

STUDY OF *AMENTOTAXUS ARGOTAENIA*
(HANCE) PILGER⁽¹⁾

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Amentotaxus argotaenia was first named by Hance in 1883, as *Podocarpus argotaenia*, its identification being based on sterile materials. In 1903, Pilger transferred it to the genus *Cephalotaxus*, but it was subsequently referred to belonging to a separate genus by him because of its very distinct long staminate inflorescences. *Amentotaxaceae* was published by Kudo and Yamamoto as a new family in 1931. Koidzumi (1932, 1942), Florin (Li, 1952) and Janchen (Li, 1952), in their opinions, they placed *Amentotaxus* in the *Taxaceae*. In 1952, Li (1952) published three additional new species of *Amentotaxus*, based on their size and shape of leaves and the relative width of their stomatal bands.

In the present paper, *A. argotaenia* has been studied from the cytological and taxonomical points of view. *Amentotaxus* differs from the genera *Taxus*, *Torreya* and *Cephalotaxus* in chromosome numbers and chemical constituents. Therefore, we strongly support Kudo's and Yamamoto's concept, in placing *Amentotaxus* in the monotypic family, *Amentotaxaceae*.

All specimens cited in this paper have been deposited in the Herbaria of the Department of Botany, National Taiwan University (TAI), and Taiwan Forest Research Institute (TAIF).

Amentotaxus argotaenia (Hance) Pilger (Figs. 5, 6).

Amentotaxus argotaenia (Hance) Pilger in Bot. Jahrb. 54:41, 1916; Yamamoto in Bot. Mag. Tokyo 40:453, 1926 and Suppl. Icon. Pl. Formos. 5:7, f. 1, 2, 1932; Sasaki, List Pl. Formos. 50, 1928; Kudo and Yamamoto in Journ. Soc. Trop. Agr. 3(2):110, 1931; Kanehira in Trans. Nat. Hist. Soc. Formos. no. 84:89 1926, and Formos. Tr. rev. ed. 33, f. 2, 1936; Masamune, Short Fl.

- (1) We are deeply grateful to Dr. H. W. Li, director of the Institute of Botany, Academia Sinica, for his valuable suggestions; to Dr. H. Y. Hsu, director of the Taiwan Provincial Hygienic Laboratory, for his kindness in sending us a young living plant for cytological study; and to Mr. S. C. Woo for his kind help during the progress of this study.
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Formos. 34, 1939 and List Vas. Pl. Taiwan 27, 1954; Li, *Taiwania* 1(2-4): 287, 1950.

Podocarpus argotaenia Hance in Journ. Bot. 21:357, 1883.

Podocarpus insignis Hemsl. in Journ. Bot. 23:287, 312, 1885.

Cephalotaxus argotaenia (Hance) Pilger in Engler Pflanzenr. IV. 5:104, 1903.

Amentotaxus formosana Li in Journ. Arn. Arb. 33(2):196, 1952; Liu, Ill.

Native Introduced Lig. Pl. Taiwan 15, 1960, syn. nov.

Distribution: China (Kwangtung, Lofaushan; Hongkong, Lantao Island; Taiwan, Tawu, at an alt. of 1200-1300 m., associated with broad-leaved trees occurring in ravines and near cliffs shaded by large trees.).

Herbarium specimens examined: Taitung, Tawu, Kutzelnshan (姑仔崙山):—S. Sasaki, Feb. 16, 1925 (TAI), Feb. 25, 1925 (TAI), Apr. 15, 1925 (TAI); Y. Yamamoto, March 3, 1931 (TAI), Apr. 9, 1931 (TAI), Sasaki and Yamamoto, June 6, 1927 (TAI); T. I. Chuang and M. T. Kao Aug. 27, 1957 (TAI); H. Y. Hsu, Oct., 1957; Kanehira, Dec. 27, 1925 (TAIF), Apr. 15, 1925 (TAIF), Dec. 27, 1925 (TAIF); Sasaki, Feb. 25, 1925 (TAIF).

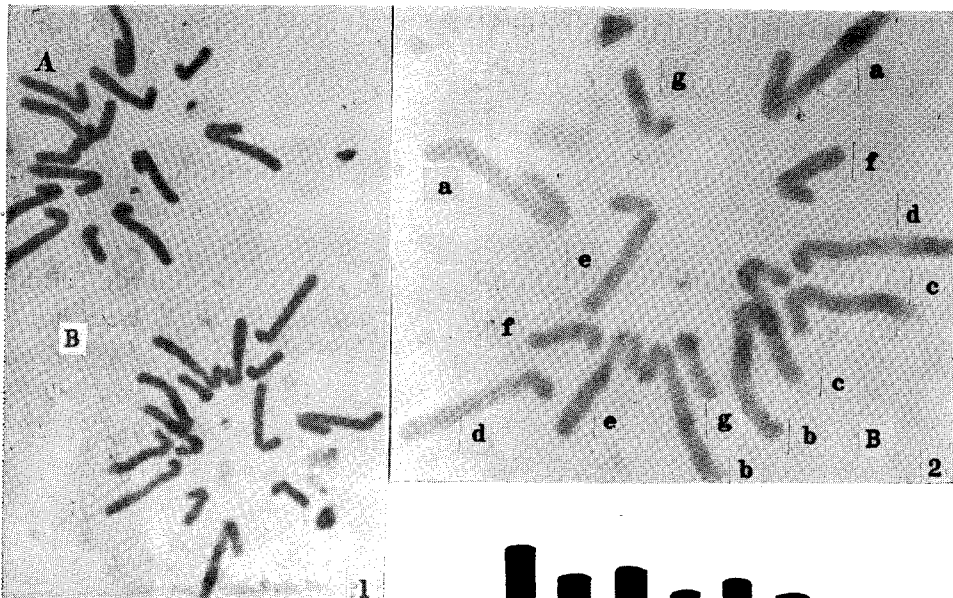
Fresh materials: Taitung, Tawu, Kutzelnshan, H. Y. Hsu, March 12, 1962.

Li (1952), in his paper, mentioned that the Taiwan specimens differed from *A. argotaenia* and proposed a new taxon, *A. formosana*, based alone on the variations of color and relative width of the stomatal bands. However, we have made a careful examination of young and mature living plants, and dry herbarium specimens. We have found that the width of the stomatal bands are variable in both young and mature plants. The color of the stomatal bands usually changed from white to whitish-brown after drying with heat. As these characters appear too weak to be of diagnostic value in the establishment of a new species, we consider *A. formosana* as a synonym of *A. argotaenia*.

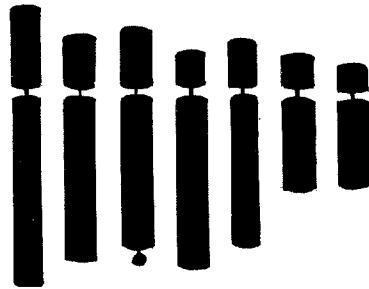
For chromosome study, living plants were obtained from Kutzelnshan, Tawu, Taitung. The fresh young root tips were cut and fixed in Farmer's solution overnight. Then, they were treated in 1N HCl and Carnoy's solutions each for 10 minutes for maceration and hardening. Propiono-carmin smear technique was employed for karyotypic study. Drawings were made under the microscope with the aid of a camera lucida at the magnification of 2100 \times . The somatic chromosome number found from root tip examination is $2n=14$ (Figs. 1,2). The karyotype is the symmetrical type, which may be represented as $2n=14, 10L+4S$, where L represents long chromosome and S short (Fig. 3). The description of chromosome types (Fig. 4) are listed as follows:

Type a, A pair of long chromosomes (the longest pair) with a nearly submedian primary constriction located at a point about 1/3 of the whole length.

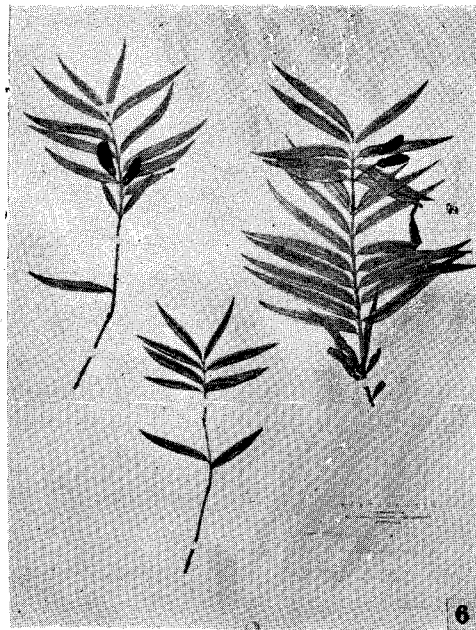
Type b, A pair of long chromosomes with primary constriction located at a point about 1/4 of the whole length.



3 a b c d e f g



4 a b c d e f g



Type c, A pair of long chromosomes having two constrictions, primary and secondary, the primary located at a point about 1/4 of the whole length, and the secondary situated at the terminus of the long arm, as a form of satellite.

Type d, A pair of long chromosomes with a primary constriction located nearly at a point about 1/6 of the whole length.

Type e, A pair of long chromosomes with a primary constriction located nearly at a point about 1/4 of the whole length.

Type f, A pair of short chromosomes with a primary constriction located at a point about 1/4 of the whole length in one, and at a point about 1/3 of the whole in the other.

Type g, A pair of short chromosomes with a primary constriction, located at a point about 1/4 of the whole length.

The chromosome number reported, so far, in the genera *Taxus*, *Torreya* and *Cephalotaxus* by the various authors, are $x=12$, $x=11$, $x=12$, respectively (Darlington and Wylie, 1955). However, on the basis of the present findings *A. argotaenia* is $x=7$.

According to Hsu's (1959) recent study of the chemical constituents of the Coniferae of Taiwan, he found that *A. argotaenia* produces amentoflavone in its leaves, while in *Taxus* and *Cephalotaxus* produce siadopitysin.

From the above discussion, we feel convinced that the genus *Amentotaxus* is sufficiently different from the genera *Taxus*, *Torreya* and *Cephalotaxus* to justify placement in a family of its own. Therefore we support Kudo and Yamamoto in their inclusion of *Amentotaxus* in a new family Amentotaxaceae.

穗 花 杉 之 研 究

莊 燦 暘 胡 慧 琳

以細胞學及分類學之觀點來研究穗花杉 (*Amentotaxus argotaenia*)。穗花杉屬 (*Amentotaxus*) 的染色體數目 ($x=7$) 與紫杉屬 (*Taxus*, $x=12$)，榧屬 (*Torreya*, $x=11$) 及三尖杉屬 (*Cephalotaxus*, $x=12$) 不同。其化學成份 (葉中產生 amentoflavone) 與紫杉屬及三尖杉屬 (產生 Siadopitysin) 亦有差異。因此著者完全贊同 Kudo 和 Yamamoto 的意見，將穗花杉屬列為穗花杉科 (Amentotaxaceae) 的唯一屬。(摘要)

- Fig. 1-4. Somatic chromosomes of *Amentotaxus argotaenia*. 1. Anaphase. (973×) 2. Explanatory Fig. 1, B. (1800×) 3. Serial arrangement of somatic chromosomes (2100×) 4. Idiogram of somatic chromosomes. (2100×)
- Fig. 5-6. Plant branches of *Amentotaxus argotaenia*. 5. Staminate branch. (1/5×) 6. Pistillate branch. (1/5×)

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