size 65-70 µm; exine distinctly granulose; distal sulcus 15-20 µm.

**Genus Vitriceisporites** Leschik emend. Jansonius 1962
Type Species: *Vitriceisporites signatus* Leschik 1955
Localities: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Oval, size 21-26 µm; on proximal face very faint trilete mark; 3-5 µm wide thickening at the base of sacchi.

*Vitriceisporites signatus* Leschik 1955
Holotype: Leschik 1955; pl. 8, fig. 10; size 28 µm

Localities: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Bisaccate, haploxyloïd, bilaterally to oval, relatively very small pollen; central body very thin, outline indistinct; sacchi more than hemispherical; distal sulcus straight, full length.

*Vitriceisporites savitrii* Kumar 2000
Holotype: Kumar 2000; pl. 1, fig. 9; size 28 x 22 µm; Slide No. BSI 12256
Localities: Anhoni Village, Chhindwara District, Madhya Pradesh, India
Horizon and Age: Denwa Formation, Late Triassic
Diagnostic Features: Size 52-70.5 x 22-52 µm; exine inframicroreticulation faintly developed; sacchi feebly intramicroreticulate, lumen puncta like but feebly.

*Vitriceisporites savitrii* Kumar 2000
Holotype: Kumar 2000; pl. 1, fig. 9; size 28 x 22 µm

Localities: Frankreich, Adamswiller, Germany
Horizon and Age: Upper Buntsandstein, Early Triassic
Diagnostic Features: Bisaccate, bilateral haploxyloïd pollen; central body distinct, exine punctate to smooth sometimes with feeble monolete or trilete mark; sacchi form highly variable; distal sulcus indistinct, wide and smooth.

**Genus Voltziaceaesporites** Klaus 1964
Type Species: *Voltziaceaesporites hetromorpha* Klaus 1964
Localities: Frankreich, Adamswiller, Germany
Horizon and Age: Upper Buntsandstein, Early Triassic
Diagnostic Features: Size 70-150 µm; central body exine thickness vary, punctate; distal sulcus broadly oval.

*Voltziaceaesporites hetromorpha* Klaus 1964
Holotype: Klaus 1964; pl. 2, fig. 19; size 125 µm

Localities: Frankreich, Adamswiller, Germany
Horizon and Age: Upper Buntsandstein, Early Triassic
Diagnostic Features: Size 70-150 µm; central body exine thickness vary, punctate; distal sulcus broadly oval.
**TAENIATE BISACCATE POLLEN**

**Genus** *Arcuatipollenites* Tiwari and Vijaya 1995  
**Type Species:** *Arcuatipollenites* (*Taeniaesporites*) *ovatus* Goubin 1965  
**Locality:** Morondava Basin, LD1, 2484 m, Madagascar  
**Horizon and Age:** Group Sakamena, Middle Triassic  
**Diagnostic Features:** Bisaccate, haplo- or diploxylo-noid, bilateral pollen; central body distinct, ovalish-circuloid with slightly curved or flat lateral ends; 4-6 taeniae (may be more) on proximal face, exine inframicroreticulate; sacci less than hemispherical, distal saccus attachment accompanied with lunar folds; sulcus distinct and wide.  

*Arcuatipollenites ovatus* (Goubin) Tiwari and Vijaya 1995  
**Holotype:** Goubin 1965; pl. 2, fig. 3; size 62 µm  
**Locality:** Morondova Basin, LD1, 2484 m, Madagascar  
**Horizon and Age:** Group Sakamena, Middle Triassic  
**Diagnostic Features:** Size 55-90 µm; central body ovalish-circuloid with slightly curved or flat lateral ends; taeniae 4-6.  

*Arcuatipollenites asansoliensis* (Tiwari and Rana) Tiwari and Vijaya 1995  
**Holotype:** Tiwari and Rana 1981; pl. 4, fig. 59; size 60 µm; Slide No. BSIP 5637  
**Locality:** Borahole RNM-4, sample no. 5, depth 59.00 m, Raniganj Coalfield, West Bengal, India  
**Horizon and Age:** Mahadeva Formation, Middle Triassic  
**Diagnostic Features:** Pronounced diploxylonoid; central body horizontally oval, dense, 4 to 5 taeniae; sulcus 10 µm wide.  

*Arcuatipollenites paliensis* (Tiwari and Ram-Awatar) Tiwari and Vijaya 1995  
**Holotype:** Tiwari and Ram-Awatar 1989; pl. 1, fig. 14; size 40 x 110 µm; Slide No. BSIP 9305  
**Locality:** Borahole JHL - 23, depth 203.0-204.0 m; about 9 km east from Birsinghpur-Pali, Johilla Coalfield, Madhya Pradesh, India  
**Horizon and Age:** Barakar Formation, Early Permian  
**Diagnostic Features:** Circuloid shape; central body big, subcircular to oval, faintly demarcated; taeniae 3-5; sacci less than hemispherical, distally inclined; sulcus 10-20 µm wide.  

*Arcuatipollenites pellucidus* (Goubin) Tiwari and Vijaya 1995  
**Holotype:** Goubin 1965; pl. 2, fig. 4; size 70 µm  
**Horizon and Age:** Panchet Formation, Early Triassic  
**Diagnostic Features:** Central body vertically elongated and trapezoid, 3-6 µm thick equatorial rim; taeniae 3-4; sacci kidney-shape or crescent-like, not fully blown; sulcus biconcave, 15-27 µm wide.  

*Arcuatipollenites damudicus* (Tiwari and Rana) Tiwari and Vijaya 1995  
**Holotype:** Tiwari and Rana 1980; pl. 2, figs. 48, 49; size 60 x 30 µm; Slide No. BSIP 5550  
**Locality:** Borahole RD-I, sample no. 5, depth 600.58 m, Raniganj Coalfield, West Bengal, India
Locality: Morondava Basin, IDI 2484 m, Madagascar
Horizon and Age: Group Sakamena, Early Triassic
Diagnostic Features: Size 68-85 x 51-60 µm; central body almost indistinct, broadly oval to rhombish, taeniae 4-9.

_Arcuatipollenites tethysensis_ (Vijaya and Tiwari) Tiwari and Vijaya 1995
Holotype: Vijaya and Tiwari in Vijaya, Kumar, Singh and Tiwari 1988; pl. 5, fig. 7; size 86 µm; Slide No. BSIP 9499

Locality: Sample No.1, Kalapani Limestone, Malla Johar area, Tethys Himalaya, India
Horizon and Age: Kalapani Limestone Formation, Middle Triassic
Diagnostic Features: Size 60-68 µm; central body distinct, oval with broader lateral ends, taeniae 5-6, each taeniae bearing 2-4 faint horizontal stria-tion-like lines; sacci less than hemispherical; sulcus 5-20 µm wide.

_Genus Chordasporites_ Klaus 1960
Type Species: _Chordasporites singulichorda_ Klaus 1960
Locality: Bellerophon beds, Southern Alps
Horizon and Age: Carnian, Late Triassic
Diagnostic Features: Bisaccate, horizontally elongated pollen; central body distinct, trapezoid, exine micropunctate to microrugulate, a wavy linear thickening (chord) of exine on proximal face; sacci more than hemispherical; distal sulcus broad.

_Chordasporites singulichorda_ Klaus 1960
Holotype: Klaus 1960; pl. 33, fig. 45; size 70-80 µm

Locality: Bellerophon beds, Southern Alps
Horizon and Age: Carnian, Late Triassic
Diagnostic Features: Size 70-80 µm; equatorial thickening around central body, thin areas adjacent to chord, chord 3-4 µm thick; distinct sulcus 15-20 µm wide.

_Chordasporites klausii_ Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 9, fig. 5; size 102 µm; Slide No. BSIP 5918
Locality: Eastern bank of Janar Nala about 2 km southeast of Bijouri, District Shahdol, Madhya Pradesh, India

Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Mostly diploxylonoid, size 85-100 µm; central body subcircular to transversely oval, broader than long, 36-52 x 40-54 µm, exine laevigate or slightly inframicrorugulate; chorda 6-18 µm wide with bulbous intermediary projections and slightly sinuous margins.

_Chordasporites raniganjensis_ Maheshwari and Banerji 1975
Holotype: Maheshwari and Banerji 1975; pl. 4, fig. 52; size 47.5 x 90 µm; Slide No. BSIP 4602-11
Locality: North-western branch of the Nonia Nala, East of Kumarpur, District Burdwan, Bengal, India
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Horizon and Age: Panchet Formation, Early Triassic Diagnostic Features: Size 80-90 x 40-50 µm; central body distinct, vertically oval to subcircular, 46-52 x 44-52 µm; exine laevigate to feebly infra-granulose; saccus distally subequatorial and associated with two vertical infields.

**Genus Infernopollenites** Scheuring 1970
Type Species: *Infernopolites (Umbrellisaccus) sulcatus* (Pautsch) Scheuring 1970
Locality: Pomerania-Kujawy, Anticlinorium, Poland Horizon and Age: Keuper, Late Triassic Diagnostic Features: Bisaccate, haplo-diploxylooid pollen; central body oval, longer than broad, proximally surface clefted in 2-4 taeniae; sacci less than hemispherical, intrareticulation coarse.

*Infernopolites sulcatus* (Pautsch) Scheuring 1970
Holotype: Pautsch 1971; pl. 11, fig. 3; size 104 µm
Locality: Pomerania- Kujawy, Anticlinorium, Poland Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Bisaccate, haplo-diploxylooid pollen; central body oval, longer than broad, proximally surface clefted in 2-4 taeniae; sacci less than hemispherical, intrareticulation coarse.

*Infernopolites janarensis* Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 10, fig. 10; size 84 µm, Slide No. BSIP 6119
Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic Diagnostic Features: Size 85-105 µm; central body horizontally oval to subcircular, 45-65 x 40-70 µm, 2-3 narrow proximal transverse clefts dissect into 3-4 taeniae, body exine faintly to distinctly punctate.

*Infernopolites pseudoclaustratus* Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 10, fig. 7; size 112 µm; Slide No. BSIP 5941
Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 80-100 µm; central body subcircular to vertically oval, 45-65 x 40-70 µm, 2-3 narrow proximal transverse clefts dissect into 3-4 taeniae, body exine faintly to distinctly punctate.

*Infernopolites simplex* Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 10, fig. 3; size 86 µm; Slide No. BSIP 5972
Locality: Eastern bank of Janar Nala about 2 km south-east of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 85-105 µm; central body horizontally oval to subcircular, 45-65 x 40-70 µm, 2-3 narrow proximal transverse clefts dissect into 3-4 taeniae, body exine faintly to distinctly punctate.
than body, hemispherical or bean-shaped, thick and spongeous.

**Genus Lunatisporites** Leschik emend. Scheuring 1970
Type Species: *Lunatisporites acutus* Leschik 1955
Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Bisaccate, oval, ± haploxyloïd pollen; central body distinct, vertically oval, exine thick, bears 3 taeniae on the proximal face; sulcus wide.

*Lunatisporites acutus* Leschik 1955
Holotype: Leschik 1955; pl. 7, fig. 24; size 36 x 50 \(\mu m\)

Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Size 35-52 \(\mu m\); central body, exine 2 \(\mu m\) thick, 3-4 taeniae on the proximal face, each taeniae ± 10 \(\mu m\) wide; sulcus about 11 \(\mu m\) wide.

*Lunatisporites gopadensis* Bharadwaj and Srivastava 1969
Holotype: Bharadwaj and Srivastava 1969; pl.25, fig. 29; size 142.5 x 87.5 \(\mu m\); Slide No. BSIP 3210-3

Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Size 72.5-142.5 x 70-107.5 \(\mu m\); central body vertically oval, 5-13 striations; sulcus straight 8-17.5 \(\mu m\) wide.

**Genus Striatisaccus** Mädler 1964
Type Species: *Striatisaccus goswicensis* Mädler 1964
Locality: Thuringia, Germany
Horizon and Age: Buntsandstein, Early Triassic
Diagnostic Features: Haploxyloïd bisaccate pollen; central body subcircular to horizontally oval; approximately 10 wide stripes (taeniae) on proximal face, inbetween stripes longitudinal furrow bears monolete mark; distal sulcus wide.

*Striatisaccus goswicensis* Mädler 1964
Holotype: Mädler 1964; pl. 2, fig. 14; size 90 \(\mu m\)

Locality: Thuringia, Germany
Horizon and Age: Buntsandstein, Early Triassic
Diagnostic Features: Sacchi 50-64 x 38-54 \(\mu m\); central body horizontally oval, 60 x 50 \(\mu m\), 6-7 wide stripes (taeniae) on proximal face, longitudinal furrow 18-22 \(\mu m\) long; saccus reticulation mediumly coarse, lumen polygonal, 1-2 \(\mu m\) wide; distal sulcus 15-20 \(\mu m\) wide.

**Genus Taeniaesporites** Leschik 1955
Type Species: *Taeniaesporites kraeuseli* Leschik 1955
Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Diploxyloïd bisaccate pollen, circular to broadly oval; central body oval, taeniae on proximal face, inbetween taeniae monolete mark present; distal sulcus wide.

*Taeniaesporites kraeuseli* Leschik 1955
Holotype: Leschik 1955; pl. 8, fig.1; size 47 \(\mu m\)

Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Size 45-50 µm; 6 or more tae-
niae on central body proximally; sulcus up to 8
µm wide.

**Genus** Trabeculosporites Trivedi and Misra emend.
Tiwari and Ram-Awatar 1992
Type Species: *Trabeculosporites gopadensis* Trivedi
and Misra 1970
Locality: Gopad River section, 2.5 km N-NE of Nidpur
Village, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic

*Trabeculosporites gopadensis* Trivedi and Misra emend.
Tiwari and Ram-Awatar 1992
Holotype: Trivedi and Misra 1970; pl. 4, fig. 49, Slide
not traceable
Neotype: Tiwari and Ram-Awatar 1992; pl. 1, fig. 1;
size 45 x 48 µm; Slide No. BSIP 10573

Locality: Gopad River Section, 2.5 km N-NE of
Nidpur Village, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Bisaccate, haploxylonoid, oval
to subcircular pollen; central body ill-defined, only
marked by the end of strinia (striaions-taeniae);
6-10 striations appearing taeniae; exine
inframicroreticulate; sacci sub-saccate in nature,
distally attached all along the corpus, generally
sickle shaped equatorially, saccus intrareticulation
with thick muri.

**MONOSACCACATE POLLEN**

**Genus** Callialasporites Dev 1961
Type Species: *Callialasporites (Zonala pollenites)*
*trilobatus* Balme 1957

Locality: Broome No. 3 Water Bore, Canning Basin,
Australia
Horizon and Age: Jarlemai Siltstone, Oxfordian, Late
Jurassic
Diagnostic Features: Circular to oval pollen; central
body subcircular-triangular, exine 1-2 µm thick,
infragranulose; saccus one bladder notched in
three separate lobes, radially folded to appear
filled.

*Callialasporites trilobatus* (Balme) Dev 1961
Holotype: Balme 1957; pl. 8, fig. 91; size 72-78 µm

Locality: Broome No. 3 Water Bore, Canning Basin,
Australia
Horizon and Age: Jarlemai Siltstone, Oxfordian, Late
Jurassic
Diagnostic Features: Size 65-91 µm; rounded to tri-
angular; central body subtriangular with three
equatorially attached sacci, sometimes a single tri-
lobed saccus, exine surface rinkled.

*Callialasporites dampieri* (Balme) Dev 1961
Holotype: Balme 1957; pl. 8, fig. 88; size 60 x 50
µm

Locality: Broome No. 3 Water Bore, Canning Basin,
Australia
Horizon and Age: Jarlemai Siltstone, Oxfordian, Late
Jurassic
Diagnostic Features: Size 53-78 µm, circular; central
body circular to rounded, 37-53 µm; saccus 8-15
µm wide, radially folded.
Genus **Crustaesporites** Leschik emend. Jansonius 1962
Type Species: **Crustaesporites globosus** Leschik 1956
Locality: Neuhof bei Fulda, Germany
Horizon and Age: Zechstein, Late Permian
Diagnostic Features: Monosaccate pollen; central body broadly subcircular, bearing number of taeniae on proximal face, exine infrapunctate, equatorial thickening on distal face; saccus intrareticulation coarse, saccus irregularly lobed.

**Crustaesporites globosus** Leschik 1956
Holotype: Leschik 1956; pl. 21, fig. 2; size 110 µm
Locality: Neuhof bei Fulda, Germany
Horizon and Age: Zechstein, Late Permian
Diagnostic Features: Size 80-110 x 50-80 µm; taeniae irregular, often short, each taeniae up to 10 µm wide.

**Crustaesporites trilobatus** Venkatachala and Rawat 1978
Holotype: Venkatachala and Rawat 1978; pl. 3, fig. 58; size 95 x 110 µm
Locality: Puranea Basin, Bihar, India
Horizon and Age: Early Triassic
Diagnostic Features: Size 110-160 µm; central body circular, 78-82 µm; no taeniae; saccus intrareticulation medium.

Genus **Enzonalasporites** Leschik emend. Scheuring 1970
Type Species: **Enzonalasporites vigens** Leschik 1955
Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Subcircular pollen with equatorial velum; exine encircling velum 5 µm wide, with irregular imperfect reticulum form by closely spaced muri, elements radial, reducing as 'T' to granulate towards the central region.

**Enzonalasporites vigens** Leschik emend. Scheuring 1970
Holotype: Leschik 1955; pl. 5, fig. 24; size 38 µm
Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Size 36-38 µm; equatorial velum 3.5 µm wide.

Genus **Goubinispora** Tiwari and Rana 1981
Type Species: **Goubinispora indica** Tiwari and Rana 1981
Locality: Borehole RD-1, sample no. 4, depth 532.48 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Girdling monosaccate pollen; central body circular to oval, distinct or indistinct, may have equatorial rim; faint to clearly marked striations on one face, 'islands' or elongated strips of partly separated exoeine (structurally comparable to the saccus) on other side; saccus intrareticulate, incipiently to markedly polylobed, equatorially attached at striated face, variously encroaching the body subequatorially on the other face, never covering completely.

**Goubinispora indica** Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 4, fig. 58; size 144.5 x 192.5 µm
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Locality: Borehole RD-1, sample no. 4, depth 532.48 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Size 90-198 µm; central body 45-130 µm, 12-22 simple, rarely forked striations on proximal face, distal islands or elongated stripes of exoexine 18-36 µm wide; saccus intrareticulation coarse, muri 1-2 µm thick, lumen 5-12 µm wide, polygonal with mostly wavy muri.

Genus *Patina* Leschik 1955
Type Species: *Patina densa* Leschik 1955
Locality: Neuweit bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Subcircular to rounded pollen; central body with broad equatorial zone - velum; exine reticulum with elongated and woven muri.

*Patina densa* Leschik 1955
Holotype: Leschik 1955; pl. 6, fig. 11; size 40 µm

Localities: Neuweit bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Size 72-125 µm; central body circular, thin and uniformly endoreticulate.

*Playfordiaspora annulata* Tiwari and Rana emend. Vijaya 1995
Holotype: Tiwari and Rana 1980; pl. 2, fig. 37; size 50 x 60 µm; Slide No. BSIP 5550

Locality: Borhole RD-4, sample no. 5, depth 59 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Size 60-75 x 44-55 µm; central body subtriangular with a well-defined 2-4 µm thick equatorial rim; trilete rays reaching up to the rim; saccus spread on proximal face up to the margin of trilete ray.

Genus Pseudenzonalasporites Scheuring 1970
Type Species: Pseudenzonalasporites summus Scheuring 1970
Locality: Bölchentunnel, Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Circular to subcircular pollen; trilete mark indistinct; exine two layered, on proximal face sculptured with baculae, baculae collectively form negative reticulum all over; on distal face feeble leptoma.

Pseudenzonalasporites summus Scheuring 1970
Holotype: Scheuring 1970; pl. 28, fig. 237; size 38 µm

Locality: Bölchentunnel, Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Size range 35-40 µm; baculae less than 1 µm high x 1 µm wide, muri thin, enclosing lumen, less then 1 µm in diameter.

POLYSACCATE POLLEN

Genus Dacrycarpites Cookson and Pike 1953
Type Species: Dacrycarpites australiensis Cookson and Pike 1953
Locality: Tasmania, Australia
Horizon and Age: ? Oligocene
Diagnostic Features: Size 26-33 µm; exine 2 µm thick, inframicroreticulate-granulate; sacci with strongly developed radial thickening.

Dacrycarpites variabilis (Dev) Haskell 1968
Holotype: Dev 1968; pl. 7, fig. 58; size 36 x 42 µm; Slide No. BSIP 28736-1
Localities: Sehora, Sher River, Narsinghpur District, Madhya Pradesh, India
Horizon and Age: Jabalpur Formation, Early Cretaceous
Diagnostic Features: Size 41-69 x 31-57 µm; central body ± rounded, exine 1.5-2.5 µm thick, inframicrorgranulose; distally sacci attached equatorially.

**SULCATE ( NONSACCATE) POLLEN**

**Genus** Aumancisporites Alpern emend. Jansonius 1962
Type Species: Aumancisporites striatus Alpern 1958
Locality: L'Aumance, Saint-Hilaire, France
Horizon and Age: Autunien-Stephanian, Carboniferous
Diagnostic Features: Nonsaccate, oval to subcircular pollen; exine microverrucose; longitudinal ribs or taeniae on proximal face, equatorially continuing; one transverse furrow bordered by thick lips on distal face.

**Aumancisporites striatus** Alpern 1958
Holotype: Alpern 1958; pl. 2, fig. 53; size 71 x 4 µm

Locality: L'Aumance, Saint-Hilaire, France
Horizon and Age: Autunien-Stephanian, Carboniferous
Diagnostic Features: Size 50-70 µm; furrow with thick lips, seems as taeniae.

**Aumancisporites indicus** Bharadwaj and Srivastava 1969
Holotype: Bharadwaj and Srivastava 1969; pl. 29, fig. 113; size 56 x 42.5 µm; Slide No. BSIP 1911-17

Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Size 30 - 67 x 22.5 - 47.5 µm; 10 transverse striations with vertical partitions on proximal face, converging towards the poles, all ends join to form one subequatorial rib.

**Genus** Cycadopites Wodehouse ex Wilson and Webster 1946
Type Species: Cycadopites follicularis Wilson and Webster 1946
Locality: Fort Union Series, Red Lodge, Carbon County, Montana, USA
Horizon and Age: Tertiary
Diagnostic Features: Monocolpate pollen, spindle shape; exine smooth to scabrate; sulcus along the longer axis, broad.

**Cycadopites follicularis** Wilson and Webster 1946
Holotype: Wilson and Webster 1946; pl. 1, fig. 7; size 39 µm long, 18 µm wide

Locality: Fort Union Series, Red Lodge, Carbon County, Montana, USA
Horizon and Age: Tertiary
Diagnostic Features: Size 35-40 µm long x 15-20 µm wide; sulcus broad at polar ends.

**Genus** Ginkgoretectina Maljkovina 1953
Type Species: Ginkgoretectina punctata Maljkovina 1953
Locality: Embenski-Gebiet, UdSSR  
Horizon and Age: Rhaetic, Late Triassic  
Diagnostic Features: Boat-shape pollen; exine smooth to infrapunctate; colpus extend longitudinally up to polar ends, slightly wrinkled, narrowing towards poles.

Ginkgoretectina punctata Maljvkina 1953  
Holotype: Mawkina 1953; pl.1, fig. 21; size 50 µm

Genus Labiipollis Mädler 1964  
Type Species: Labiipollis mesozoicus Mädler 1964  
Locality: Bad Harzburg, Germany  
Horizon and Age: Keuper, Late Triassic  
Diagnostic Features: Monocolpate, elongated pollen with oval to round ends; exine 1 µm thick, infrapunctate; colpus along longer axis on distal face, broad.

Labiipollis mesozoicus Mädler 1964  
Holotype: Mädler 1964; pl. 12, fig.15; size 39 x 25 µm

Locality: Bad Harzburg, Germany  
Horizon and Age: Keuper, Late Triassic  
Diagnostic Features: Maxium size 40 µm; colpus 11 µm broad in middle, 8 µm at polar ends.

Genus Monosulcites Cookson ex Couper 1953  
Type Species: Monosulcites minimus Cookson 1947  
Locality: Kerguelen-Archipelago  
Horizon and Age: Tertiary  
Diagnostic Features: Elongate to subcircular, boat shape pollen; exine infrapunctate to infragranulose; sulcus broadest in the centre.

Monosulcites minimus Cookson 1947  
Holotype: Cookson 1947; pl. 15, fig. 47; size 30 µm

Genus Monosulcites Cookson ex Couper 1953  
Type Species: Monosulcites minimus Cookson 1947  
Locality: Kerguelen-Archipelago  
Horizon and Age: Tertiary  
Diagnostic Features: Size 29.6-34 µm long x 26.5-29 µm broad; almost circular; exine 2 µm thick; boat-shaped sulcus.

Genus Praecolpatites Bharadwaj and Srivastava 1969  
Type Species: Praecolpatites nidpurensis Bharadwaj and Srivastava 1969  
Locality: Nidpur, Sidhi District, Madhya Pradesh, India  
Horizon and Age: Nidpur, Early Triassic  
Diagnostic Features: Ellipsoid or elongated pollen, twice long as broad; exine inframicroreticulate; one longitudinal furrow on one face, three folds present on other face.

Praecolpatites nidpurensis Bharadwaj and Srivastava 1969  
Holotype: Bharadwaj and Srivastava 1969; pl. 29, fig.117; size 115 x 60 µm; Slide No. BSIP 3197-6
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Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Oval; size 115-162.5 µm long, 57-80 µm wide.

Genus Pretricolpipollenites Danzé-Corsin and Laveine 1963
Type Species: Pretricolpipollenites ovalis Danzé-Corsin and Laveine 1963
Locality: Hydrequent, Vallee Heureuse, France
Horizon and Age: Late Triassic to Early Jurassic
Diagnostic Features: Fusiform pollen; exine smooth; median furrow prominent associated with fold, slightly wide, 2 less prominent lateral furrows, 2/3 of length, without folds.

Pretricolpipollenites ovalis Danzé-Corsin and Laveine 1963
Holotype: Danzé-Corsin and Laveine 1963; pl. 11, fig. 19; size 30 µm

Locality: Hydrequent, Vallee Heureuse, France
Horizon and Age: Late Triassic to Early Jurassic
Diagnostic Features: Size 28-32 µm; exine thin, median furrow broad at lateral ends.

Genus Weylandites Bharadwaj and Srivastava 1969
Type Species: Weylandites indicus Bharadwaj and Srivastava 1969

Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Bilateral, subcircular to circular or transversely oval pollen; exine microverrucose, about 10 to 20 transverse striations on proximal face; many vertical or oblique striations on each side of a biconvex or rectangular sulcus on distal face.

Weylandites indicus Bharadwaj and Srivastava 1969
Holotype: Bharadwaj and Srivastava 1969; pl. 28, fig. 92; size 47.5 x 37 µm; Slide No. 1889-10.

Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Transversely oval; size 45-75 x 30-57.5 µm; proximally 20 horizontal striations, distally 7 vertical striations, sulcus biconvex.

Weylandites bilateralis Bharadwaj and Srivastava 1969
Holotype: Bharadwaj and Srivastava 1969; pl. 29, fig. 105; size 90 x 60 µm; Slide No. BSIP 3193-5

Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Oval pollen; size 50-92.5 x 27.5-60 µm; transverse pollen; size 50-92.5 x 27.5-60 µm; transverse striations close on both faces, irregularly distributed, converging each side, branched with vertical partitions, sulcus longish.

Weylandites circularis Bharadwaj and Srivastava 1969

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Holotype: Bharadwaj and Srivastava 1969; pl. 28, fig. 94; size 55 x 50 µm; Slide No. BSIP 1954-5

Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Circular pollen; size 42.5-80 x 42.5-65 µm; proximally 20-22 and distally 6-10 vertical striations, rectangular sulcus on either side.

Weylandites irregularis Bharadwaj and Srivastava 1969
Holotype: Bharadwaj and Srivastava 1969; pl. 29, fig. 110; size 54 x 50 µm; Slide No. BSIP 1888-12

Locality: Nidpur, Sidhi District, Madhya Pradesh, India
Horizon and Age: Nidpur, Early Triassic
Diagnostic Features: Circular, thick rimed pollen; size 32.5-67.5 x 30-52 µm; striated in concentric or circular manner; distal sulcus rectangular to triangular.

Weylandites minutus Bharadwaj and Srivastava 1969
Holotype: Bharadwaj and Srivastava 1969; pl. 28, fig. 101; size 35 x 27.5 µm; Slide No. BSIP 1889-13

Locality: Eastern bank of Janar Nala about 2 km southeast of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic

Circumpoll Group

Genus Camerosporites Leschik emend. Scheuring 1970
Type Species: Camerosporites secatus Leschik 1955
Locality: Neuewelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Oval to subcircular pollen; body covered with big and low auriculate processes on proximal face and equator; circum-sulcus on distal face, sometimes ring-tenuitas present adjacent to the equatorial processes.

Camerosporites secatus Leschik 1955
Holotype: Leschik 1955; pl. 5, fig. 11; size 50 µm

Locality: Neuewelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Size 50-36 µm; exine 1 µm thick, sculptural elements 2-5 µm in diameter, sulcus 9 x 6 µm.

Camerosporites minor Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 10, fig. 15; size 30 µm; Slide No. BSIP 6116

Locality: Eastern bank of Janar Nala about 2 km southeast of Bijouri, District Shahdol, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 20-30 μm; exine about 1 μm thick, proximally sculptured with small verrucae, verrucae 1-2 μm broad x 1 μm high, distal sculpture reduced, with a distal ring tenuitas, 10-15 μm diameter.

**Genus Classopollis** (Pflüg) Pocock and Jansonius 1961
Type Species: *Classopollis classoides* Pflüg 1953
Locality: Siegelsum, Holstein, Europe
Horizon and Age: Liassic, Late Triassic
Diagnostic Features: ± Spherical pollen; monoporate distally; reduced trilete scar may be present on proximal face; exine two layered, equatorially with a striated band.

*Classopollis classoides* (Pflüg) Pocock and Jansonius 1961
Holotype: Pflüg 1953; pl. 16, fig. 29-31; size 30 μm
Locality: Siegelsum, Holstein
Horizon and Age: Liassic, Late Triassic
Diagnostic Features: Size 23-27 x 26-29 μm; exine 1.5-2 μm thick, with 2.5-3 μm thick and 7-8 μm broad equatorial striated band; on distal face thin circular area, 5 μm in diameter.

**Genus Discisporites** Leschik emend. de Jersey 1964
Type Species: *Discisporites niger* Leschik 1955
Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Cingulate, circular to subcircular spore; trilete distinct, rays up to equator; exine scabrate, granulate, verrucose and striated proximally; narrow circular band of thinner exine (ring tenuitas) on distal face.

*Discisporites niger* Leschik 1955
Holotype: Leschik 1955; pl. 3, fig. 12; size 23 μm
Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Roundish to oval spore; exine 1 μm thick, finely sculptured, 15 μm wide distinct thickening surrounds 7 μm wide faint zone on distal face.

*Discisporites triassicus* Kar 1970
Holotype: Kar 1970; pl. 2, figs. 27a-27b; size 41 μm; Slide No. BSIP 3464
Locality: Bore-core No. RE9, depth 83 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 30-50 μm; trilete rays strongly developed; exine thick, mostly verrucose; a circular, thin, depressed area present in central region on distal face.

**Genus Duplicisporites** Leschik emend. Klaus 1960
Type Species: *Duplicisporites granulatus* Leschik 1955
Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Rounded to subtriangular spore; trilete mark rarely seen on proximal face; exine infrapunctate to infragranulose; on distal face exinal band along equatorial margin and thin area in center.

*Duplicisporites granulatus* Leschik 1955
Holotype: Leschik 1955; pl. 2, fig. 23; size 36 μm
Locality: Neuwelt bei Basel, Switzerland
Horizon and Age: Keuper, Late Triassic
Diagnostic Features: Broadly triangular spore; trilete mark rarely seen on proximal face; exine infragranulose, three prominent, 4-13 μm wide exinal band around equator on distal face.
**Genus Granuloperculatipollis** Venkatachala and Góczán 1964  
Type Species: *Granuloperculatipollis rudis* Venkatachala and Góczán 1964  
Locality: Ungarn, Nagylengyel, Hungary  
Horizon and Age: Kossen-Facies, Late Triassic  
Diagnostic Features: Circular pollen; trilete mark hardly perceptible, operculum and pore clearly delimited; exine granulose.

*Granuloperculatipollis rudis* Venkatachala and Góczán 1964  
Holotype: Venkatachala and Góczán 1964; pl. 3, fig. 22; size 40 µm  
Locality: Ungarn, Nagylengyel, Hungary  
Horizon and Age: Kossen-Facies, Late Triassic  
Diagnostic Features: Size 35-40 µm; trilete mark hardly perceptible due to sculptures; exine granulose, grana ± 2 µm, unevenly distributed; operculum and pore clearly delimited.

*Granuloperculatipollis distinctus* Kumaran in Maheshwari and Kumaran 1979  
Holotype: Kumaran in Maheshwari and Kumaran 1979; pl. 6, fig. 11; size 30 µm; Slide No. BSIP 5653  
Locality: Son River Section, west of Tharipathar Village, District Shahdol, Madhya Pradesh, India  
Horizon and Age: Tiki Formation, Early Triassic  
Diagnostic Features: Size 30-45 µm; trilete rays more than 3/4 of radius; exine 3 µm thick, finely granulose, grana less than 1 µm in diameter.

Genus *Rhaetipollis* Schulz 1967  
Type Species: *Rhaetipollis germanicus* Schulz 1967  
Locality: Becken, Germany  
Horizon and Age: Rhaetic and Liassic, Late Triassic to Early Jurassic  
Diagnostic Features: Bilateral hemispherical pollen; ring-furrow along equator, towards inner side exine beset with warts.

*Rhaetipollis germanicus* Schulz 1967  
Holotype: Schulz 1967; pl. 22, fig. 10; size 40 µm
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Localities: Becken, Germany
Horizon and Age: Rhaetic and Liassic, Late Triassic to Early Jurassic
Diagnostic Features: Oval to roundish; size 35-40 µm; exine 4 µm thick, inner side irregular, ±6 µm wide warts on exine surface.

ALETE

Genus Araucariacites (Cookson) Couper 1958
Type Species: Araucariacites australis Cookson 1947
Locality: Waterfall Gorge near Port Jeanne D, Kerguelen Archipelago
Horizon and Age: Tertiary
Diagnostic Features: Originally spherical, frequently folded, alete pollen; exine invariably sculptured with fine grana to scabrate.

Araucariacites australis Cookson 1947
Holotype: Cookson 1947; pl. 13, figs. 1-4

Localities: Waterfall Gorge near Port Jeanne D, Kerguelen Archipelago
Horizon and Age: Triassic
Diagnostic Features: Size 39-93 µm; usually flattened, circular; exine ± 1 µm thick, sculptured with fine grana.

Genus Bartenia Helby 1987
Type Species: Bartenia communis Helby 1987
Locality: Exmouth Plateau, Carnarvon Basin, Australia
Horizon and Age: Mungaroo Formation, Late Triassic
Diagnostic Features: Circular to subcircular, frequently folded; exine ornamented with concentric low ridges, striae continuous and uniform in width.

Bartenia communis Helby 1987
Holotype: Helby 1987; fig 3A; size 34 x 45 µm

Localities: Exmouth Plateau, Carnarvon Basin, Australia
Horizon and Age: Mungaroo Formation, Late Triassic
Diagnostic Features: Size 34-51 µm; central thickened area up to 1.5 µm in diameter; rounded protrusions extending from each cylindrical area.

Genus Circulisporites de Jersey 1962
Type Species: Circulisporites parvus de Jersey 1962
Locality: Bore N. S. 118, Ipswich Coalfield, Australia
Horizon and Age: Triassic
Diagnostic Features: Subspherical ovoid to cylindrical cysts; cyst wall two layered, cavate; cylindrical thickened area in center.

Circulisporites parvus de Jersey 1962
Holotype: de Jersey 1962; pl. 5, fig. 3; size 20 µm

Localities: Bore N. S. 118, Ipswich Coalfield, Australia
Horizon and Age: Triassic
Diagnostic Features: Size 15-20 µm; exine ± 1 µm thick, smooth on one face, other face ornamented with 2-6 concentric striae, 1-3 µm wide and up to 1-3 µm apart.

Genus Conaletes Reinhardt and Schön 1967
Type Species: Conaletes apiculatus Reinhardt and Schön 1967
Locality: Germany
Horizon and Age: Early Triassic
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Diagnostic Features: Alete spore, circular to subcircular; exine beset with densely placed coni or bacula.

*Conaletes apiculatus* Reinhardt and Schön 1967
Holotype: Reinhardt and Schön 1967; pl. 1, fig. 5; size ± 30 µm

Locality: Germany
Horizon and Age: Early Triassic
Diagnostic Features: Size 30-40 µm; exine thin, strongly folded, sculptural elements 0.7 x 0.7-1 µm, 100-120 sculptural elements on surface.

*Conaletes gondwanensis* Kumaran and Maheshwari 1980
Holotype: Kumaran and Maheshwari 1980; pl. 11, fig. 16; size 60 µm; Slide No. BSIP 5941

Locality: Eastern bank of Janar Nala about 2 km southeast of Bijouri, Shahdol District, Madhya Pradesh, India
Horizon and Age: Tiki Formation, Late Triassic
Diagnostic Features: Size 54-65 µm; exine up to 1.5 µm thick, coni and spinules about 1 µm in basal diameter, up to 1.5 µm high, less than 1 µm apart, about 90 elements projecting at equator.

*Genus* Conipollenites Cameron 1974
Type Species: *Conipollenites arabicus* Cameron 1974
Locality: Aramco, ST-17 cuttings (6.36-90 ft.), Arabian Peninsula
Horizon and Age: Jilh Formation, Late Triassic
Diagnostic Features: Alete subtriangular to subcircular pollen; exine unequally ornamented with irregularly arranged conical processes, densely spaced papillae.

*Conipollenites arabicus* Cameron 1974
Holotype: Cameron 1974; pl. 1, fig. 3; size 77 µm

Locality: Aramco, ST-17 cuttings (6.36-90 ft), Arabian Peninsula
Horizon and Age: Jilh Formation, Late Triassic
Diagnostic Features: Size 66-77 µm; exine beset with 10-11 µm long x 2-4 µm wide conical processes, spaced 10 µm apart, papillae less than 1 µm apart, blunt, segmented, 8 x 2 µm in size.

*Genus* Equisetosporites Daugherthy 1941
Type Species: *Equisetosporites chinleana* Daugherthy 1941
Locality: Petrified Nation, Arizona, USA
Horizon and Age: Late Triassic
Diagnostic Features: Alete pollen, spherical; exine smooth, thin, encircled with 4 elators.

*Equisetosporites chinleana* Daugherthy 1941
Holotype: Daugherthy 1941; pl. 34, fig. 4; size 37.5 µm

Locality: Petrified Nation, Arizona, USA
Horizon and Age: Late Triassic
Diagnostic Features: Size 35-40 µm; encircled with 4 elators side by side, 70 µm long, 4 µm wide, terminating spirally around body.

*Genus* Densostriapollis Tiwari and Rana 1981
Type Species: *Densostriapollis damudicus* Tiwari and Rana 1981
Locality: Borehole RD-1, sample No. 4, 532.8 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Bilaterally oval to subcircular spore; circular thin area in centre; exine smooth to infrapunctate, striations on both faces of body, converging at ends.

Densostriapollis damudicus Tiwari and Rana 1981
Holotype: Tiwari and Rana 1981; pl. 2, fig. 37; size 62 x 42 µm; Slide No. BSIP 5626
Locality: Borehole RD-1, sample No. 4, 532.8 m; Raniganj Coalfield, West Bengal, India
Horizon and Age: Mahadeva Formation, Middle Triassic
Diagnostic Features: Size 52-70 x 42-62 µm; 4-7 striations, unbranched, inner thin area occupies 2/3 of total diameter.

Genus Graminoides Goubin 1965
Type Species: Graminoides crenes Goubin 1965
Locality: Morondava Basin, (CDB 4, 162-229 m), Madagascar
Horizon and Age: Groupe de l’Isalo, Late Triassic
Diagnostic Features: Monoporate, spherical spore; exine faintly ornamented.

Graminoides crenes Goubin 1965
Holotype: Goubin 1965; pl. 8; fig. 8; size 57 µm
Locality: Morondava Basin, (CDB 4, 162-229 m), Madagascar
Horizon and Age: Groupe de l’Isalo, Sakamana, Late Triassic
Diagnostic Features: Size 50-60 µm; exine 3 µm thick, rugulate, forming imperfect reticulum.

Genus Grebespora Jansonius 1962
Type Species: Grebespora concentrica Jansonius 1962
Locality: Imp. 534-2, Peace River area, western Canada
Horizon and Age: Toad/ Grayling Formation, Early Triassic
Diagnostic Features: Circular, spore/pollen; exine thin, single layered, unstructured with concentric fold equatorially.

Grebespora concentrica Jansonius 1962
Holotype: Jansonius 1962; pl. 16, fig. 3; size 118.9 x 38.9 µm
Locality: Imp. 534-2, Peace River area, western Canada
Horizon and Age: Toad/ Grayling Formation, Early Triassic
Diagnostic Features: Size 20-55 µm; exine thin, scabrate to lavigate; 1-4 µm wide, dark concentric fold near equator.

Genus Laricoidites Potonié 1931
Type Species: Laricoidites (Sporonites) magnus Potonié, Thomson and Thiergart 1950
Locality: Ville bei Köln, Beisselsgrube, Germany
Horizon and Age: Oligocene, Miocene
Diagnostic Features: Subcircular alete; exine smooth to infrapunctate, variously thinned as secondary features.

Laricoidites magnus Potonié, Thomson and Thiergart 1950
Holotype: Potonié 1931; fig. 6; size 88 µm
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Locality: Ville bei Köln, Beisselsgrube, Germany
Horizon and Age: Oligocene, Miocene
Diagnostic Features: Size 85-90 µm; exine less than 1 µm thick, surface variously folded.

**Genus** *Rimaspora* Kar 1970
Type Species: *Rimaspora plicata* Kar 1970
Locality: Bore-core No. RE9, depth 83 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Circular-subcircular spore; a suture present in middle region; exine laevigate, generally folded at equator, hardly rupture in two complete halves.

*Rimaspora plicata* Kar 1970
Holotype: Kar 1970; pl. 2, fig. 30; size 32 µm; Slide No. BSIP 3466

Locality: Bore-core No. RE9, depth 83 m, Raniganj Coalfield, West Bengal, India
Horizon and Age: Panchet Formation, Early Triassic
Diagnostic Features: Size 38-70 µm; exine 2 µm thick, laevigate to weakly infragranulose.

**Genus** *Schizosporis* Cookson and Dettmann 1959
Type Species: *Schizosporis reticulatus* Cookson and Dettmann 1959
Locality: Australia
Horizon and Age: Neocomian, Cretaceous
Diagnostic Features: Medium to large spore, with an equatorial furrow which separates into two equal parts.

*Schizosporis reticulatus* Cookson and Dettmann 1959
Holotype: Cookson and Dettmann 1959; pl. 1, figs. 1-3

Locality: Australia
Horizon and Age: Neocomian, Cretaceous
Diagnostic Features: Size 90-135 µm; circular, biconvex, flattened at poles; exine reticulate, muri 1 µm wide, luminae 5-6 x 8-10 µm in diameter.
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This 'Atlas of Spores and Pollen from the Triassic Succession of India' provides a comprehensive information about the palynofossils from the Triassic rock strata in different Mesozoic sedimentary basins of India. This includes the check-list of all the taxa recorded from the Triassic of India. Details of the genus with their type species; and the species instituted from India are dealt herein. Further, it includes the distribution of various species through Triassic, which enables the identification of a group of species for the palynozonation in the Triassic Sequence. These Groups further enhance their role and use in biostratigraphy.

This Atlas will be useful to the Earth scientist, Researchers, Teachers of various Organizations world over.