
Microscopical study of *Qasimia* from the Permian of western Henan Province, Central China

Wang Hongshan & Yang Guanxiu

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On the basis of characters of vegetative and fertile fronds, the specimens collected from the Pingdingshan Coalfield, western Henan Province, Central China, have been assigned to a new species—*Qasimia lanceolata*.

Key-words—*Qasimia*, Pingdingshan Coalfield, Permian, China.

Wang Hongshan & Yang Guanxiu, China University of Geosciences, Beijing 100 083, China.

सारांश

केन्द्रीय चीन में पश्चिमी हेनान प्रान्त के परमियन युग से प्राप्त क्वासीमिआ का सूक्ष्मदर्शीय अध्ययन

वांग होंगशान एवं यांग गुआन्सिउ

शाकीय एवं अबन्ध्य प्रपर्णों के लक्षणों के आधार पर केन्द्रीय चीन में पश्चिमी हेनान प्रान्त के पिंगडिंगशान कोयला-क्षेत्र से एकत्र प्राप्त को क्वासीमिआ लेन्सिओलेटा नव जाति के नाम से वर्णित किया गया है।

THE form-genera which are frequently found in the Permian of South and North China and characterized by long-elliptical to broadly-linear large pinnules of pinnately compound leaves, may be mentioned *Compsopteris* (*Protoblechnum*), *Neuropteridium* (pars.) and *Taeniopteris* (pars.). As their fertile pinnae have not been found the status of their natural classification remains obscure. Some specimens with both fertile and sterile fronds preserved are collected from the late Middle Permian Xiaofengkou Formation in Pingdingshan city, Henan Province, China. Based on the characters of fertile fronds, they should be assigned to *Qasimia*, but the characters of pinnules, sporangia and spores are different from those of *Qasimia schyfsmae* (Lemoigne) Hill, Wagner et EL-Khayal, the type species of *Qasimia* established by Hill *et al.* (1985). So the present specimens are described as *Qasimia lanceolata* sp. nov.

MATERIAL AND METHODS

As all the specimens studied in this paper are compressions, the methods used in the study are the

same as those mentioned in a paper "Morphological and microscopical study on *Scolecopteris* in China" (in this Volume).

DESCRIPTION

Marattiales

Qasimia Hill *et al.* 1985

Qasimia lanceolata sp. nov.

Pl. 1, figs 1-9

Description—Fronds at least bipinnate. Vegetative pinnules linear or lanceolate, 1.2-1.6 cm broad and 5 cm long; cordate base covering the ultimate pinna rachis. Pinnules attached to the rachis only at the base of midrib. Adjacent pinnules separate or the pinnule anadrome margin overlapping the catadrome margin of the adjacent pinnule. Apices obtuse and margins may or may not be parallel. Midrib 1 mm wide and persisting almost to the apex. Lateral veins curved outward immediately after arising from midrib, with first bifurcation very near the

midrib and the second bifurcation somewhat far from it, occasionally additional fork occurring near the pinnule margin. Lateral veins perpendicular or subperpendicular to the pinnule margin. About 40 veins per cm at the pinnule margin. Fertile pinnules cordate at base and obtuse at apex; the bivalved and linear synangia imbricately arranged, occupying almost the half-width of the pinnule lamina, with its length almost equal to that of the lateral vein; the number of sporangia in each row of synangium varies but not more than 32. Sporangium long-elliptical with parallel striations on the dorsal wall, generally 0.8 x 0.2 mm in size; spores *in situ* monolete, elliptical or reniform; exine ornamentation unclearly granular, generally 90 x 55 μm in size, with suture 50 μm long. Sometime timid ridge is observed along the suture.

Syntypes—Specimens in Pl. 1, figs 3, 5.

Type locality—Pingdingshan Coalfield (Henan).

Horizon—Xiaofengkou Formation (late Middle Permian).

Etymology—The species is named after the form of the pinnule.

COMPARISON AND DISCUSSION

On comparison with the type species of *Qasimia*, e.g., *Q. schyfsmae* (Lemoigne) Hill *et al.* (1985) it has been found that the sporangium of *Q. lanceolata* sp. nov. is smaller (0.8 x 0.2 mm) and its spores *in situ* are unclearly granular. The sporangium of *Q. schyfsmae* is 1.5-2 mm in length and exine ornamentation of monolete spores is warty or spiny. These characters serve to differentiate the two species.

Compsopteris (*Danaeites*?) sp. (Huang *et al.*, 1989, p. 45, pl. 23, figs 3, 4; pl. 24; pl. 25, fig. 4) collected from the 3rd Member of the Tongziyan Formation in Fujian Province, China, is similar to *Q. schyfsmae* in its linear pinnules and pinnule bases clearly auriculate. It differs from *Q. lanceolata* sp. nov. and *Q. schyfsmae* in lower vein density (32 veins

per cm at margin) and its sporangia are smaller (not more than 0.2 mm in length). According to the characters of its vegetative and fertile fronds, *Compsopteris* (*Danaeites*?) sp. may possibly be assigned to another species of *Qasimia*. Though Hill *et al.* (1985, pp. 4-6) hold that "*Compsopteris* Zalesky refers to *Protoblechnum* sensu Halle (non Lesquereux) which shows quite variable pinnule attachments (including markedly decurrent forms) and oblique lateral veins; both of these characters set this genus clearly apart from *Qasimia*", We believe that at least part of the specimens which were formerly assigned to *Compsopteris* in China, such as *Compsopteris* (*Danaeites*) sp. (Huang *et al.*, 1989) from Fujian Province, may be assigned to *Qasimia*.

Hill *et al.* (1985) also suggested that many ferns from the East Asian Cathaysian Province were wrongly determined as *Taeniopteris* or *Neuropteridium*, and those with fertile pinna such as *Danaeites mirabilis* Gu et Zhi 1974 and *Lophotheca panxianensis* Zhao 1980 are possibly congeneric with *Qasimia*. Their comparisons are mostly based on illustrations. As a result of comparison between *Qasimia* and a large number of specimens assigned to *Neuropteridium* collected from Pingdingshan city we found that it is probably inappropriate to assign *Neuropteridium* to *Qasimia*. First of all, it is difficult to compare *Neuropteridium* with *Qasimia*, because all species of the former genus lack fertile fronds. Secondly, pinnules of *Neuropteridium* are smaller than those of *Qasimia*, and the most important thing is that *Neuropteridium* possesses high vein density, and its veins often fork more times and form an acute angle with the pinnule margin (often less than 60°). The above-mentioned characters are distinct in *Neuropteridium coreanicum* Koiwai and *N. polymorphum* Halle. So it is suggested here that form genera such as *Neuropteridium*, *Taeniopteris* and *Compsopteris* (*Protoblechnum*) should still be used before their reproductive organs *in situ* are found and

PLATE 1

1. Vegetative fronds. Pinnules cordate at the base. No. HEP4389.
2. Fragments of vegetative pinnules. No. HEP4423.
- 3, 3a. Vegetative fronds probably bipinnate. 3a, X 2 showing venation. No. HEP5174.
- 4, 4a. Fragment of fertile pinnule bearing synangia only at the lower part of the pinnule. 4a, X 3. No. HEP4378.
- 5, 5a-d. Fragment of fertile pinnule. 5a, X 2 showing synangia occupying the entire half-width of the pinnule lamina; 5b, X 4. 5c, X 3. 5d, X 6 showing imbricately arranged synangia at the upper end, the middle and the base of pinnule. No. HEP4325.
6. Fragment of ultimate fertile pinna. No. : HEP4377.
- 7-9. Spores *in situ*. 7, X 300; 8, X 500; 9, X 550. No. HEP4379. Registered numbers of SEM pictures: 7, 86915; 8, 86918; 9, 86916.

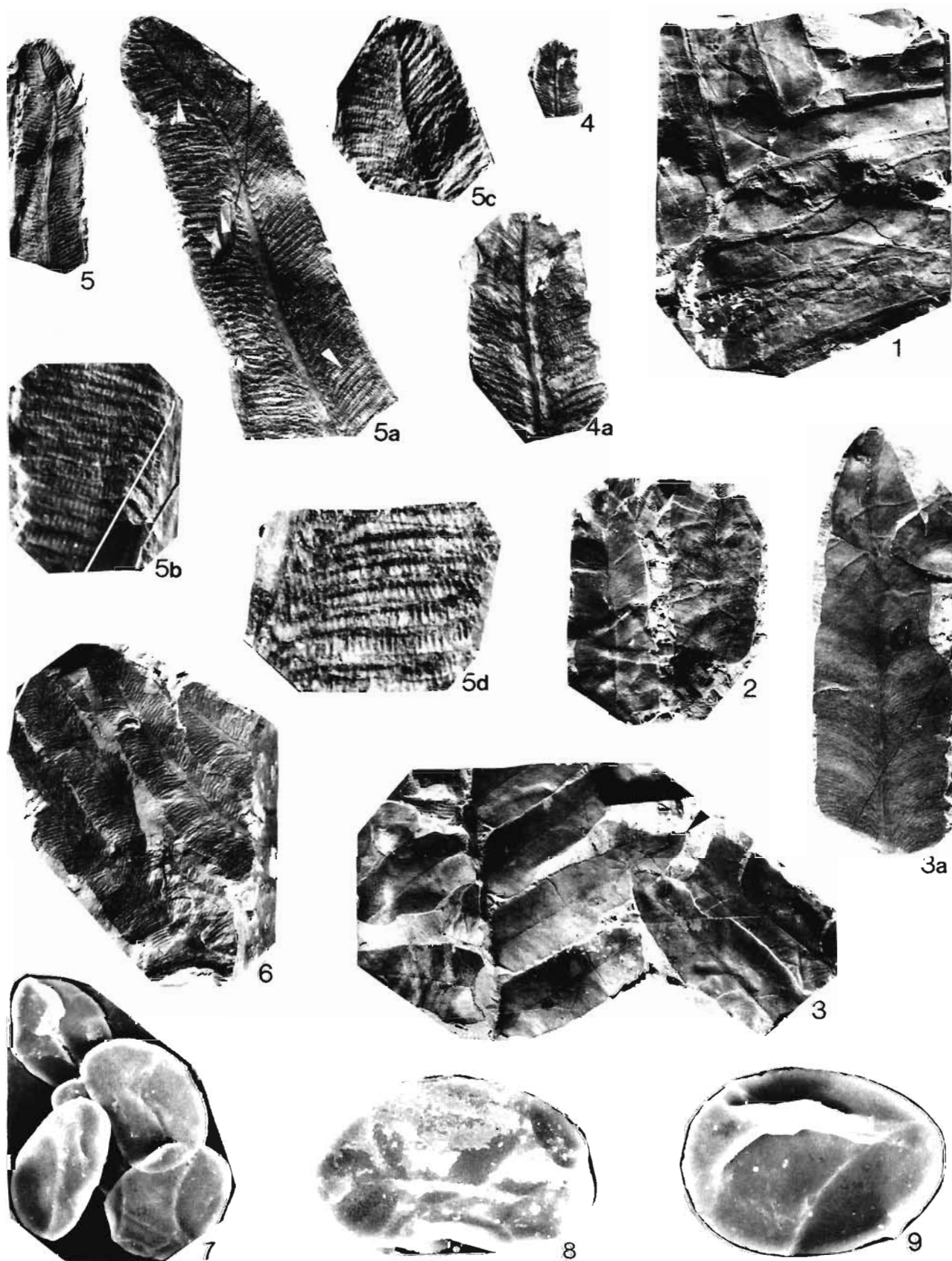


PLATE 1

studied. The fertile pinnules assigned to *Danaeites* Stur or *Orthotheca* (Corsin) which have linear synangia occupying the entire half-width of the pinnule lamina are similar to *Qasimia*, but their pinnules are smaller and spores *in situ* have not yet been found and also the relationship between vegetative and fertile fronds still remains obscure. Consequently, it needs further research to see if they can be assigned to *Qasimia*. According to characters of their vegetative pinnules, fertile pinnules and synangia, we agree with Hill *et al.* (1985) that *Taeniopteris tobaensis* (Li Xingxue *et al.*, 1982, pl. V, fig. 3-b; pl. XI, figs 1-4b) be changed to *Qasimia tobaensis* (Li, Yao et Deng) Hill, Wagner et El-Khayal.

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