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Upper Permian Spore Holotypes of W. KLAUS from the Southern Alps (Dolomites, Italy) in the Collections of the Geological Survey of Austria

ILSE DRAXLER*)

4 Plates

Palynology
Type Specimens
Permian
Southern Alps
Paleontological collection

Contents

Oberpermische Sporen-Holotypen von W. KLAUS aus den Südalpen (Dolomiten, Italien) in den Sammlungen der Geologischen Bundesanstalt

Zusammenfassung

Von den von Wilhelm KLAUS (1921–1927) angefertigten und erstbeschriebenen Dauerpräparaten mit Sporen-Holotypen aus dem Oberperm der Dolomiten (Italien) sind noch 33 erhalten. Diese werden an der Geologischen Bundesanstalt aufbewahrt und werden hier neu dokumentiert. Drei Präparate konnten nicht mehr aufgefunden werden. Das Material stammt aus schwarzen Tonsteinlagen der Gröden-Formation („Grödner Sandstein", Arenaria di Val Gardena). Es wurden im Durchlichtmikroskop Farbfotos angefertigt, die zusammen mit den Daten der Originalabbildungen, den Angaben über Typus-Schichten und -Lokalitäten, den Präparate-Nummern und den Englandfinder-Angaben zu den einzelnen Objekten präsentiert werden. Probenmaterial oder Aufbereitungsrückstände der Proben, aus denen die Sporen-Holotypen gewonnen wurden, sind nicht mehr an der Geologischen Bundesanstalt vorhanden.

Abstract

Thirty-three permanent slides with spore holotypes from black shale horizons in the Upper Permian Gröden Formation (Arenaria di Val Gardena) of the Southern Alps (Dolomites, Italy), that were prepared and described for the first time by Wilhelm KLAUS (1921–1927), are stored at the Geological Survey of Austria. Three slides with holotypes have been lost. Colour photographs were taken of the holotypes in a transmitting light microscope and are presented here in four plates together with the more important published publication data on the type figures, the type strata and localities, the collection numbers of the slides and the Englandfinder data of the types. Rock material or organic residues of the samples are not available at the Geological Survey.

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Introduction

With the exception of the excellently preserved spores, discovered by KLAUS (1953a) in the evaporitic succession of the Haselgebirge, the Upper Permian to Lower Triassic evaporites of the Eastern Alps are devoid of fossils. Thus to establish the age of the evaporites, it was necessary, to calibrate their palynological record with biostratigraphically well constrained deposits. For this reason, in the early 1960s KLAUS (1921–1987), the pioneer of Permo-Triassic palynology, started investigating black claystones from the siliciclastic succession of the Gröden Formation in the Arenaria di Val Gardena (northern Italy). Although KLAUS started and carried out these internationally important studies whilst at the Geological Survey, he continued with them subsequently including sulphur-isotope investigations at the University of Vienna until his early death in 1987 (KLAUS, 1972, 1974, 1977, 1987).

The Upper Permian age of the spore-bearing material from the Gröden Formation was well known from mega- and microfauna. KLAUS found many similarities between the microflora of the Gröden Formation and that of the main part from the alpine salt deposits. This led to a biostratigraphical correlation between these deposits and proved the Upper Permian age of the alpine evaporites.

Fifty-five formspecies of spores were treated and described on the basis of single grains (KLAUS, 1953b) and photomicrographs, thirty-six of which were considered to be new species (KLAUS, 1963). Of this collection 33 permanent slides with spore holotypes are stored at the collection of the Geological Survey. The three other holotypes are missing: *Illinites bentzi, Taeniaesporites alatus, Jugasporites schaubergeroides.*

In general, the preservation of these holotypes, which are mounted in glycerine jelly between two coverglasses, is good. However, air bubbles occur in most slides endangering the holotypes by oxidation. This makes it necessary, to re-embed the specimens in the near future.

For this paper, the holotypes have been re-photographed in colour although the black and white photos of KLAUS are of excellent quality. All the light microscope photographs were taken with a digital camera (Canon Power Shot S80) on a Leitz Diaplan transmitting light microscope. The slides of most specimens have numbers given by KLAUS but as the slides have now been integrated into the Geological Survey collections, new collection numbers have been given.

Description of the Spore Types

Preliminary Notes

This paper is not a systematic revision of the Upper Permian spore holotypes described by KLAUS 1963. Instead, the types are presented together with the relevant data given in the original description and with light microscope colour photographs.

The holotypes described here are cited under their original names given by KLAUS (1963) and in the order of the publication KLAUS (1963). The slide number was given by KLAUS (1963) and is in the original description of the holotype.

Description

Converrucosisporites dejerseyi KLAUS 1963
(Pl. 1, Fig. 1)

Coll. no.: GBA 2010/013/0001.

Holotype: Single grain preparation slide Nr. 431, Englandfinder F37/4.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Seceda West, Cuecenes near St. Ulrich, fine-sandy to clayish layer with plant debris in Gröden Formation.

Type figure: KLAUS 1963, p. 249, Pl. 1, Fig. 1.

Converrucosisporites eggeri KLAUS 1963
(Pl. 1, Fig. 2)

Coll. no.: GBA 2010/013/0002.

Holotype: Single grain preparation slide Nr. 425, Englandfinder H40/2.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Runggaditsch, on the way to Panider Pass (Passo Piné) next the farm building of Sepp Oberrauch, Lower clayband in Gröden Formation.

Type figure: KLAUS 1963, p. 254, Pl. 1, Fig. 2.

Endosporites hexareticulatus KLAUS 1963
(Pl. 1, Fig. 3)

Coll. no.: GBA 2010/013/0007.

Holotype: Single grain preparation slide Nr. 480, Englandfinder A45/2.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge, near Fontana Fredde (Kaltenbrunn), Gröden Formation, lower dark clayish layer.

Type figure: KLAUS 1963, p. 266, Pl. 4, Fig. 9.

Perisaccus granulatus KLAUS 1963

(Pl. 1, Fig. 4)

Coll. no.: GBA 2010/013/0010.

Holotype: Single grain preparation slide Nr. 461, Englandfinder N39.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge, near Fontana Fredde (Kaltenbrunn), lower layer with plant fossils, clay layer with plant debris.

Type figure: KLAUS 1963, p. 269, Pl. 4, Fig. 12.

Illinites parvus KLAUS 1963

(Pl. 1, Fig. 5)

Coll. no.: GBA 2010/013/0014.

Holotype: Single grain preparation slide Nr. 414, Englandfinder S40/4.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Runggaditsch, narrow pass near the farmbuilding of Sepp Oberrauch, coaly clay-layer in Gröden Formation, Upper belt.

Type figure: KLAUS 1963, p. 271, Pl. 5, Fig. 18.

Illinites gamsi KLAUS 1963

(Pl. 1, Fig. 6)

Coll. no.: GBA 2010/013/0015.

Holotype: Single grain preparation slide Nr. 415, Englandfinder P38/4.

Type level: Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Kaltenbrunn (Fontana Fredde), Upper clay layer.

Type figure: KLAUS 1963, p. 273, Pl. 5, Fig. 16.

Remarks: No type level is in the description of the holotype but it corresponds with *Taeniaesporites* and, therefore, it should be Lower Upper-Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Illinites pemphicus KLAUS 1963

(Pl. 1, Fig. 7)

Coll. no.: GBA 2010/013/0016.

Holotype: Single grain preparation slide Nr. 401, Englandfinder M34/2.

Type level: Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Cuecenes in Val Gardena near St. Ulrich (Ortisei).

Type figure: KLAUS 1963, p. 273, Pl. 5, Fig. 17.

Illinites bentzi

The slide with the holotype is lost. First description in KLAUS 1955.

Jugasporites paradelasaucei KLAUS 1963

(Pl. 1, Fig. 9)

Coll. no.: GBA 2010/013/0019.

Holotype: Single grain preparation slide Nr. 410, Englandfinder O40/2.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Kaltenbrunn (Fontana Fredde), lowermost layer with plant fossils, clay layer in sandstone with plant debris.

Type figure: KLAUS 1963, p. 279, Pl. 6, Fig. 23.

Jugasporites schaubergeroides KLAUS 1963

The slide with the holotype is lost.

Jugasporites lueckoides KLAUS 1963

(Pl. 1, Fig. 10)

Coll. no.: GBA 2010/013/0021.

Holotype: Single grain preparation slide Nr. 400, Englandfinder Q41.

Type level: Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Runggaditsch, narrow pass near the farmbuilding of Sepp Oberrauch, dark coaly claylayer in Gröden Formation.

Type figure: KLAUS 1963, p. 280, Pl. 6, Fig. 21.

Limitisporites parvus KLAUS 1963

(Pl. 1, Fig. 8)

Coll. no.: GBA 2010/013/0020.

Holotype: Single grain preparation slide Nr. 346, Englandfinder M36/2.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Kaltenbrunn (Fontana Fredde), lowermost layer with plant fossils.

Type figure: KLAUS 1963, p. 286, Pl. 6, Fig. 25.

Remarks: This holotype is on the slide nr. 346 with the label *"Jugasporites schaubergeroides".*

Limitisporites leschiki KLAUS 1963

(Pl. 1, Fig. 11)

Coll. no.: GBA 2010/013/0023.

Holotype: Single grain preparation slide Nr. 405, Englandfinder N40.

Type level: Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Kaltenbrunn (Fontana Fredde), black clay layer with plant fragments.

Type figure: KLAUS 1963: p. 285, Pl. 6, Fig. 26.

Scutasporites unicus KLAUS 1963
(Pl. 1, Fig. 12)

Coll. no.: GBA 2010/013/0027.

Holotype: Single grain preparation slide Nr. 404, Englandfinder K34r.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Rungggaditsch, road to Panider Pass (Passo Piné), near the farmbuilding of Sepp Oberrauch, Lower clay band in Gröden Formation.

Type figure: KLAUS 1963, p. 290, Pl. 7, Figs. 30, 31.

Gigantosporites hallstattensis KLAUS 1963
(Pl. 2, Fig. 1)

Coll. no.: GBA 2010/013/0029.

Holotype: Single grain preparation slide Nr. 477, Englandfinder O39r.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Runggaditsch, lower claybed in Gröden Formation, outcrop on the way from Runggaditsch to Panider Pass (Passo Piné) near the farmbuilding of Sepp Oberrauch.

Type figure: KLAUS 1963, p. 293, Pl. 8, Figs. 34–35.

Gigantosporites aletoides KLAUS 1963
(Pl. 2, Fig. 2)

Coll. no.: GBA 2010/013/0035.

Holotype: Single grain preparation slide Nr. 478, Englandfinder.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Runggaditsch, lower clay bed in Gröden Formation, outcrop on the way from Runggaditsch to Panider Pass (Passo Piné) near the farmbuilding of Sepp Oberrauch.

Type figure: KLAUS 1963, p. 293, Pl. 9, Fig. 40.

Gigantosporites illinoides KLAUS 1963
(Pl. 2, Fig. 3)

Coll. no.: GBA 2010/013/0037.

Holotype: Single grain preparation slide Nr. 479, Englandfinder R22/2.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Runggaditsch, lower clay bed in Gröden Formation, outcrop on the way from Runggaditsch to Panider Pass (Passo Piné) near the farm building of Sepp Oberrauch.

Type figure: KLAUS 1963, p. 294, Pl. 9, Fig. 39.

Gardenasporites heisseli KLAUS 1963
(Pl. 2, Fig. 5)

Coll. no.: GBA 2010/013/0038.

Holotype: Single grain preparation slide Nr. 455, Englandfinder N41.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Kaltenbrunn (Fontana Fredde), lowermost layer with plant fossils, clay layer in sandstone with plant debris.

Type figure: KLAUS 1963, p. 296, Pl. 10, Figs. 42–43.

Gardenasporites moroderi KLAUS 1963
(Pl. 2, Fig. 6)

Coll. no.: GBA 2010/013/0040.

Holotype: Single grain preparation slide Nr. 456, Englandfinder P38.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Cuecenes near St. Ulrich. Fine sandy to clayey layer with plant fragments in Gröden Formation.

Type figure: KLAUS 1963, p. 297, Pl. 10, Figs. 44–45.

Gardenasporites leonardii KLAUS 1963
(Pl. 2, Fig. 4)

Coll. no.: GBA 2010/013/0041.

Holotype: Single grain preparation slide Nr. 439, Englandfinder O32/2.

Type level: Lower Upper Permian, Gröden Formation (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge, near Fontana Fredde (Kaltenbrunn), Upper black clay layer with plant debris.

Type figure: KLAUS 1963, p. 297, Pl. 11, Figs. 46–47.

Remarks: Originally the specimen was located on *s*ingle grain preparation slide Nr. 457 which now is free of any spore. The specimen is located now on a slide with the label *"Striatites marginalis".*

Gardenasporites oberrauchi KLAUS 1963
(Pl. 2, Fig. 7)

Coll. no.: GBA 2010/013/0042.

Holotype: Single grain preparation slide Nr. 458, Englandfinder O36/3.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Cuecenes near St. Ulrich (Ortisei). Finesandy to clayey layer with plantfragments in Gröden Formation (Arenaria di Val gardena).

Type figure: KLAUS 1963, p. 298, Pl. 11, Figs. 48–49.

Lueckisporites microgranulatus KLAUS 1963.
(Pl. 3, Fig. 1)

Coll. no.: GBA 2010/013/0044.

Holotype: Single grain preparation slide Nr. 458, Englandfinder M38/2.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Kaltenbrunn (Fontana Fredde), lowermost layer with plant fossils, clay layer in sandstone with plant debris.

Type figure: KLAUS 1963, p. 303, Pl. 12; Fig. 57.

Remarks: The slide Nr. 458 also was given to *Gardenasporites oberrauchi*.

Lueckisporites globosus KLAUS 1963

(Pl. 3, Fig. 2)

Coll. no.: GBA 2010/013/0047.

Holotype: Single grain preparation slide Nr. 459, Englandfinder P39.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge, not far from Kaltenbrunn (Fontana Fredde), lower clayey layer with plant debris.

Type figure: KLAUS 1963, p. 304, Pl. 13, Fig. 60.

Lueckisporites parvus KLAUS 1963

(Pl. 3, Fig. 3)

Coll. no.: GBA 2010/013/0048.

Holotype: Single grain preparation slide Nr. 460, Englandfinder P30.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge, not far from Kaltenbrunn (Fontana Fredde), lower clayey layer in Grödner sandstone.

Type figure: KLAUS 1963, p. 304, Pl. 12, Fig. 58.

Taeniaesporites ortisei KLAUS 1963

(Pl. 3, Fig. 4)

Coll. no.: GBA 2010/013/0051.

Holotype: Single grain preparation slide Nr. 446, Englandfinder N36.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Fontana Fredde (Kaltenbrunn), Upper black clayey layer with plant debris.

Type figure: KLAUS 1963, p. 310, Pl. 14, Figs. 67–68.

Taeniaesporites labdacus KLAUS 1963

(Pl. 3, Fig. 5)

Coll. no.: GBA 2010/013/0054.

Holotype: Single grain preparation slide Nr. 447, Englandfinder O40/4.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Fontana Fredde (Kaltenbrunn), Upper black clayey layer with plant debris.

Type figure: KLAUS 1963, p. 311, Pl. 13, Figs. 65–66.

Taeniaesporites alatus KLAUS 1963

Coll. no.: GBA 2010/013/0055.

Remarks: The holotype is lost but a paratype is available (Coll. no.: GBA 2010/013/0056).

Strotersporites jansonii KLAUS 1963

(Pl. 3, Fig. 6)

Coll. no.: GBA 2010/013/0058.

Holotype: Single grain preparation slide Nr. 475, Englandfinder M37/1.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Kaltenbrunn (Fontana Fredde), lowermost layer with plant fossils, clayey layer in sandstone with plant debris.

Type figure: KLAUS 1963, p. 317, Pl. 15, Figs. 74–75.

Strotersporites wilsoni KLAUS 1963

(Pl. 3, Fig. 7)

Coll. no.: GBA 2010/013/0061.

Holotype: Single grain preparation slide Nr. 474, Englandfinder N45/3.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Runggaditsch.

Type figure: KLAUS 1963, p. 318, Pl. 16, Fig. 77.

Striatites marginalis KLAUS 1963

(Pl. 4, Fig. 1)

Coll. no.: GBA 2010/013/0063.

Holotype: Englandfinder P28/1.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Runggaditsch, lower clay bed in Gröden Formation (Arenaria di Val Gardena) outcrop on the way from Runggaditsch to Panider Pass (Passo Piné) near the farmbuilding of Sepp Oberrauch.

Type figure: KLAUS 1963, p. 323, Pl. 17, Figs. 80–81.

Remarks: The holotype is no more on slide Nr. 439, it is on another slide without number. On the slide with Nr. 439 and the label *Striatites marginalis* is the holotype of *Gardenasporites leonardi*.

Striatites minor KLAUS 1963

(Pl. 4, Fig. 2)

Coll. no.: GBA 2010/013/0064.

Holotype: Single grain preparation slide Nr. 440, Englandfinder S46/4.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Kaltenbrunn (Fontana Fredde), lowermost layer with plant fossils, clayey layer in sandstone with plant debris.

Type figure: KLAUS 1963, p. 324, Pl. 17, Fig. 82.

Striatites angulistriatus KLAUS 1963
(Pl. 4, Fig. 3)

Coll. no.: GBA 2010/013/0065.

Holotype: Single grain preparation slide Nr. 441, Englandfinder L32.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Cuecenes near St. Ulrich. Finesandy to clayey layer with plantfragments in Gröden Formation.

Type figure: KLAUS 1963, p. 324, Pl. 17, Fig. 83.

Vesicaspora schemeli KLAUS 1963
(Pl. 4, Fig. 4)

Coll. no.: GBA 2010/013/0072.

Holotype: Single grain preparation slide Nr. 443, Englandfinder L46/3.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Runggaditsch, lower claybed in Gröden Formation, outcrop on the way from Runggaditsch to Panider Pass (Passo Piné) near the farmbuilding of Sepp Oberrauch.

Type figure: KLAUS 1963, p. 336, Pl. 18, Fig. 84.

Vittatina ovalis KLAUS 1963
(Pl. 4, Fig. 5)

Coll. no.: GBA 2010/013/0077.

Holotype: Single grain preparation slide Nr. 502, Englandfinder Q37.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Kaltenbrunn (Fontana Fredde), lowermost layer with plant fossils, clayey layer in Gröden Formation.

Type figure: KLAUS 1963, p. 341, Pl. 20, Fig. 97.

Vittatina angulistriata KLAUS 1963
(Pl. 4, Fig. 7)

Coll. no.: GBA 2010/013/0078.

Holotype: Single grain preparation slide Nr. 503, Englandfinder N38/1.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Kaltenbrunn (Fontana Fredde), lowermost layer with plant fossils, clayey layer in Gröden Formation.

Type figure: KLAUS 1963, p. 342, Pl. 20, Figs. 98–99.

Ephedripites primus KLAUS 1963
(Pl. 4, Fig. 6)

Coll. no.: GBA 2010/013/0079.

Holotype: Single grain preparation slide Nr. 504, Englandfinder N38.

Type level: Lower Upper Permian, Gröden Formation = Grödner Sandstein (Arenaria di Val Gardena).

Type locality: Butterloch, Bletterbach Gorge near Fontana Fredde (Kaltenbrunn), lower clayish layer in Gröden Formation.

Type figure: KLAUS 1963, p. 343, Pl. 20, Fig. 100.

Alphabetic List of Spore Types

Type-Localities with List of Holotypes

Runggaditsch Val di Gardena

Illinites parvus
Jugasporites lueckoides
Scutasporites unicus
Gigantosporites hallstattensis
Gigantosporites aletoides
Gigantosporites illinoides
Striatites marginalis
Converrucosisporites eggeri
Vesicaspora schemeli
Strotersporites wilsoni
Taeniaesporites alatus

Cuecenes near St. Ulrich (Ortisei), Val di Gardena

Converrucosisporites dejerseyi
Illinites pemphicus
Gardenasporites moroderi
Gardenasporites oberrauchi
Striatites angulistriatus

Butterloch, Bletterbach Gorge

Endosporites hexareticulatus
Perisaccus granulatus
Illinites gamsi
Limitisporites leschiki
Limitisporites parvus
Gardenasporites heisseli
Jugasporites paradelasaucei
Gardenasporites leonardii
Strotersporites jansonii
Lueckisporites microgranulatus
Lueckisporites globosus
Lueckisporites parvus
Taeniaesporites labdacus
Striatites minor
Vittatina angulistriata
Vittatina ovalis
Ephedripites primus

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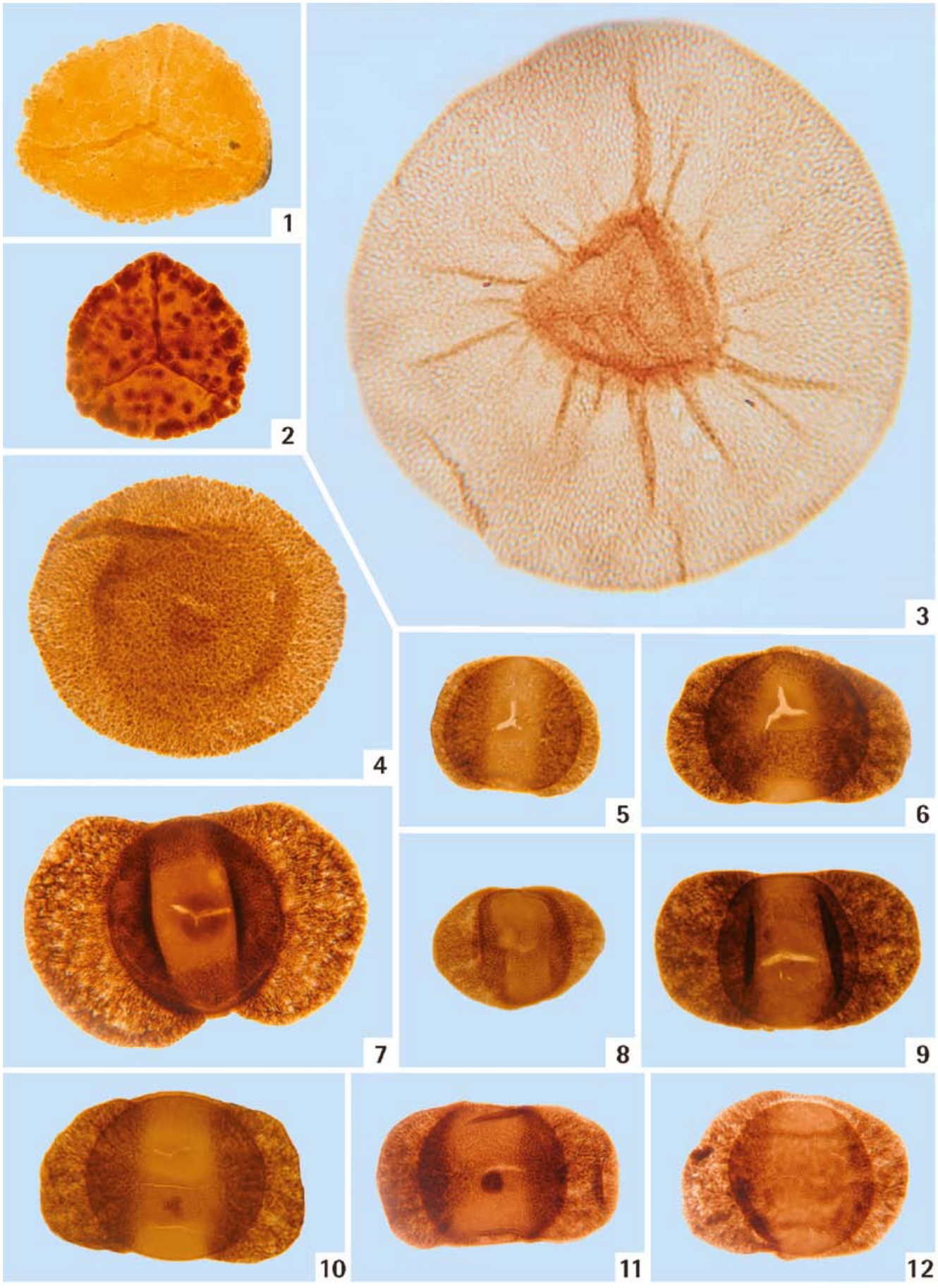
Plate 1

Fig. 1: *Converrucosisporites dejerseyi.*
Fig. 2: *Converrucosisporites eggeri.*
Fig. 3: *Endosporites hexareticulatus.*
Fig. 4: *Perisaccus granulatus.*
Fig. 5: *Illinites parvus.*
Fig. 6: *Illinites gamsi.*
Fig. 7: *Illinites pemphicus.*
Fig. 8: *Limitisporites parvus.*
Fig. 9: *Jugasporites paradelasaucei.*
Fig. 10: *Jugasporites lueckoides.*
Fig. 11: *Limitisporites leschiki.*
Fig. 12: *Scutasporites unicus.*

Magnification of all Figures = x 750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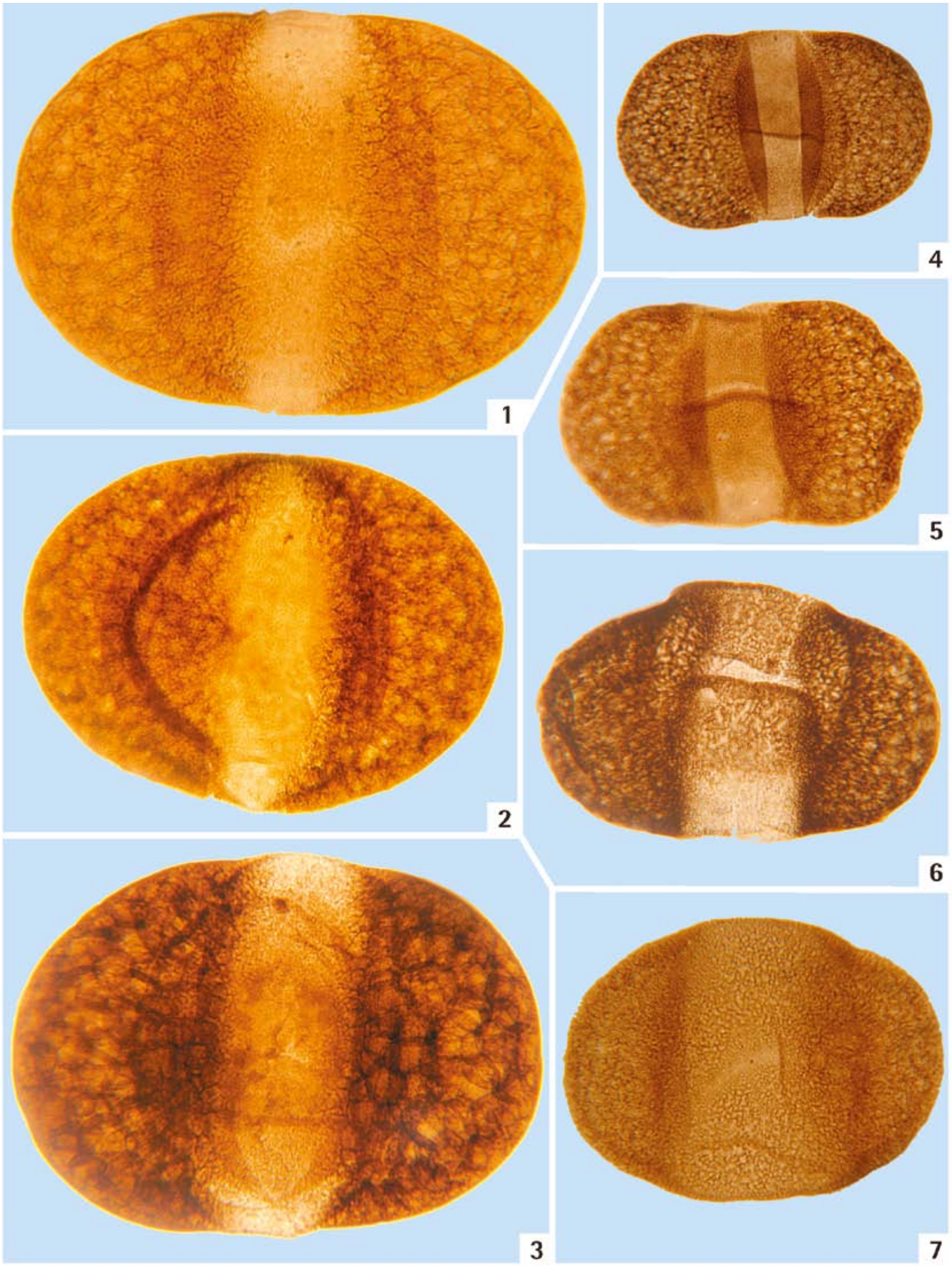
12
50µm

Plate 2

Fig. 1: *Gigantosporites hallstattensis.*
Fig. 2: *Gigantosporites aletoides.*
Fig. 3: *Gigantosporites illinoides.*
Fig. 4: *Gardenasporites leonardii.*
Fig. 5: *Gardenasporites heisseli.*
Fig. 6: *Gardenasporites moroderi.*
Fig. 7: *Gardenasporites oberrauchi.*

Magnification of all Figures = x 750


1
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50µm

Plate 3

Fig. 1: *Lueckisporites microgranulatus.*
Fig. 2: *Lueckisporites globosus.*
Fig. 3: *Lueckisporites parvus.*
Fig. 4: *Taeniaesporites ortisei.*
Fig. 5: *Taeniaesporites labdacus.*
Fig. 6: *Strotersporites jansonii.*
Fig. 7: *Strotersporites wilsoni.*

Magnification of all Figures = x 750

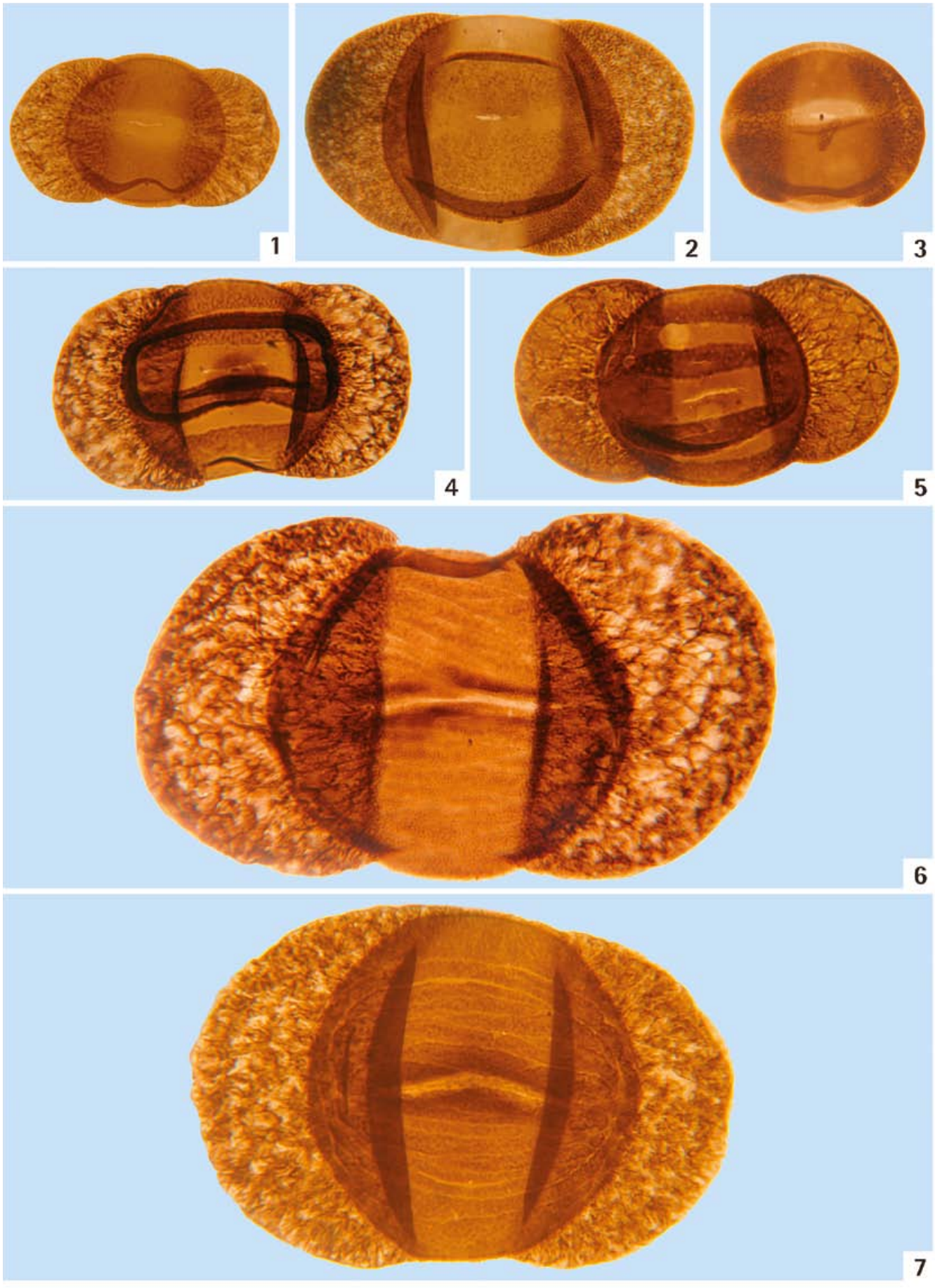
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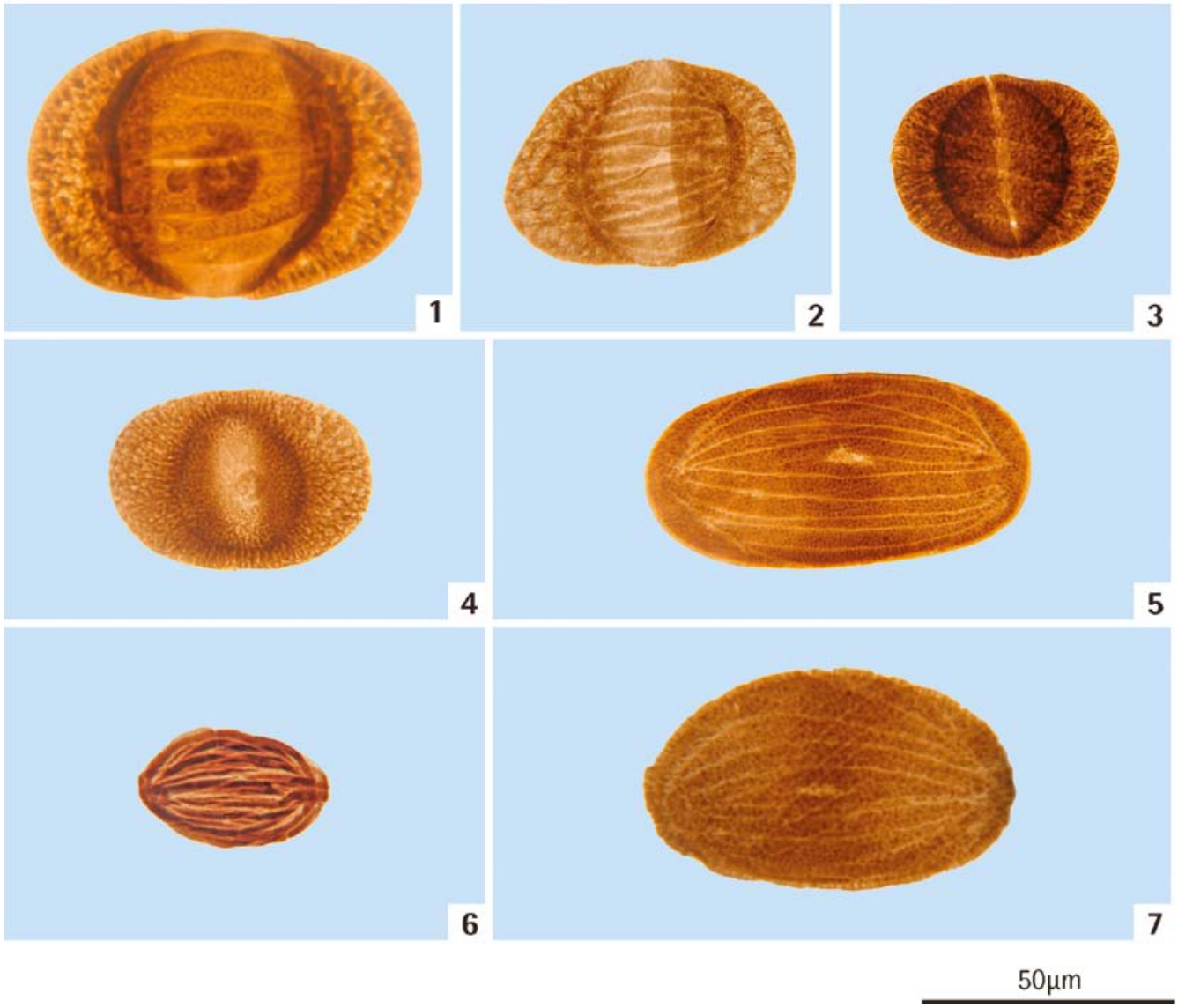
Plate 4

Fig. 1: *Striatites marginalis.*
Fig. 2: *Striatites minor.*
Fig. 3: *Striatites angulistriatus.*
Fig. 4: *Vesicaspora schemeli.*
Fig. 5: *Vittatina ovalis.*
Fig. 6: *Ephedripites primus.*
Fig. 7: *Vittatina angulistriatus.*

Magnification of all Figures = x 750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