

## MIOCENE PALYNOFORMS OF TAIWAN

II. Tetrad grains<sup>(1)</sup>

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(Received September 20, 1977; Accepted December 1, 1977)

This is the second report for the fossil spores and pollen grains of the Miocene of Taiwan. The present paper describes five new form taxa which belong to four different orders: Coniferales, Ericales, Rubiales, and Sarraceniales. These grains are all united into tetrads except for one with free single grains which is found in the grains of *Classopollis* of the Coniferales.

## KEY TO THE GENERA

1. Exine psilate or rarely mixed with scabrate processes.
    2. Grains porate; sexine with thickening belt.....1. *Classopollis*
    2. Grains colpate; sexine without thickening belt.....4. *Ericipites*
  1. Exine with echinate, gemmate, clavate, baculate or rarely mixed with scabrate processes.
    3. Grains inaperturate; exine with clavate and baculate processes.....
      - ..... 2. *Droserapites*
    3. Grains porate.
      4. Exine with gemmate and baculate processes.....3. *Droserapollis*
      4. Exine with gemmate and scabrate processes.....5. *Gardeniapites*
1. **CLASSOPOLLIS** Pflug 1953 emend De Jersey & Paten 1964.

Grains tetrads. Individual grains distally monoporate. Exine with an equatorial girdle which is formed by an incomplete ring-shaped beltlike thickening.

1. *Classopollis taiwanensis* Huang sp. nov. Pl. 1, Figs. 1-2.

Grains tetrad; 46-59  $\mu$  wide. Individual grains monoporate; prolate; 33-40  $\times$  23-24  $\mu$ ; pores. large. Exine 1.5-3  $\mu$  thick, psilate; sexine granulate, with an

(1) The first report of this series study appears on pages 13-31 of the same issue of the Botanical Bulletin of Academia Sinica (1978).

incomplete ring-shape belt of thickening, the belt 2-3  $\mu$  thick.

Type locality: Kuantaoshan Sandstone Member.

Type slide: 35-3R.

Taxonomic affinity: Coniferales.

## 2. **DROSERAPITES** Huang gen. nov.

Grains tetrad. Individual grains inaperturate. Exine mixed with dense clavate and baculate processes; sexine reticulate.

### 1. **Droserapites clavatus** Huang sp. nov. Pl. 1, Figs. 3-4.

Grains tetrahedral tetrad; 34-40  $\mu$  wide. Individual grain inaperturate; subspheroidal; 18-25  $\mu$  wide: amb circular, but abruptly acute at distal pole. Exine 0.5-1  $\mu$  thick, mixed with dense superposed clavate and baculate processes, the bacula or clavae 2-3  $\mu$  long; sexine reticulate.

Type locality: Peliao Sandstone.

Type slide: 29-1L.

Taxonomic affinity: Possibly related with species of *Quadrisperites* Honnelly 158 *ex* Potonié & Lele 1961, or *Droseidites* Cooksen 1947 *ex* Potonié 1960.

## 3. **DROSERAPOLLIS** Krutzsch 1970

Grains tetrahedral tetrad. Individual grains porate-like? Exine mixed with gemmate and short baculate processes; sexine granulate.

### 1. **Droserapollis gemmatus** Huang sp. nov. Pl. 1, Figs. 5-6.

Grains tetrahedral tetrad; 53-56  $\mu$  wide. Individual grains Porate-like?; 35-40  $\times$  25-26  $\mu$ ; prolate. Exine 1.5-2.4  $\mu$  thick, mixed with gemmate and short baculate processes, the gemmae or bacula 1-2  $\mu$  long; sexine granulate.

Type locality: Yutengping Sandstone Member.

Type slide: 57-2L.

Taxonomic affinity: *Drosera* species of the Droseraceae of the Sarraceniales.

## 4. **ERICIPITES** Woodehouse 1933

Grains tetrahedral tetrad, generally tightly appressed. Individual grains 3-colporate; pores indistinct, usually where two neighbouring grains join each other, the adjacent furrows close to and facing each other across the suture. Exine psilate, rarely mixed with scabrate processes.

1. **Ericipites taiwanensis** Huang sp. nov. Pl. 1, Figs. 7-8.

Grains tetrahedral tetrad; 45-52  $\mu$  wide. Individual grains 3-colporate; spheroidal; 34  $\mu$  wide; amb circular; colpi continuous with one of the furrows of each of its three neighbours across the suture between their contact faces, 10-15  $\mu$  long (each furrow ranges 5-7.5  $\mu$  long) crassimarginate, the margo 2-4  $\mu$  wide, the pores obscure. Exine 1.5-2  $\mu$  thick, psilate or with scabrate processes; sexine granulate.

Type locality: Shangfuchi Sandstone.

Type slide: 47-4R.

Taxonomic affinity: Closely related to the *Rhododendron* species of the Ericaceae of the Ericales.

Note: Some other pollen grains were also found from several different rock types, such as Shangfuchi Sandstone, Kuantaoshan Sandstone Member, and Shuliufeng Shale. The size of the pollen grains ranges from 34 to 41  $\mu$ .

5. **GARDENIAPITES** Huang gen. nov.

Grains tetrahedral tetrad. Individual grains 3-porate; amb circular; pores crassimarginate, bordered circular. Exine mixed with gemmate and scabrate processes.

1. **Gardeniapites taiwanensis** Huang sp. nov. Pl. 1, Figs. 9-10.

Grains tetrad: 36-39  $\mu$  wide. Individual grains 3-porate; spheroidal; 20  $\mu$  wide; amb circular; pores crassimarginate, 2-3  $\times$  1.5-2  $\mu$ , the margo 5  $\mu$  thick. Exine 1-1.5  $\mu$  thick, mixed with gemmate and scabrate processes; sexine granulate, the granules coarse, with LO-pattern.

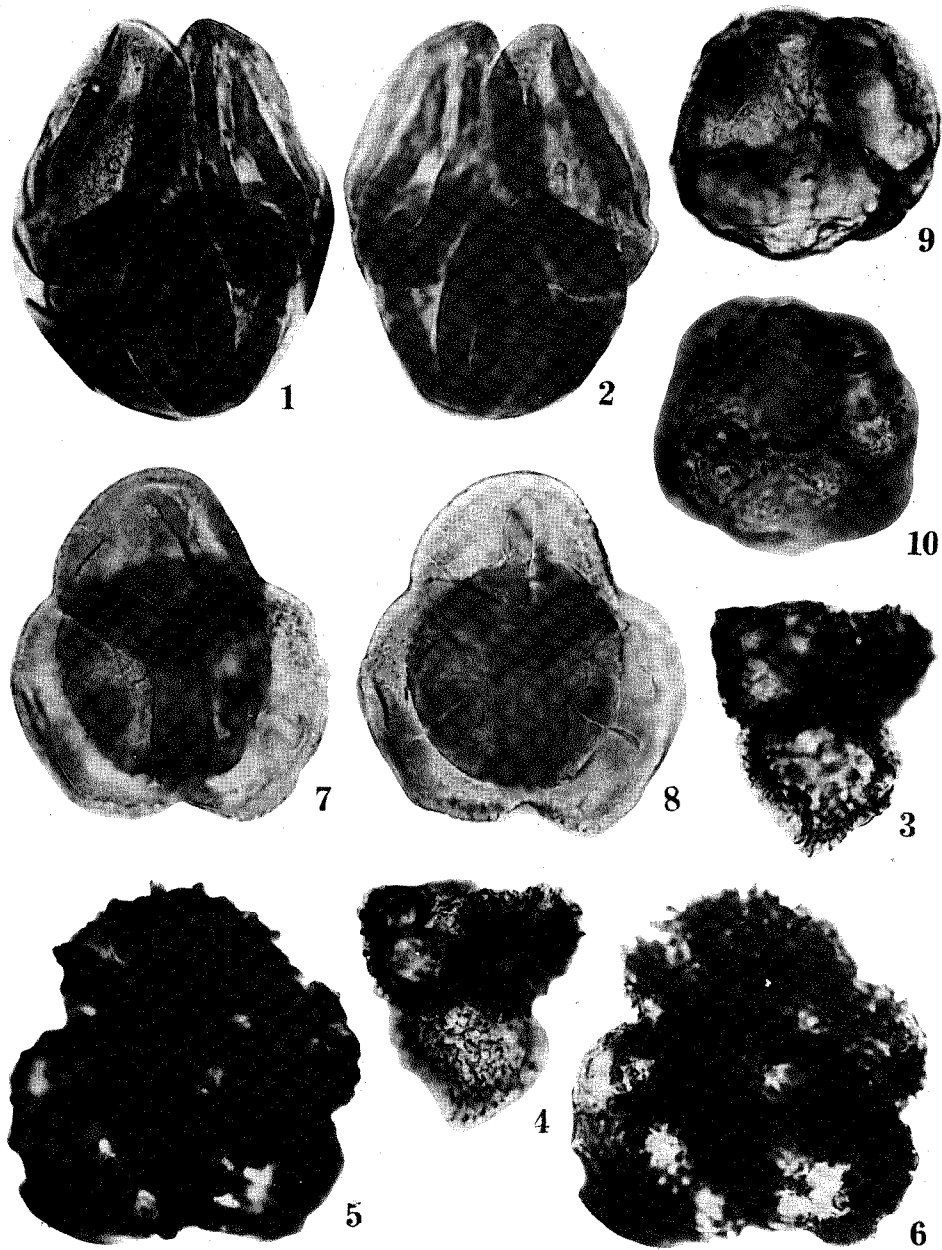
Type locality: Yutengping Sandstone Member.

Type slide: 57-2R.

Taxonomic affinity: *Gardenia* species of the Rubiaceae of the Rubiales.

#### Literature Cited

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- KREMP, G. O. and T. KAWASAKI. 1972. The spores of the Pteridophytes. Hirokawa Publ. Co.
- KRUTZSCH, W. 1971. Atlas der mittel- und jungtertiären dispersen Sporen und Pollen-sowie der Mikroplanktonformen des nördlichen Mitteleuropas. Veb Deutscher Verlag der Wissenschaften Berlin.



Pl. 1. Tetrad grains,  $\times 900$ .

- 1-2, *Classopollis taiwanensis* Huang (CONIFERALES);  
 3-4, *Droserapites clavatus* Huang (DROSERACEAE);  
 5-6, *Droserapollis gemmatus* Huang (DROSERACEAE);  
 7-8, *Ericipites taiwanensis* Huang (ERICACEAE);  
 9-10, *Gardeniapites taiwanensis* Huang (RUBIACEAE).

## 臺灣中新世之化石孢粉(II)四分子花粉粒

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本文描述伍花粉形態種，隸屬於松柏部，杜鵑花部，茜草部及瓶子草部。花粉粒均為四分子集合體，惟內環粉屬 (*Classopollis*) 亦有單粒體出現。