

MIOCENE PALYNOMORPHS OF TAIWAN (VI)

Miscellaneous Spores and Pollen Grains

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Abstract: In this paper I have presented five classes and 28 taxa of fossil palynomorphs including thirteen taxa of fungal spores, three of algal spores, four of dinoflagellates, five of gymnospermous pollen grains, and three of angiospermous pollen grains. Four of these taxa represent corrections from the typographical errors, a later homonym, or a transfer to other genera and an emendation from the last publication; the remaining 23 taxa are newly proposed.

INTRODUCTION

Most of the taxonomical treatment of Miocene palynomorphs of Taiwan have been completed. There are still many unknown fossil palynomorphs to be identified and taxonomically classified. Due to the lack of definitive references the study of fossil systematics is difficult or impossible for the non-vascular plants. The three classes belonging to fungal, algal, and dinoflagellate palynomorphs are the least complete in my study. This should be re-investigated in the future when more references are developed. I hope the specialists in this field can offer me more useful guidebooks.

SYSTEMATIC TREATMENT

The order of systematic treatment follows fungal spores, algal spores, dinoflagellates, gymnospermous pollen grains and angiospermous pollen grains as below.

I. FUNGAL SPORES

1. *Cadyxinis* stach 1957

Spores 1-aperturate; elongated; exine psilate, smooth.

1. *Cadyxinis taiwanensis* Huang *sp. nov.*

Pl. 1:1-2.

Spores acute at both ends; $53 \times 7 \mu$; furrow almost as long as the length; exine psilate; sexine smooth.

Locality: Kuantaoshan Sandstone Member.

Slide: 50-2L.

Film: 31:16.

Reference: Jansonius & Hills 1976: 342.

2. *Diporicellaesporites* Elsik 1968

Elongate, diporate, multicellulate fungal or algal spores; one pore at each end.

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2. *Diporicellaesporites taiwanensis* Huang *sp. nov.* Pl. 1:3.
Six-cellular spore; elongate-elliptic; $20 \times 13 \mu$; septum two layered, 1μ thick; wall smooth, about 1μ thick.

Locality: Kuanyinshan Sandstone.

Slide: 37-1L.

Film: 7:3.

Reference: Jansonius & Hills, 1976: 808; Jansonius, 1976: *Pl. 1, Fig. 14.*

3. *Dyadosporites vander Hammen* 1954 *ex* Clarke 1965.

Fungal spores bicellules, elliptical; septum simple; exine psilate smooth.

3. *Dyadosporites taiwanensis* Huang *sp. nov.* Pl. 1:4.

Spores elliptic; $22 \times 14 \mu$; septum darker, 2μ wide; exine psilate; sexine smooth.

Locality: Kuanyinshan Sandstone.

Slide: 37-1L.

Reference: Jansonius & Hills, 1976: 882.

4. *Ephedracetes* Huang *gen. nov.*

Ephedra-like fungal spores, with 3-4 furrows.

4. *Ephedracetes taiwanensis* Huang *sp. nov.* Pl. 1:5-8

Brown fungal spores; elliptic oblong, obtuse or emarginate at one end, acute at opposite end; $34-49 \times 13-15 \mu$; furrows 3-4, as long as longitudinal axis, 1μ wide; exine psilate, 2μ thick; sexine smooth.

Locality: Peliao Sandstone; Kuanyinshan Sandstone.

Slide: 24-11 (holotype); 26-5L; 39-6R.

Film: 45:34 (*Fig. 3*, holotype); 47:20 (*Fig. 6*); 53:24-25 (*Figs. 4-5*).

5. *Foliopollenites* Sierotin 1961

Fungal spore with blunt spines.

5. *Foliopollenites taiwanensis* Huang *sp. nov.* Pl. 1:9-10.

Basidiospore; elliptic, one end acute, the other rounded; $15 \times 12 \mu$; exine 1μ thick, with blunt echinate processes, the echini about 1μ long; sexine granulate.

Locality: Talu Shale.

Slide: 5-1L.

Film: 42:19-20.

Reference: This spore type is similar to the *Russula* of the Russulaceae (Kapp, 1960: 66, *Fig. 105*); Jansonius & Hills, 1976: 1029.

6. *Fomesporites* Huang *gen. nov.*

Fungal spores, elliptic, with minutes and broad, flat and terminal attachment scar.

6. *Fomesporites taiwanensis* Huang *sp. nov.* Pl. 1:11-12.

Basidiospore; elliptic; $9 \times 6 \mu$; exine 1μ thick, minutely spinulate, the spines less than 1μ long; sexine granulate; attachment scar broad, flat and terminal.

Locality: Talu Shale.

Slide: 1-2L.

Film: 2:38.

Reference: Kapp 1969: *Fig. 10* (Polyporaceae).

7. *Fusiformisporites* Rouse 1962, *emend.* Elsik 1968

Inaperturate, bicellate fungal spores bearing elongate striae parallel to the long axis.

7. *Fusiformisporites taiwanensis* Huang *sp. nov.*

Pl. 1:13.

Spores bicellate; elongated elliptic; $24 \times 7 \mu$; septum thick, darker, 3μ wide; exine less than 1μ thick; exine longitudinal striae about 10, less than 1μ thick.

Locality: Kuanyinshan Sandstone.

Slide: 37-2R.

Film: 9:13.

Reference: Jansonius & Hills 1976: 1066.

8. *Lepiotasporites* Huang *gen. nov.*

Fungal spores with terminal hilum.

8. *Lepiotasporites taiwanensis* Huang

Pl. 1:14.

Basidiospore; elliptic with terminal hilum; $12 \times 6 \mu$; wall smooth.

Locality: Talu Shale.

Slide: 1-2L.

Film: 3:11.

References: Kapp 1969; 58, *Fig. 97* (Leucoprinaceae).

9. *Microsporonites* Jain 1968

Small fungal spores, inaperturate; exine psilate, smooth.

9. *Microsporonites taiwanensis* Huang *sp. nov.*

Pl. 1:15-17.

Spore $4-6 \times 6-9 \mu$; exine thin, psilate; sexine smooth.

Locality: Kuanyinshan Sandstone; Talu Shale.

Slide: 37-1L (holotype), 37-1L, 1-2L.

Film: 7:5 (holotype); 7:30; 4:34.

Reference: Jansonius & Hills, 1976: 1664.

10. *Nailisporites* Huang *gen. nov.*

Fungal spores with nail-shape at one end.

10. *Nailisporites taiwanensis* Huang *sp. nov.*

Pl. 1:18-19.

Spores subprolate, with nail-shape at one end; $16 \times 13 \mu$; furrows 3, long, extending into appendage; nail $5 \times 2 \mu$; exine 0.4μ thick; tectum psilate; sexine with irregular size of cross veins.

Locality: Talu Shale.

Slide: 1-3L.

Film: 14:18-19.

Taxonomic affinity: Basidiospore?

11. *Pezizasporites* Huang *gen. nov.*

Fungal spore with thin, reticulate exine.

11. *Pezizasporites taiwanensis* Huang

Pl. 1:20-21.

Ascospore; elliptical; $20 \times 13 \mu$; exine less than 1μ thick, with scabrate processes; sexine reticulate, the lumina $2 \times 3 \mu$, the muri 1μ wide.

Locality: Peliao Sandstone.

Slide: 27-5L.

Film: 48:4-5.

Reference: Kapp 1969: 59, Fig. 102.

12. *Senegalosporites* Jardiné & Magloire 1965

Spores 1-aperturate, lunate, with beak at one end.

12. *Senegalosporites taiwanensis* Huang *sp. nov.*

Pl. 1:22.

Spores lunate with beak at one end; $19 \times 12 \mu$ excluding the length of the beak; furrow widely open, $23 \times 5 \mu$; beak $4 \times 2 \mu$, acute at apex; exine 0.5μ thick; tectum psilate; sexine with obscure pattern.

Locality: Talu Shale.

Slide: 1-3L.

Film: 14-30.

Reference: Jansonius & Hills 1976: 2574.

13. *Striadiporites* Varma and Rawat 1963

Diporate grains with striated exine.

13. *Striadiporites taiwanensis* Huang *sp. nov.*

Pl. 1:23.

Ascospore or conidium; elliptic, obtuse at both ends, $36 \times 21 \mu$; pores indistinct. Exine psilate, 1μ thick; sexine striato-reticulate, muri 1μ wide.

Locality: Peliao Sandstone.

Slide: 24-11R.

Film: 45-33.

Note: This spore is very closely related to the Eocene *Striadiporites sanctaebabarbarae* Elik & Jansonius 1974 in all respects except that the apical biospore is indistinct. This is also very similar to Type JAM. 2005 fungal spores from Jamaica (Germeraad, 1979).

II. ALGAL SPORES

14. *Botryococcusporites* Huang *gen. nov.*

Spores 8-cells, circular; sexine incompletely reticulate.

1. *Botryococcusporites taiwanensis* Huang *sp. nov.*

Pl. 1:24.

Spores polyad (8-cells); somewhat circular; 30μ wide; single spores 9-11 μ wide; exine 1μ thick; tectum psilate; sexine incompletely reticulate.

Locality: Talu Shale.

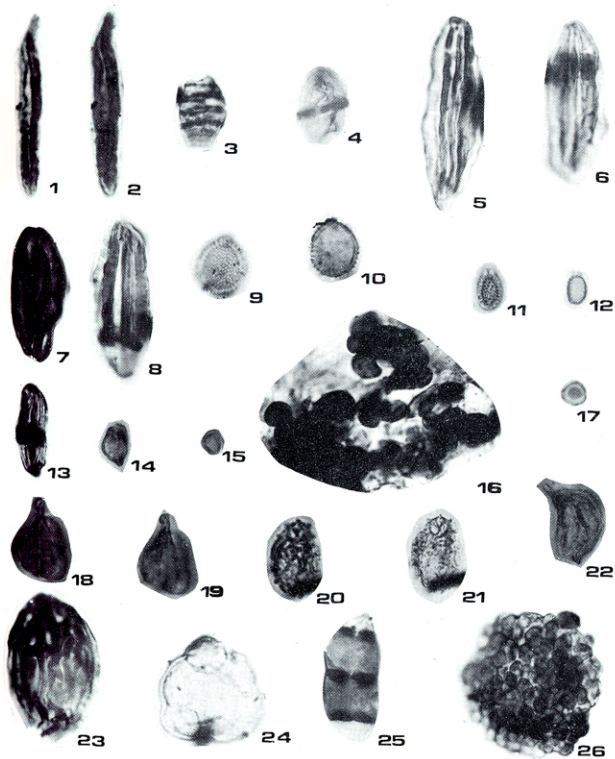
Slide: 1-1R.

Film: 82:4-7.

Reference: Tschndy & Scott 1969: 9, Pl. 2-1, Fig. 9.

Plate 1. Fungal and algal spores, all figures $1000 \times$.

1-2. *Cadyxinis taiwanensis* Huang; 3. *Diporicellaesporites taiwanensis* Huang; 4. *Dyadosporites taiwanensis* Huang; 5-8. *Ephedracetes taiwanensis* Huang; 9-10. *Foliopollenites taiwanensis* Huang; 11-12. *Fomosporites taiwanensis* Huang; 15. *Fusiformisporites taiwanensis* Huang; 14. *Lepiotosporites taiwanensis* Huang; 15-17. *Microsporonites taiwanensis* Huang; 18-19. *Nailisporites taiwanensis* Huang; 20-21. *Pezizasporites taiwanensis* Huang; 22. *Senegalosporites taiwanensis* Huang; 23. *Striadiporites taiwanensis* Huang; 24. *Botryococcusporites taiwanensis* Huang; 25. *Chaetosphaerites taiwanensis* Huang; 26. *Ulotasporites taiwanensis* Huang.



15. *Chaetosphaerites Felix* 1894

Spores 4-cells; two central cells dark, two end cells transparent; septum dark.

2. *Chaetosphaerites taiwanensis* Huang *sp. nov.* Pl. 1:25.

Spores tetrad, linear, 4-cellular spores; central two cells dark, while end two cells transparent; elongated elliptic, slightly constricted at middle cell wall, one end acute, the other end rounded; 35 μ long, 15 μ wide at maximal width; central cell 10 \times 15 μ ; septum darkest, 2-4 μ wide.

Locality: Peliao Sandstone.

Slide: 27-1R.

Film: 13:23.

Taxonomic affinity: It is related to the fossil Pyrenomyces.

Reference: Jansonius & Hills 1976: 445.

16. *Ulotasporites Huang gen. nov.*

Spores multi-cellular, oval.

3. *Ulotasporites taiwanensis* Huang *sp. nov.* Pl. 1:26.

Spores multi-cellular, oval, 35-42 μ wide; single spore 2.5-7 μ wide; exine smooth, 1 μ thick.

Locality: Peliao Sandstone.

Slide: 23-18L.

Film: 45:23.

Reference: Kapp 1969: 54, Fig. 87.

III. DINOFLAGELLATES

17. *Hemicystodinium Wall* 1967

Shell subspheroidal, with capitate processes, the archeopyle very long.

1. *Hemicystodinium parvum* Huang *sp. nov.* Pl. 2:1-2.

Shell 11-17 μ wide, 0.5-1 μ thick, granulate, with capitate processes, the capilli 1.5-2 μ long.

Locality: Kuanyinshan Sandstone.

Slide: 35-1L.

Film: 82:30-33.

Note: This is similar to *Microstridium tenuissimum* Deflandre (Leopold, 1969: p. 1304, fig. 17) but differs from the later by having long archeopyle.

2. *Hemicystodinium taiwanianum* Huang *sp. nov.* Pl. 2:3-4

Shells 15-25 μ wide, less than 1 μ thick, extervermiculate or granulate, with capitate processes, the capilli 3-4 μ long.

Locality: Peliao Sandstone.

Slide: 27-1R (holotype), 33-9L.

Film: 13:24 (holotype), 50:9.

Reference: deLeón (Index and guide to genera).

Note: This form is similar to *Bacuinaperturites* Pierce 1961 (Jansonius and Hills, 1976: 216).

18. *Polystephanephous Sarjeant* 1961b

Shells spheroidal, with one oval archeopyle and with furcate processes.

3. *Polystephanepous valensii* Sarjeant

Pl. 2:5-6

Shells 26-38 μ wide, 1 μ thick, with archeopyle of 15 μ wide and with 2(3-4)-furcate processes, the processes 10-15 μ long.

Locality: Talu Shale.

Slide: 7-2L.

Film: 42:22-23.

19. *Spiniferites* Mantell 1850 *emend.* Sarjeant 1970

Shells subspheroidal to spheroidal, with echinate processes, the processes arised from the sutural line.

4. *Spiniferites bentori* (Rosignol) Sarjeant

Pl. 2:7-8

Shells elliptic, 28-30 μ long, 18-20 μ wide, 1 μ thick, with echinate or filiform processes, the elements 3 \times 4 μ ; archeopyle 25-30 μ long.

Locality: Peliao Sandstone; Kuanyinshan Sandstone.

Slide: 21-13R, 37-1R.

Film: 45-18, 8:6.

5. *Spiniferites reginaldi* Mantell

Pl. 2:9-12.

Shells spheroidal, 15-26 μ wide, with columellate processes which arise from the sutural lines, are connected to each other at tip and form a ring, the columellae 3-6 μ long; archeopyle circular, semi-equatorial, incompletely up to 3/5th the length of the total length of the equator.

Locality: Shuliufen Shale Member, Taliao Formation.

Slide: 56-5L, TR₂-3R.

Film: 39:10-11, 80:27-31.

20. *Spinuliferites* Huang *gen. nov.*

Spores (shells) inaperturate or bilobed, spheroidal, with spinulate processes.

6. *Spinuliferites taiwanensis* Huang *sp. nov.*

Pl. 2:13.

Spores (shells) inaperturate or bilobed, spheroidal, 13 μ wide, less than 1 μ thick, with spinulate processes, the spines 2.5 μ long.

Locality: Shuliufen Shale Member.

Slide: 54-2L.

Film: 36:19.

Taxonomic affinity: Possibly it belongs to the dinoflagellate group.

IV. GYMNOSPERMOUS POLLEN GRAINS

21. *Dacrydiumites* Cookson & Harris 1965

Dacrydiumites in Huang, Taiwania 24:101 was misprinted as a typographic error, missing "u".

1. *Dacrydiumites taiwanensis* Huang

The generic name was spelled incorrect at the last publication as *Dacrydiumites taiwanensis* Huang, Taiwanian 24:101, Pl. 13, Figs. 1-2, 1979.

22. *Ephedripites* Bolkh. *ex R.* Pot. 1958 *emend.* Krutzsch 1961

Grains perprolate to prolate; ridges 6-8; exine psilate; sexine smooth.

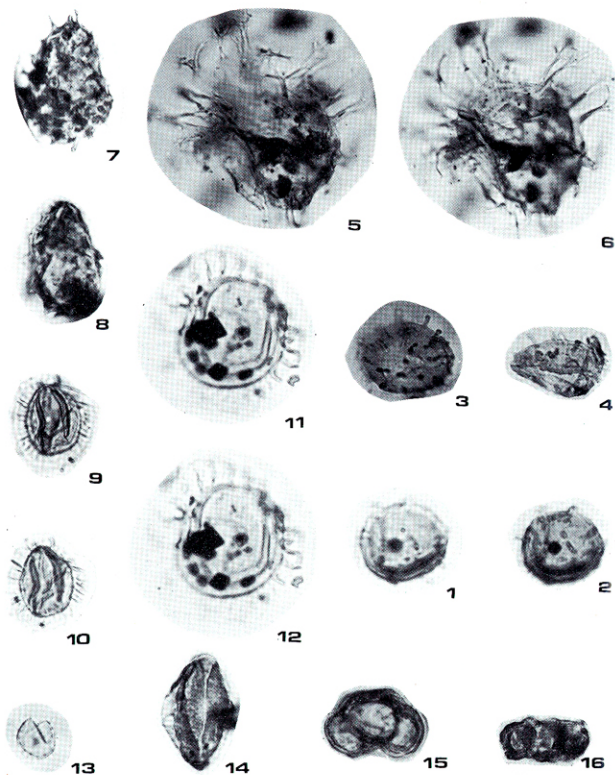


Plate 2. Dinoflagellate spores and pollen grains, all 1000 \times except 1-2 \times 1462.

1-2. *Hemicystodinium parvum* Huang 3-4. *Hemicystodinium taiwanianum* Huang 5-6. *Polystephanophous valensii* Sargeant; 7-8. *Spiniferites bentori* (Rosignol) Sargeant; 9-12. *Spiniferites reginaldi* Mantell; 13. *Spinuliferites taiwanensis* Huang; 14. *Cycadopites ellipticus* Huang 15. *Semivitreissporite divaricatosaccatus* Huang; 16. *Vitreissporites shitiensis* Chaw and Huang.

KEY TO THE SPECIES

1. Cross-grid pattern between grooves present.
 2. Grains with 6 ridges, ellipsoidal, one pole obtuse, the other one acute....3. *E. kuanyinshanensis*
 2. Grains with 5 ridges, fusiform, one prominently prolate, other appendaged.
 3. Grains large, more than $40 \times 15 \mu$4. *E. miocenus* var. *miocenus*
 3. Grains small, less than $33 \times 14 \mu$5. *E. miocenus* var. *minus*
1. Cross grid-pattern between grooves absent.
 4. Grain prolate, $30 \times 19 \mu$2. *E. ellipticus*
 4. Grain perprolate, $42-46 \times 12-16 \mu$6. *E. taiwanensis*

2. *Ephedripites ellipticus* Huang, *Taiwania* 24:103, Pl. 1, Figs. 13-14.

3. *Ephedripites kuanyinshanensis* Huang & Chaw, *sp. nov.*, Pl. 3:1-4.

Grains 5-ridged; perprolate, the one pole obtuse, the other pole rounded; $55 \times 20 \mu$; ridge 1μ thick; pore at one end of groove?; groove 0.5μ wide, as long as the P axes; exine 1μ thick; tectum psilate; sexine with cross-grid pattern.

Locality: Kuanyinshan Sandstone.

Slide: 35-1R (holotype).

Film: 82:26-29 (holotype).

Taxonomic affinity: This is very similar to *Ephedra distachya* type (Elsik, W.C. 1974).

Pl. 1, Fig. 10, Tafel 21.

4. *Ephedripites miocenus* Huang & S.M. Chaw, *sp. nov.*

Pl. 3:5-11.

Ephedripites miocenus var. *miocenus*.

Ephedripites chuhuankengensis Chaw, Miocene Gymnospermous Palynomorph Biostratigraphy, Taiwan, p. 24, Pl. 7, Figs. 1-2, 1980 (Unpublished M.S. thesis).

Grain 5-ridged?; perprolate, fusiform, the one pole porate, the other pole appendaged with bulb-like body, the appendage 2μ long; $45-48 \times 15-18 \mu$; ridge 1μ wide, the groove as long as P axes; exine 1μ thick; tectum psilate; sexine with cross-grid pattern.

Locality: Talu Shale, Chuhuankeng Formation.

Slide: 1-3L (holotype), 12-10L, 1-1L.

Film: 82:15-21 (holotype), 83:6, 2:30.

Taxonomic affinity: This form resembles pollen grains of *Pteracanthopollenites* (Jansonius & Hills, 1976: 2252).

Note: Other form (slide: 1-1L; film: 2-30) may belong to this taxon.

5. *Ephedripites miocenus* Huang & Chaw var. *minus* Huang, *var. nov.*

Pl. 3:12.

Grains 5-ridged; perprolate, the one pole porate, the other pole obtuse; $33 \times 14 \mu$; grooves as long as P axes; exine 1μ thick; tectum psilate; sexine with cross-grid pattern.

Locality: Chuhuankeng Formation.

Slide: 19-2L.

Film: 12:1.

6. *Ephedripites taiwanensis* Huang *Journ. Jap. Palynology* 18:76, 1976, et *Taiwania* 24:103, Pl. 1, Figs. 15-18.

23. *Cycadopites* Wodehouse 1933

Grains monosulcate; ellipsoidal; furrow rounded on both ends; exine psilate, smooth.

7. *Cycadopites ellipticus* Huang, *emend.*

Pl. 2:14.

Grains longitudinally oblong-elliptic; $29 \times 13 \mu$; furrow monosulcate; exine less than 1μ thick; tectum psilate; sexine obscure pattern. This is an abnormal form because portion of body was flaked bilaterally from one pole as if they were two bladders of bissacate grains.

Locality: Peliao Sandstone.

Slide: 27-19R.

Film: 48-11.

Reference: Huang, 1979: 81, *Pl. 1:1-5*.

24. *Semivitreisporites* Huang *gen. nov.*

Grains bisaccate; body subspheroidal; one furrow; bladders divaricate from body.

8. *Semivitreisporites divaricosaccatus* Huang, *sp. nov.* Pl. 2:15.

Grains bisaccate; body subspheroidal, 12-13 μ wide; one furrow; exine psilate, 1 μ wide; sexine smooth; bladder 8-9 \times 13-14 μ , smooth, or obscurely granulate.

Locality: Shuliufen Shale Member.

Slide: 55-5L.

Film: 39:9.

Note: This form differs from the most diagnosis of the *Vitreisporites* by its lateral orientation and the two sacs forming divaricate relationship with the central body, and the evenly thickness of exine of both body and bladders.

25. *Vitreisporites* Leschik 1956

Grains bisaccate; body suborbicular, less than 20 μ wide; attachment zones of the bladders thick; strongly preferred proximal-distal orientation, showing the two air sac's linear relationship with the central body (Tschudy & Scott, 1969: 302). Leschik (1956) described that at proximal pole of this genus a weak Y-mark can be seen. Nilsson (1958) stated that the presence or absence of a Y-mark should not be considered as a diagnostic characteristic of this genus, because he could not observe it in his specimens. In our specimen, the Y-mark was also not observed. Jansonius (1962) removed the requirement of a trilete mark and size restriction of less than 20 μ (Jansonius & Hill, 1976). Furthermore, Hugh (1969) stated that this genus occurred universally throughout the mid-Mesozoic.

9. *Vitreisporites shihtiensis* S. M. Chaw & Huang *sp. nov.* Pl. 2:16.

Grains bisaccate; 25 μ wide; body suborbicular, 11-12 μ wide; bladders 10 μ wide, obscurely reticulate; bladder-root less than the body depth; attachment zones of bladder thick.

Locality: Shihti Formation.

Slide: 15-40.

Film: 83:7.

Reference: Tschudy & Scott, 1969: 293, 302, 321.

V. ANGIOSPERMOUS POLLEN GRAINS

26. *Alnipollenites* Potonié 1931; Jansonius & Hills 1980

1. *Alnipollenites formosensis* (Huang) Huang *transf. nov.*
Polyvestibulopollenites formosensis Huang *Taiwania* 25:68, *Pl. 1, Figs. 9-16*, 1980.

27. *Daphniphyllumpollenites* Huang 1980 *emend.* Huang 1981

2. *Daphniphyllumpollenites* Huang *Taiwania* 25:76, 1980 was, according to the International Code of Botanical Nomenclature, article 37, not published validly. The type species for this genus is here assigned to *Daphniphyllumpollenites oldhamii* Huang *Taiwania* 25:76, *Pl. 9, Figs. 2-4*. *D. ignotus* Huang *l. c.* p. 76, *Pl. 9, Fig. 1*, is also validated here.



Plate 3. *Ephedrapites* (Ephedraceae), all figures 1000 \times .

1-4. *E. kuanyinshanensis* Huang; 5-11. *E. miocerus* Huang & Chaw; 12. *E. miocerus* var. *miocerus* Huang.

28. *Monosulcites* Cookson *ex* Couper 19533. *Monosulcites formosensis* Huang, nom. nov.

Monosulcites taiwanensis Huang in *Taiwania* 25: 101, pl. 12, fig. 11, 1980 which belongs to a monocotyledonous pollen grains, was published as a later homonym. The same name appeared in the *Taiwania* 24: 84, pl. 2, figs. 13-15, 1979 for the fossil taxon of gymnospermous pollen grains.

CHECKLIST

| | |
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| 1. <i>Cadyxinis taiwanensis</i> Huang | 45, 1: 1-2 |
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| 3. <i>Dyadosporites taiwanensis</i> Huang..... | 46, 1: 4 |
| 4. <i>Ephedracetes taiwanensis</i> Huang | 46, 1: 5-8 |
| 5. <i>Foliopollenites taiwanensis</i> Huang | 46, 1: 9-10 |
| 6. <i>Fomesporites taiwanensis</i> Huang | 46, 1: 11-12 |
| 7. <i>Fusiformisporites taiwanensis</i> Huang | 47, 1: 13 |
| 8. <i>Lepiotasporites taiwanensis</i> Huang | 47, 1: 14 |
| 9. <i>Microsporonites taiwanensis</i> Huang | 47, 1: 15-17 |
| 10. <i>Nailisporites taiwanensis</i> Huang | 47, 1: 18-19 |
| 11. <i>Peziziasporites taiwanensis</i> Huang..... | 47, 1: 20-21 |
| 12. <i>Senegalosporites taiwanensis</i> Huang..... | 48, 1: 22 |
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| 16. <i>Ulotasporites taiwanensis</i> Huang | 50, 1: 26 |
| 17. <i>Hemicystodinium parvum</i> Huang | 50, 2: 1-2 |
| 18. <i>Hemicystodinium taiwanianum</i> Huang..... | 50, 2: 3-4 |
| 19. <i>Polystephanephus valensii</i> Sarjeant..... | 51, 2: 5-6 |
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| 21. <i>Spiniferites reginaldi</i> Mantell..... | 51, 2: 9-12 |
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| 23. <i>Dacrydiumites taiwanensis</i> Huang | 51 |
| 24. <i>Ephedripites ellipticus</i> Huang | 53 |
| 25. <i>Ephedripites kuanyinshanensis</i> Huang and Chaw..... | 53, 3: 1-4 |
| 26. <i>Ephedripites miocenus</i> Huang and Chaw | 53, 3: 5-11 |
| 27. <i>Ephedripites miocenus</i> var. <i>minimus</i> Huang..... | 53, 3: 12 |
| 28. <i>Ephedripites taiwanensis</i> Huang | 53 |
| 29. <i>Cycadopites ellipticas</i> Huang..... | 53, 2: 14 |
| 30. <i>Semivitreisporites divaricatosaccatus</i> Huang | 54, 2: 15 |
| 31. <i>Vitreisporites shihtiensis</i> Chaw and Huang | 54, 2: 16 |
| 32. <i>Alnipollenites formosensis</i> (Huang) Huang..... | 54 |
| 33. <i>Daphniphyllumpollenites oldhamii</i> Huang | 54 |
| 34. <i>Daphniphyllumpollenites ignotus</i> Huang..... | 54 |
| 35. <i>Monosulcites formosensis</i> Huang | 56 |

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