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Pollen morphology of tribe Klugieae (Gesneriaceae) in China①

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Abstract: A study on pollen morphology of 4 species in three genera of the tribe Klugieae (Gesneriaceae) in China was undertaken under SEM. Pollen grains of the tribe are tricolporoidate, with indistinctly delimited endoapertures (oroids), spheroidal (*Rhynchoglossum*) or suboblate (the other genera) in shape, circular or subcircular in polar view, subround or round in equatorial view. Colpi of *Whytokia* and *Rhynchoglossum* are comparatively short, and colpus membranes of *Rhynchoglossum* and *Stauranthera* are of tubercular processes. The differentiation of colpi of *Whytokia hekouensis* is indistinct, and colpus membrane with fragmentary reticular tectum probably represents primitive characteristics. The exine in *Epithema* and *Gyrogyne* is rugulate, which may represent another direction of evolution. A preliminary key to genera is proposed based on pollen characteristics.

Key words: Gesneriaceae, Klugieae, pollen morphology, systematic significance

Introduction

There are 5 genera (including 2 endemic genera) in the tribe Klugieae in China. Most of them are distributed in Southwest and South China (Wang et al. 1990). There are a few pollen morphological studies on species and genera of the tribe published in some books, but most of them were undertaken under light microscopy and no one had intention to relate to systematics of the tribe (Erdtman 1952; Xi 1982; Ying et al. 1993). Pollen grains of four species in three genera of the tribe in China were examined under SEM and it is the aim of this study to present more data of pollen morphology for discussion on systematics of the tribe.

Materials and Methods

All materials studied, except for the one in Stauranthera umbrosa which was collected from a

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specimen in the Herbarium of Institute of Botany, Chinese Academy of Sciences (PE), were collected from the field and fixed in FAA. *Whytockia purpurascens* and *W. hekouensis* have been characterized as two new species (Wang, 1995). The materials for SEM study were dehydrated through 70%, 80%, 90%, 95%, 100% alcohol, and directly mounted on a double-sided adhensive tapes sticked on stubs, coated with gold for three minutes, then observed and photographed under Hitachi S–800 SEM. Three photographs were taken for every sample in polar, equatorial, and partly detailed view. The species examined for this study is listed in Table 1. The terminology of description of pollen characteristics follows Erdtman (1969)

Results

1. Characteristics of pollen grains of the tribe Klugieae

Pollen grains of the tribe Klugieae tricolporoidate, with endoaperture (oroid) indistinctly delimited, spheroidal (*Rhynchoglossum*) or suboblate (the other genera) in shape, circular or subcircular in polar view, subround or round in equatorial view, and variable in size, colpus character and ornamentation.

2. The pollen characteristics of all the species examined in this study are summarized in Table 2.

Table 1. The vouchers for pollen examination in the present study (preserved in PE)

Species	Locality	Collector	Voucher No.
Whytockia hekouensis Y. Z. Wang	Hekou, Yunnan	Y. Z. Wang	93021
W. purpurascens Y. Z. Wang	Hekou, Yunnan	Y. Z. Wang	93019
Stauranthera umbrosa (Griff.) Clarke	Baise, Guangxi	X. C. Lu	3-22093
Rhynchoglossum obliquum Bl.	Xichou, Yunnan	Y. Z. Wang	93007

Discussion

In the tribe Klugieae, pollen grains of only *Rhynchoglossum* are spheroidal, while those of the other genera are suboblate. Colpi in *Rhynchoglossum* are rather short and broad, and colpus membranes are covered with dense tubercular processes, which could also be observed in *Stauranthera*. *Whytokia* has the shortest colpus in the tribe. The differentiation of colpi of *Whytokia hekouensis* is indistinct, and colpus membrane with fragmentary reticular tectum probably represents primitive characteristics. Colpi of *Whytokia purpurascens* are distinct, and with no tectum as in *Whytokia hekouensis*. Pollen grains of *Monophyllaea* are similar to those of *Whytokia*, but with long colpi. Pollen grains in *Epithema* and *Gyrogyne*, which have compacted cymes, are rugulate, which may represent another direction of evolution. Pollen grains of *Gyrogyne* have sparse and small perforations only in two polar areas.

Table 2. Pollen characteristics of the tribe Klugieae (Gesneriaceae) in China

Characteristics of Pollen Grains / Species	Shape P:Polar View E:Equatorial View	Size	Aperture		Ornamentation (Under SEM)	Plate
			Type	Colpus Characters		
Whytockia hekouensis	Suboblate P:Subcircular E:Subround	(10.2—14.8) 12.9×15.8(13.6—18.2) (P:E=0.82)	3—colporoidate	Short and narrow, slightly but distinctly delimited,	Coarsely reticulate, Muri thin, Lumina rather big and irregular	I 1-3
W. purpurascens	Suboblate P:Subcircular E:Subround	(11.2—15.7)13.2×16.9(15.1—19.4) (P:E=0.78)	Do	Rather short and narrow, distinctly delimited, colpus membrane smooth	Finely reticulate, Muri thin, Lumina small and irregular	I 4-6
* *Gyrogyne subaequifolia*	Suboblate P:Subcircular E:Subround	(15.7—17.4)16.4×17.9(17.4—19.1) (P:E=0.92)	Do	Long and rather narrow, slightly but distinctly delimited, colpus membrane protruding in the middle	verrucate-rugulate	
Stauranthera umbrosa	Suboblate P:Circular E:Subround	(12.8—17.5)15.0×17.6(15.6—20.2) (P:E=0.85)	Do	Short and narrow, distinctly delimitd colpus membrane with sparse tubercular processes	Finely reticulate, Muri thin, Lumina small and irregular	I 7-9
Rhynchoglossum obliquum	Spheroidal P:Circular E:Round	(10.3—14.6) 12.7×12.1(10.1—13.9) (P:E=1.05)	Do	Rather short and rather broad, distinctly delimited, colpus membrane with dense tubercular processes	Finely reticulate, Muri coarse, Lumina small and irregular	I 10-12

* from Ying et al. 1993.

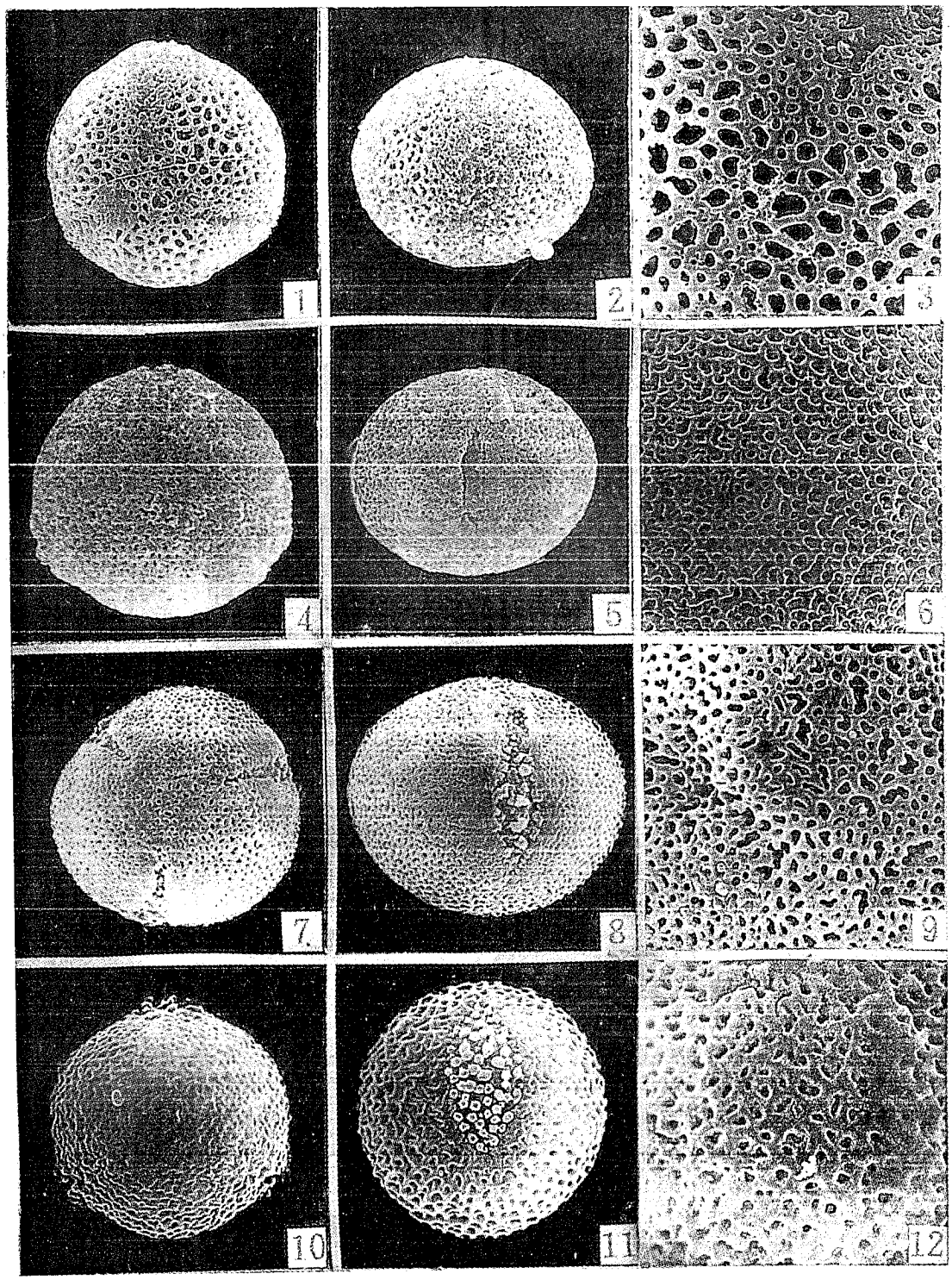

Plate 1. SEM photographs of pollen grains of *Whytockia*, *Stauranthera*, and *Rhynchoglossum*: 1–3. *Whytockia hekouensis*; 4–6. *Whytockia purpurascens*; 7–9. *Stauranthera umbrosa*; 10–12. *Rhynchoglossum obliquum*. (1–2, 4–5, 7–8, ×2400; 10–11, ×3000; 6, ×4800; 3,9, ×6000; 12, ×7200).

A preliminary key to genera is proposed based on pollen characteristics revealed by the present authors and by Luegmayr (1993) and Ying et al. (1993).

1. Pollen grains spheroidal; colpus membrane with tubercular processes. . . . . *Rhynchoglossum* Bl. (Klugia Schlechtd.)

1. Pollen grains suboblate

2. Colpus membrane with tubercular processes. . . . . *Stauranthera* Benth.

2. Colpus membrane with no tubercular processes

3. Colpi short, about half as long as polar axis . . . . . *Whytokia* W. W. Smith

3. Colpi comparatively long, over 4 / 5 as long as polar axis

4. Apocolpia and mesocolpia reticulate; muri and lumina equal in size. . . . . *Monophyllaea* R. Br. (Moultonia Balf. f. et W. W. Smith)

4. Apocolpia and mesocolpia rugulate; muri distinctly larger than lumina

5. Apocolpia and mesocolpia similar in ornamentation . . . . . *Epithema* Bl.

5. Apocolpia and mesocolpia same in ornamentation; exine with sparse and small perforations in two polar areas . . . . . *Gyrogyne* W. T. Wang

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References

Ertdman G. 1952. Pollen Morphology and Plant Taxonomy: Angiosperm. The Chronics Botanica Co. USA. pp153.

Ertdman G. 1969. Handbook of Palynology. Munksgaad, Copenhagen.

Luegmayr E. 1993. Pollen Characters of Old World Gesneriaceae (Cyrtandroideae): With Special Reference to SE Asia Taxa, Grana 32:221–232.

Wang W.T., Pan K.Y., & Li Z.Y. 1990. Flora Reipublicae Poprlaris Sinicae. Tomus 69. Science Press, Beijing, pp485–575.

Wang Y.Z. 1995. Two New Species of *Whytockia* (Gesneriaceae) From Yunnan. Acta Phytotaxonomica Sinica. 33(3):297–301.

Xi Y.Z. 1982. Angiosperm Pollen Flora of Tropic and Subtropic China. Science Press, pp157–165.

Ying T.S., Zhang Y.L., & Boufford D. 1993. The Endemic Genera of Seed Plants of China. Science Press, pp446–448.

中国苦苣苔科尖舌苣苔族花粉形态及其系统学意义

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摘要： 本文对中国苦苣苔科尖舌苣苔族 3 属 4 种花粉进行了扫描电镜观察。此族花粉为三拟孔沟，拟孔很不明显；形状为近扁球形或为圆球形；极面观为圆形(尖舌苣苔属)或近圆形(其它各属)；赤道面观为近圆形或圆形。各种属在花粉大小、花粉沟的形态和表面纹饰上有区别。异叶苣苔属 *Whytokia* 和尖舌苣苔属 *Rhynchoglossum* 的花粉沟较短，后者和十字苣苔属 *Stauranthera* 的花粉沟膜表面具颗粒状突起。河口异叶苣苔 *Whytokia hekouensis* 花粉沟的分化不明显，沟膜上残留的网状覆盖层可能代表一种较原始性状。具紧缩聚伞花序的盾座苣苔属 *Epithema* 和圆果苣苔属 *Gyrogyne*，其花粉具皱波状饰纹而其余属为网状饰纹，代表另一个演化方向。根据作者的研究，并参考前人的工作，提出尖舌苣苔族 Trib. Klugieae 以花粉为特征的初步检索表。

关键词： 苦苣苔科，尖舌苣苔族，花粉形态，系统学意义