

ON THE DISCOVERY OF FOSSIL PALMS FROM THE TERTIARY FORMATION OF KWANGTUNG AND KWANGSI

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The fossil palms described in this paper were found by the writer in the Tertiary formations of Maoming county and Haikou city of Hainan Island, Kwangtung Province, in 1958 and 1959, and by comrade Wu An-shun from the Tertiary formations of Shangssu county of Kwangsi Province in 1960.

The specimens belong to four species within the genus *Sabalites*. They are *Sabalites* cf. *taishuensis* Takahashi, *Sabalites szei* sp. nov., *Sabalites changchangensis* sp. nov., *Sabalites* sp.

The Tertiary plants of Kwangtung and Kwangsi have been very little known, only one of Tertiary plants has so far been recorded by Schenk (1883, p. 268, pl. 50, figs. 9, 10). Palm remains are generally believed to be an indicator plant of tropical, or of subtropical, climate of geological time. Therefore the present material is, to some extent, of significance.

DESCRIPTION OF SPECIES

Family Arecaceae (Palmae) C. H. Schultz-Schultzenstien, 1832

Genus *Sabalites* Saporta, 1865

***Sabalites* cf. *taishuensis* Takahashi**

(Pl. II, fig. 1)

This species is represented by an imperfect specimen. The marginal portion and half the right side of the leaf are wanting.

Leaf fan-shaped, probably rounded, cordate at base, about 14 cm in measurable diameter; both petiole and rachis not preserved; fold oblanceolate-linear, carinate, 1.4 cm in maximum width near the upper portion, and cuneate at the base, about 28 in number, crowded, probably all arising from the apex of petiole; central folds straight and expanded; the left-hand basal folds resembling "S" in shape, curved upward, and recurved, but not fully expanded; radiate primary veins obvious; lateral veins somewhat indistinct and parallel to the primary veins. Texture coriaceous, firm.

Judging from the recurved left-hand basal folds and a deep concavity, probably an impression of a ligule or hastula, shown on the point of attachment of folds, the present specimen may be regarded as the impression of the abaxial surface of a leaf, though the petiole and rachis are missing.

In many respects, the present species closely stands to *Sabalites taishuensis* Takahashi (1958, p. 158, pl. 27a) from the Oligocene deposit(?) of Tsushima Island, northern Kyushu of Japan, but differs from the latter in the folds arising regularly from the apex of the petiole.

In the shape of leaf, our form is also similar to *Sabalites chinensis* Endo (1934, p. 486, pl. 1) from the Oligocene, or late Eocene, sediments of the Fushun coal field, but the latter is characterized by its stronger primary veins, more straight basal folds with a maximum width of 2.2 centimeters.

Horizon and locality: Huangnuling formation (Tertiary, probable Miocene); Maoming, Kwangtung.

Register: No. PB 3533.

Sabalites szei sp. nov.

(Pl. I, figs. 1, 2)

This species is represented by two well-preserved specimens, which appear to be the impressions of the abaxial surface of the leaves.

Leaf fan-shaped, circular, marginal portion not preserved, about 8 cm in length, 10 cm in width, truncate and more or less rounded at base; sheath invisible; petiole stout and lens-shaped in transverse section, rugose, about 3.3 cm in width and 3.3 cm in measurable length, prolonged upward into an awl-shaped, abruptly narrowed to form a straight and strong rachis, with margins unarmed; rachis 8—9 cm in length, with a base as wide as the petiole; folds linear, 4—5 mm in width, about 30—32 in pairs, arising from the bilateral sides of the rachis, straight or slightly curved, very closely arranged, numbering about 7—9 per centimeter along the rachis; the basal folds forming almost a right angle with the rachis; primary veins very slender, lateral veins barely visible, parallel to the primary ones. Texture coriaceous and stiff.

This new species is characterized by the stout petiole, being lens-shaped in transverse section, by the slender, stiff, very closely set folds (about 7—9 per centimeter), and by the filiform and straight primary veins. It is easily distinguished from all other species of *Sabalites*.

In general characters, this species closely resembles *Sabalites inquirenda* Knowlton (1917, p. 288, pl. 56) from the Raton formation (Paleocene) of New Mexico of the United States, but the latter species differs in the broader folds and the stronger primary veins. *S. inquirenda* has been generally considered by some authors (Knowlton, 1930; LaMotte, 1952 etc.) as the synonym of the species *Sabalites grayanus* from the Cretaceous to Eocene deposits of North America. However, there is no question of differentiation between our species and the latter, since all the specimens of *Sabalites grayanus* (Lesquereux, 1878, p. 112, pl. 12, fig. 2; Berry, 1916, p. 117, pl. 12, figs. 1—3; pl. 14, fig. 1; Berry, 1919, p. 4, pl. 1; pl. 3, fig. 5; Knowlton, 1930, p. 36, pl. 9, fig. 5 etc.) are distinguished by the very large leaves (about 1.3 m long), by the broader and stouter petiole and by the greater number of folds (about 100 in number), of which each attains a maximum width of 5 cm and is marked with 6 to 8 fine veinlets between each pair of vein.

In regard to the general characters of the leaf, the present new species is similar to some species of the two living genera, *Sabal* Adonson (see Bailey, 1933, 1944) of Central America, and *Livestona* R. Brown of Southeast Asia and South China. But the forms of these two living genera are distinguished by having no such narrow folds as ours.

This new species is named in honour of the late Prof. H. C. Sze.

Horizons and localities: Changchang formation (Tertiary, probable Eocene);

Changchang village near Haikou of Hainan Island, Kwangtung; bottom of Youngning Group (Tertiary, probable Eocene); Chitang village of Shangssu, Kwangsi.

Register: Nos. PB 3534, 3535.

***Sabalites changchangensis* sp. nov.**

(Pl. I, fig. 3)

This species is represented by one single fragment. The specimen, though not well-preserved, is sufficient to serve as a type for the new species.

Leaf radiate circular, probably rather small in size, about 2.8 cm in measurable diameter, reniform or cordate at base; petiole relatively stout, flat, no more than 2 cm in breadth, margins incomplete, probably unarmed; ligule or hastula broad, but very short; rachis inconspicuous, very short and slender; folds linear, not fully expanded, about 46 in number, arising from the apex of the petiole and bilateral sides of the rachis, straight in the central ones, pendulous in basal ones on each side of the rachis; primary veins distinct, lateral veins very fine and obscure. Texture thin, coriaceous.

On account of the presence of the ligule impression, the present specimen may represent the impression of the adaxial surface of a leaf. This species is mainly characterized by the small leaf, the stouter petiole, the rather short and slender rachis, and the fine folds, which are pendulous on the basal bilateral sides.

In regard to the attachment of the folds to the apex of the petiole and the bilateral sides of the rachis, the present species bears a resemblance to the widely-distributed species *Sabalites campbelli* (Newberry) Lesquereux (1878, p. 113; Newberry, 1898, p. 37, pl. 21, figs. 1, 2) from the Paleocene to Eocene deposits of North America, but the latter has a truncate base and a relatively large number (about 50—70) of folds, our species is similar to *Sabal? rugosa* Knowlton (1917, p. 288, pl. 58) from the Raton formation (Paleocene) of New Mexico in the United States, but the latter has a rather long rachis. This new species is distinguished from *Sabalites szei* by its very slender and short rachis.

In the rachis and the number of folds, the living species *Sabal minor* (see Bailey, 1944) in Central America and the southern part of North America, resembles the present species, but differs in its broader folds. In many respects, some living species of *Trachycarpus* Wendland in South China and Southeast Asia also bear a certain resemblance to our form.

Horizon and locality: Changchang formation (Tertiary, probable Eocene); Changchang village near Haikou of Hainan Island, Kwangtung.

Register: No. PB 3536.

***Sabalites* sp.**

(Pl. II, figs. 2, 3)

The fragment shown in Pl. II, fig. 3 is the negative of the specimen whereas that shown in Pl. II, fig. 2 is the positive one.

Leaf probably fan-shaped, with an asymmetrical base; petiole strong, about 1 cm in width, prolonged and tapered upward to form a long rachis, with margin probably unarmed; rachis straight, with a base not enlarged; folds linear, not expanded, asymmetrically arising from the bilateral sides of the rachis, generally forming a right angle with

the rachis near the base, and an acute angle in the upper part; primary veins strong, lateral veins very slender, parallel to the primary veins. Texture coriaceous and stiff.

In the straight rachis of nearly equal strength and the basal folds irregularly arising from the rachis, the present form may be compared with *Geonomites* Lesquereux (1878, p. 115), but it differs therefrom in many respects. Some living species of *Sabal* such as *S. questeliana*, *S. jamicensis* (see Bailey, 1944, p. 422, fig. 255) also show a striking resemblance to the present form, especially in the long, straight rachis and the basal folds arising asymmetrically from the rachis.

Our form stands also near to the species described as *Sabal montana* by Knowlton (1916, 1917 and 1922) from the Paleocene deposits in the western part of the United States, but Knowlton's species is rather large in size. Our species is easily distinguished from the specimen from the Lance formation (Upper Cretaceous) of Wyoming of the United States, placed by Dorf (1942, p. 132, pl. 6, fig. 12) under the same designation.

Horizon and locality: Changchang formation (Tertiary, probable Eocene) Changchang village near Haikou of Hainan Island, Kwangtung.

Register: Nos. PB 3537, 3538.

图 版 說 明

下列各图均示标本的原大，并且未加任何潤飾。所有的标本都保存在中国科学院地质古生物研究所。

图 版 I

- 图 1. *Sabalites szei* sp. nov.
产地及层位：广西上思七塘村；邕宁羣底部(可能属始新统)。共型模式标本。
登记号码：PB 3534。
- 图 2. *Sabalites szei* sp. nov.
产地及层位：广东海南岛海口长昌镇；长昌组(可能属始新统)。共型模式标本。
登记号码：PB 3535。
- 图 3. *Sabalites changchangensis* sp. nov.
产地及层位：广东海南岛海口长昌镇；长昌组(可能属始新统)。正型标本。
登记号码：PB 3536。

EXPLANATION OF PLATES

All the figures are photographed in natural size, and without any retouch. The original specimens are kept in The Institute of Geology and Palaeontology, Academia Sinica.

Plate I

- fig. 1. *Sabalites szei* sp. nov.
Locality and horizon: Chitang village of Shangssu, Kwangsi; bottom of Yongning Group (probable Eocene). Syntypes.
Reg. No: PB 3534.
- fig. 2. *Sabalites szei* sp. nov.
Locality and horizon: Changchang village near Haikou of Hainan Island, Kwangtung; Changchang formation (probable Eocene). Syntypes.
Reg. No: PB 3535.
- fig. 3. *Sabalites changchangensis* sp. nov.
Locality and horizon: Changchang village near Haikou of Hainan Island, Kwangtung; Changchang formation (probable Eocene). Holotype.
Reg. No: PB 3536.



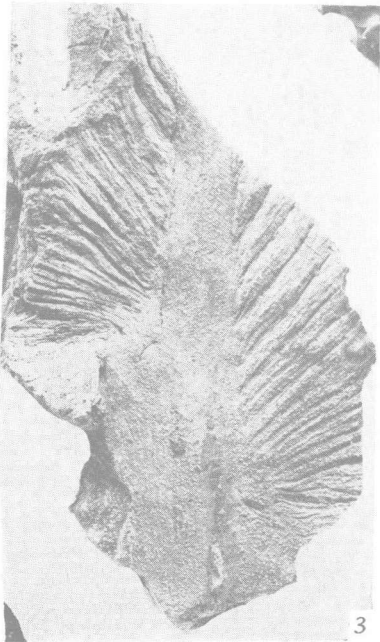
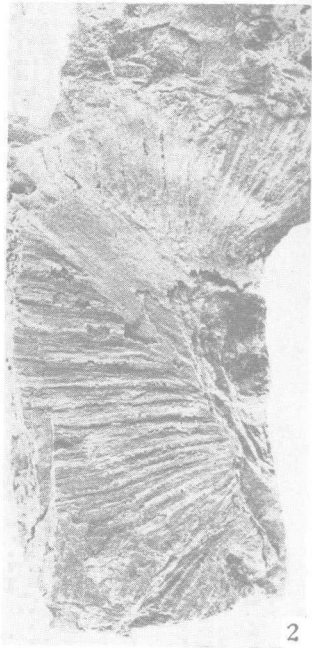


图 版 II

- 图 1. *Sabalites* cf. *taishunensis* Takahashi
产地及层位: 广东茂名鸡公岭;黄牛岭组(可能属中新统)。
登记号码: PB 3533。
- 图 2, 3. *Sabalites* sp.
图 2 是叶的背面印痕,图 3 是图 2 标本的正面,但保存的部分不完全相同。
产地及层位: 广东海南岛海口长昌镇;长昌组(可能属始新统)。
登记号码: PB 3537, 3538。

Plate II

- fig. 1. *Sabalites* cf. *taishunensis* Takahashi
Locality and horizon: Maoming, Kwangtung; Huangnuling formation (probable Miocene).
Reg. No: 3533.
- figs. 2, 3. *Sabalites* sp.
Fig. 3 is the counterpart of the specimen in fig. 2, but the preserved portion is not exact the same.
Locality and horizon: Changchang village near Haikou of Hainan Island, Kwangtung; Changchang formation (probable Eocene).
Reg. Nos: PB 3537, 3538.

页 335, 图版 85, 图 2; 1917, 页 225, 图版 32, 图 3) 的标本与我们的标本有些接近, 但 Knowlton 的标本体积很大。我们的标本与 Dorf (1942, 页 132, 图版 6, 图 12) 发现于美国怀俄明晚白垩世 (Lance formation) 保存相当完好的、归于同一种名下的标本则相差更大。

产地及层位: 广东海南岛海口市长昌镇, 长昌组(第三纪, 可能属始新世)。

登记号: PB 3537, 3538。

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