yellow and stellate-pubescent and same sized. Despite the numerous similarities between these two species, *S. mauritianum* is distinct from the latter by having 1 or 2 smaller auriculate leaves in the axils and by the lilac blue corolla. They can be distinguished by the following key.

1. Leaves elliptic, each with 1 or 2 smaller auriculate leaves in axils; corolla lilac blue with a pale star-shaped area at base; ovary densely pubescent; berries dull yellowish, succulent, pubescent at least in early stages ..... *S. mauritianum*
1. Leaves ovate, without auriculate leaves in axils; corolla white; ovary stellate-tomentose; berries yellow, stellate-pubescent ..... ..... *S. erianthum*

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## REFERENCES

D'Arcy, W.G. (ed.) 1986. Solanaceae: biology and systematics. Columbia Univ. Press, New York. pp. 48-49, 365-367.

D'Arcy, W.G. and C.I Peng. 1998. Solanaceae. *In* Editorial Committee of the Flora of Taiwan, 2nd. edn., Flora of Taiwan. Vol. 4, pp. 549-581.

Grierson, A. J.C. and D.G. Long. 2001. Solanaceae. *In* L. S. Springate (ed.). Flora of Bhutan 2(3): 1049-1051.

Hsu, T.W. and Y.H. Tseng. 2003. *Solanum elaeagnifolium* Cav. (Solanaceae): a noxious weeds newly naturalized to Taiwan. Endemic Species Res. 5(1): 49-51

Kleinschmidt, H.E., G. Rankin, and M. Saul. 1991. Suburban weeds. 2nd edn. Information Series. QI90037, Queensland Department of Primary Industries, Brisbane, 63 pp.

Kleinschmidt, H.E. and R.W. Johnson. 1979. Weeds of Queensland. Queensland Department of Primary Industries, Brisbane, 332 pp.

Smith, A.C. 1991. Flora Vitiensis Nova: a new Flora of Fiji. Lawai, Kauai, Hawaii, Natl. Trop. Bot. Garden 5: 8-9.

Takematsu, T. and N. Ichizen. 1987. Weeds of the world. Zenkoku Noson Kyoiku Kyokai 1: 479.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999. Manual of the flowing plants of Hawaii. Rev. edn. Univ. of Hawaii Press, Honolulu. pp. 1271, 1273.

# 臺灣新歸化茄科植物—野煙樹

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野煙樹（*Solanum mauritianum* Scop.）原產南美洲東部的茄科植物，新近發現歸化於臺灣中部山區。此爲臺灣新記錄種。本文除對其分類特徵及生態環境加以描述外，並提供野煙樹與山煙草的檢索表。

關鍵詞：野煙樹，茄科，分類，臺灣，歸化植物。



# Two Fossil Dicotyledonous Woods from the Kungkuan Tuff (Early Miocene), Northern Taiwan

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**Abstract.** Two species of dicotyledonous fossil woods from the Kungkuan Tuff (Early Miocene) of Kweishan, Taoyuan County, northern Taiwan, were described. They show a close resemblance with the woods of *Bischofia* (Euphorbiaceae) and *Camellia* (Theaceae) and are, threrfore, named *Bischofia javanoxyla* and *Camellia kueishanensis* sp. nov., respectively. Comparison between the fossils and the modern species indicates that the fossil woods possibly grew in a warm, humid habitat.

**Key words:** *Bischofia*, *Camellia*, Fossil wood, Kungkuan Tuff, Early Miocene.

## INTRODUCTION

Fossil woods have been found in various locations in Taiwan, but scientific reports on them are relatively rare, especially anatomical study. A chunk of petrified wood from the Toukoshan Formation near Kuanshi Township, Hsinchu County was studied under light microscopy to determine the hardwood anatomical elements (Chen, 1990). A taxodiaceous fossil wood was recognized in the Kungkuan Tuff at the Shantzechiao Anticline at Kweishan, Taoyuan County, northern Taiwan (Li *et al.*, 1999). Additional fossil wood specimens from the same locality were collected and studied. Almost all specimens belong to the same species, *Taxodioxylon sequoianum*, except for two dicotyledonous woods, and that is the subject of this paper.

The Kungkuan Tuff consists of many discontinuous unit distributed sporadically in northern Taiwan including Keelung City, Taipei City, and Taipei, Taoyuan, and Hsinchu Counties. The Kungkuan Tuff lacks a persistent position as a formation in the Early Miocene succession, and may or may not occur between the Taliao Formation and the Mushan Formation (Ho, 1969). The Kungkuan Tuff is composed mainly of clastic volcanic rocks and subordinately of basalt. Lenticular beds of limestone, sandstone and shale are also intercalated in the massive tuff but have a rather limited distribution. Limestone or tuffaceous limestone is best developed in the Shantzechiao area. Volcanism in the Kungkuan Stage continued throughout the time of the Mushan Formation and the Taliao Formation (Ho, 1967, 1969).

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## MATERIALS AND METHODS

The present study deals with two fossil wood specimens collected from the Shantzechiao Anticline at approximately 25°00'N, 121°22'E, next to Provincial Hwy. 1. The fossils were found embedded in dark green, medium to fine vitric and lithic tuff belonging to the Kungkuan Tuff (Fig. 1).

The fossils are calcified and well preserved. Thin sections of transverse, tangential, and radial facets were made for studying the materials. Specimens are deposited at the National Museum of Natural Science (TNM), Taichung, Taiwan. For identification, the fossil woods are compared with extant wood specimens deposited at the TNM.

## DESCRIPTION AND COMPARISON

1. ***Bischofia javanoxyla*** nom. nov.
(Euphorbiaceae) Figs. 2-8.
*Bischofia javanica* Bl. in Qi *et al.*, 1987, p. 310, pl. I, Figs. 1-7.

*Material*: The description is based on a single piece of secondary xylem. Numerous oval cavities were found on cross section, which might be the wood eroded by saprotrophs before fossilization (Fig. 2). Specimen nos. NMNS004104, F003830, measuring 7 cm in length and 11×15 cm in diameter.

*Description*: Wood diffusely porous. Growth rings indistinct. Vessels solitary and mostly in radial multiples of 2-6, or sometimes in clusters (Fig. 3); circular to oval in cross section when solitary, flattened at the place of contact when in multiples; 24-41 vessels/mm$^2$, evenly distributed; medium sized, radial diameter 50-110 μm, tangential diameter 60-90 μm; thin-walled; end walls oblique; perforation plates simple (Fig. 4); intervessel pits bordered, alternating with circular to lenticular apertures, 9-13 μm in diameter (Fig. 5); spiral thickening not observed.

Fibers aligned in radial rows; mostly oval to flattened and polygonal in cross section (Fig. 6), thin-walled, 20-40 μm in diameter, mostly septated.

Axial parenchyma absent or rarely 1-2 paratracheal cells present.

Rays 1-6 cells wide in tangential section (Fig. 7), 5-7 rays/mm in cross section. Uniseriate rays homocellular, upright cells only, 3-9 cells high. Multiseriate rays heterocellular, mostly 3-5 cells wide, 17-68 cells high, made of procumbent cells in the center with extensions of upright cells at 1 or both ends; sometimes 2-3 rays fused end to end; sheath cells occasionally present. Vessel-ray pits with much-reduced borders or apparently simple, opposite to scalariform (Fig. 8). Reddish-brown deposits abundant, and prismatic crystals often observed in ray cells.

*Affinity*: This fossil is characterized by the following features. 1. diffuse porous wood with

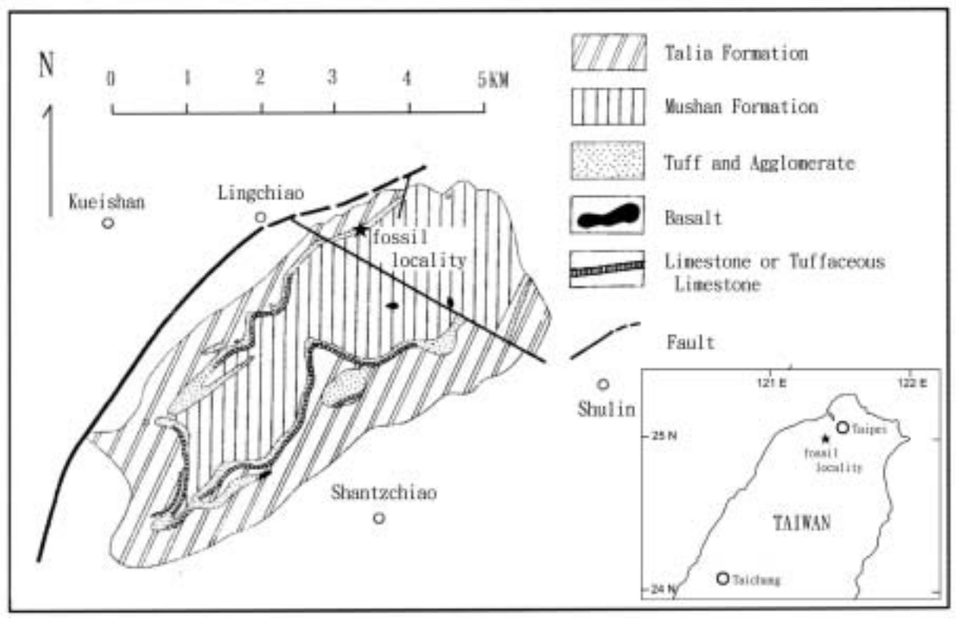


Fig. 1. Locality of the fossil woods (from Ho, 1969)

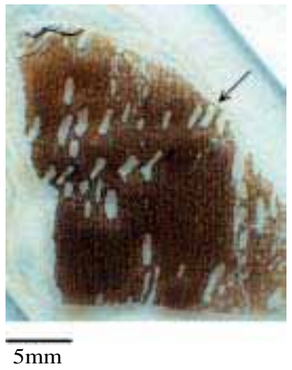


Fig. 2. *Bischofia javanoxyla*, transverse section. Growth rings are indistinct. The arrow shows an oval cavity which might be wood eroded by saprotrophs before fossilization.

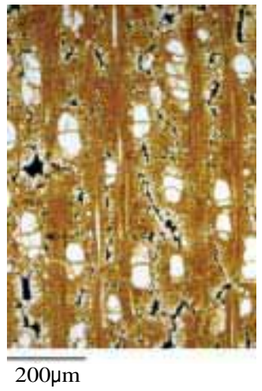


Fig. 3. *Bischofia javanoxyla*, transverse section. Vessels are solitary and mostly in radial multiples of 2-6, or sometimes in clusters (arrow).




Fig. 4. *Bischofia javanoxyla*, radial section of a simple perforation plate.


Fig. 5. *Bischofia javanoxyla*, tangential section. Intervessel pits are bordered, alternating with circular to lenticular apertures, 9-13 μm in diameter.


Fig. 6. *Bischofia javanoxyla*, transverse section. Fibers are aligned in radial rows; being mostly oval to flattened and polygonal in cross section, and thin-walled.


Fig. 7. *Bischofia javanoxyla*, tangential section. Rays are 1-6 cells wide (arrow).


Fig. 8. *Bischofia javanoxyla*, radial section. Vessel-ray pits have much-reduced borders and are apparently simple, opposite to scalariform.

evenly distributed, solitary or mostly 2-6 radial multiple vessels; 2. simple perforation plates; 3. axial parenchyma absent or rarely 1-2 paratracheal cells present; 4. moderately broad rays up to 68 cells high, sheath cells present; and 5. fibers septated, thin-walled. Woods possessing such characteristics are found in the Phyllanthoideae of the family Euphorbiaceae. In a comparison of all other structural details, such as size, frequency of vessels, structure of ray, inter-vessel pits, and vessel-ray pits, this fossil resembles *Bischofia javanica* Bl. of the Bischofiaceae (Kanehira, 1921; Kanehira, 1940; Chiang, 1964; Burgess, 1966; Yang and Yang, 1987; Cheng *et al.*, 1992; Liu *et al.*, 1993).

*Comparison with fossil woods*: Among the fossil woods resembling *Bischofia javanica, Phyllanthinium pseudohobashiraishi* Ogura described from the Palaeogene of Tabata City, Japan (Ogura, 1932; Watari, 1943), *Bischofia paleojavanica* Awasthi described from Namsang beds near Deomali, Arunachal Pradesh, India (Awasthi, 1989), and two species, *Bischofia javanica* Bl. and *Bischofia polycarpa* Airy Shaw, described from Late Tertiary deposits of Xinzhou County, Hubei Province, China (Qi *et al*., 1987; Yang *et al*., 1998), are comparable with the present fossil.

All the above show a resemblance with modern woods of *Bischofia javanica* but differ in some characters with each other. In view of the pore diameter, the length of the radial multiple vessels, and the inter-vessel pit diameters, the present fossil differs from the others species but closely resembles one of the Hubei woods. Qi *et al.* (1987) recognized the *Bischofia* woods from Late Tertiary deposits of China and named it the same as the extant species, *Bischofia javanica* Bl (Qi *et al.*, 1987).

Although the fossil from Taiwan resembles the extant species, there are still some differences such as a greater number of pore clusters, smaller pore diameter, a greater number of vessels/mm$^2$, and smaller inter-vessel pits in the fossil (Chiang, 1964; Burgess, 1966; Yang and Yang, 1987). Consequently, it represents a new species.

2. ***Camellia kueishanensis*** Li *et al.* sp. nov. (Theaceae), Figs. 9-15.

*Material*: This species is represented by a small piece of wood measuring 8×6×6 cm, including secondary xylem and bark (Fig. 9). Specimen nos. NMNS004104, F003831 (holotype).

*Description*: Wood diffuse-porous. Growth rings indistinct (Fig. 10), delineated by several layers of denser fibrous tissue. Ring width 0.5-1.5 mm.

Vessels evenly distributed throughout the growth ring (Fig. 10); very numerous, 141-180 vessels/mm$^2$; mostly solitary, sometimes 2-3 in radial multiples or clusters. Solitary pores distorted; angular in outline (Fig. 11), estimated 40-70 μm and 40-50 μm in radial and tangential diameters, respectively; thin-walled. Vessel element end walls steeply oblique. Perforation plates scalariform with 20-42 (average 28) bars (Fig. 12). Spiral thickenings not observed. Vessel-ray pits scalariform to opposite; large aperture, horizontally elongated elliptical. Tyloses not observed.

Fiber tracheids constitute the ground mass of the wood; square to polygonal in cross section; 10-18 μm in diameter; thin-walled (about 3.5 μm); non-septated. Pits not observed as fiber tracheid walls poorly preserved.

Axial parenchyma diffuse-in-aggregates and diffuse; cells triangular, rectangular, or polygonal in cross section; reddish-brown deposits abundant; crystals not observed.

Rays heterogeneous; uniseriate, biseriate, or rarely triseriate (Fig. 13); 13 rays/mm in cross section. Uniseriate and multiseriate rays both composed of procumbent, square, and upright cells (Fig. 14). Multiseriate portions of multiseriate rays mostly wider than uniseriate portions (Fig. 15), sometimes of equal width. Crystals not observed; reddish-brown deposits abundant in ray cells.

*Affinity*: This fossil is characterized by the following features. 1. wood diffuse-porous and evenly distributed, mostly solitary, small vessels; 2. perforation plates exclusively scalariform; 3. diffuse-in-aggregates and diffuse axial parenchyma; and 4. narrow heterocellular rays. Woods possessing such characteristics are found in the Theaceae, Hamamelidaceae, Caprifoliaceae, Daphniphyllaceae, Symplocaceae, and a few other families. Because of the number of bars per perforation plate, the rather low rays, and no crystals observed in either axial parenchyma cells or ray cells, the present fossil is similar to that of *Camellia* of the Theaceae. (Metcalfe and Chalk, 1950; Huang, 1965; Carlquist, 1982, 1988; Deng and Baas, 1991; Cheng *et al.*, 1992; Wang, 2000).

The genus *Camellia* consists of about 82




Fig. 9. *Camellia kueishanensis*, specimen no. NMNS004104, F003831 (holotype). The arrow shows the bark.

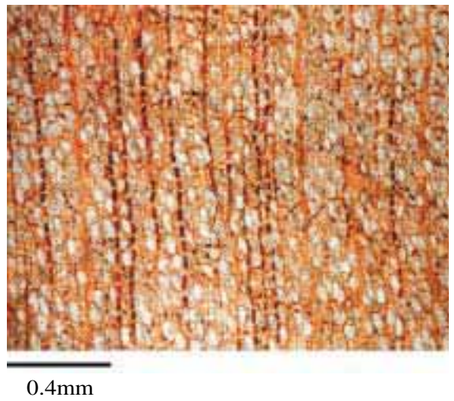


Fig. 10. *Camellia kueishanensis*, transverse section. Growth rings are indistinct; vessels are evenly distributed.


Fig. 11. *Camellia kueishanensis*, transverse section. Solitary pores are distorted and angular in outline.


Fig. 12. *Camellia kueishanensis*, radial section. Perforation plates are scalariform.


Fig. 13. *Camellia kueishanensis*, tangential section. Rays are uniseriate, biseriate, or rarely triseriate.

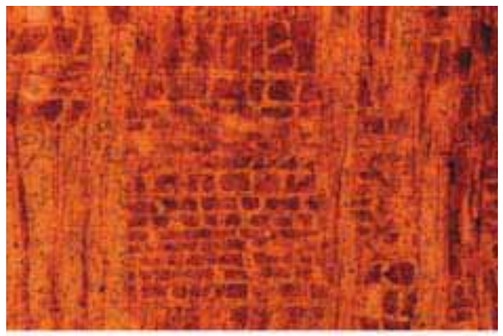


Fig. 14. *Camellia kueishanensis*, radial section. Rays are composed of procumbent, square, and upright cells.


Fig. 15. *Camellia kueishanensis*, tangential section. Multiseriate portions of multiseriate rays are mostly wider than uniseriate portions.

species, mainly distributed in tropical and subtropical Asia (Hsieh *et al.*, 1996). Deng and Baas (1991) studied the wood anatomy of the Theaceae and classified *Camellia* into four groups based on the following characters: 1. crystalliferous ray cells; 2. spiral thickening in vessels; and 3. width of the rays. Neither crystals in ray cells nor spiral thickening in vessels were observed, it indicats that the present fossil belongs to Deng and Baas' group III. The fossil is similar to *C. sinensis* especially in the ray width and the lack of spiral thickening in vessels (Deng and Baas, 1991; Cheng *et al.*, 1992).

*Comparison with fossil woods*: There is a fossil wood of *Camellia, C. japonoxyla*, which was reported from Lower Miocene deposits of Japan. Suzuki and Terada (1996) described the fossil wood with characters of Deng and Baas' group II species and with a close similarity to *C. japonica*, which is one of the most common tree species in the warm-temperate forests of Japan. The wood characters of the present fossil belong to *Camellia* and are easily distinguished from *C. japonica* in 1) the number of bars per perforation plate, 2) the thin-walled fiber tracheids and 3) the absence of crystals. Consequently, we describe our specimen as a new species of *Camellia* and name it *Camellia kueishanensis*.

**Specific diagnosis**

***Camellia kueishanensis*** Li *et al.*, sp. nov.

Wood diffuse-porous. Growth rings indistinct. Vessels evenly distributed; 141-180 vessels/mm$^2$; mostly solitary, sometimes 2-3 in radial multiples or clusters. Perforation plates scalariform with 20-42 bars. Spiral thickenings not observed. Vessel-ray pits scalariform to opposite; with large aperture. Tyloses not observed. Fiber tracheids thin-walled; non-septated. Axial parenchyma diffuse-in-aggregates and diffuse; crystals not observed. Rays heterogeneous; uniseriate, biseriate, or rarely triseriate and composed of procumbent, square, and upright cells. Multiseriate portions of multiseriate rays and uniseriate portions sometimes of equal width. Crystals not observed.

## DISCUSSION

*Bischofia javanica* Bl., the closely related extant species of *Bischofia javanoxyla*, is a monospecies of the genus *Bischofia* Bl. and is a large semi-deciduous tree widely distributed in India, Malaysia, southern China, Taiwan, the Ryukyus, Polynesia, and Australia. It is a characteristic element of swamps in India (Guleria and Srivastava, 2001). In Taiwan, the species grows throughout the island in forests at low and medium elevations (Hsieh *et al.*, 1993; Liu *et al.*, 1994).

The genus Camellia is only distributed in eastern and southeastern Asia, from 7°S latitude to 35°N latitude, and 80~140°E longitude in China. The closely related extant species of *Camellia kueishanensis, C. sinensis*, is widely distributed south of the Yangtze River (Ming and Zhang, 1996).

The distributional patterns of both modern species that occur in tropical and subtropical regions indicate that these fossil woods most likely grew in warm, humid habitats.

## ACKNOWLEDGEMENTS

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## REFERENCES

Awasthi, N. 1989. Occurrence of *Bischofia* and *Antiaris* in Namsan beds (Miocene-Pliocene) near Deomali, Arunachal Pradesh, with remarks on the identification of fossil woods referred to *Bischofia*. Palaeobotanist 37(2): 147-151.

Burgess, P.F. 1966. Timber of Sabah. The Forest Department of Sabah, Sabah. 600 pp.

Carlquist, S. 1982. Wood anatomy of Daphniphyllaceae: ecological and phylogenetic considerations, review of Pittosporalean families. Brittonia 34(2): 252-266.

Carlquist, S. 1988. Comparative wood anatomy. Berlin, Heidelberg, Springer-Verlag. 436 pp.

Cheng, J.Q., J.J. Yang, and P. Liu. 1992. Anatomy and properties of Chinese woods. Beijing, Chinese Forestry Publication. 820 pp. (in Chinese)

Chen, Y.S. 1990. The nature of the petrified hardwood from the Toukoshan stratigraphic formation. For. Prod. Ind. 9(3): 49-56.

Chiang, F.C. 1964. Studies on the anatomical structure and identification of the commercial timbers in Taiwan (2). Bull. Taiwan For. Res. Inst. 95: 1-25.

Guleria, J.S., and R. Srivastava. 2001. Fossil dicotyledonous woods from the Deccan Intertrappean beds of Kachchh, Gujarat, Western India. Palaeontogr. Abt. B 257: 17-33.

Ho, C.S. 1967. Strike-slip faulting in Shantzechiao and Chingshuikeng, northern Taiwan. Proc. Geol. Soc. China 10: 83-98.

Ho, C.S. 1969. Stratigraphy of the Kungkuan Tuff in the northern Taiwan. Bull. Geol. Surv. Taiwan 20: 5-62.

Hsieh, C.F., S.M. Chaw, and J.C. Wang. 1993. Euphorbiaceae. *In* Editorial Committee of the Flora of Taiwan (eds.). Flora of Taiwan. Vol. 3, 2nd ed.. pp. 414-504.

Hsieh, C.F., K.C. Yang, and L.K. Ling. 1996. *Camellia*. *In* Editorial Committee of the Flora of Taiwan (eds.). Flora of Taiwan. Vol. 2, 2nd ed.. pp. 667-674.

Huang, T.C. 1965. Monograph of Daphniphyllum. I. Taiwania 11: 57-89.

Kanehira, R. 1921. Anatomical characters and identification of Formosan woods. Taipei, Bureau of Productive Industries, Government of Formosa. 317 pp.

Kanehira, R. 1940. Atlas of Formosa timbers. Taipei, Bulletin of Forest Experiment Station Vol. 2, 127 pp.

Li, C.Y., J.Y. Hsiao, and C.H. Yang. 1999. Fossil woods of Taxodiaceae from the Kungkuan Tuff (Early Miocene) of northern Taiwan. Bull. Natl. Mus. Nat. Sci. 12: 41-48.

Liu, P., J.Q. Cheng, and J.J. Yang. 1993. Southeast Asia tropical wood. Beijing, Chinese Forestry Publication. 331 pp. (in Chinese)

Liu, Y.C., F.Y. Lu, and C.H. Ou. 1981. Trees of Taiwan. Taichung, Taiwan, College of Agriculture, National Chung-Hsing University. Monographic publication no. 7. 925 pp. (in Chinese)

Metcalfe, C.R. and L. Chalk. 1989. Anatomy of the Dicotyledons. Vol. II. 2nd ed. Oxford, UK, Clarendon Press. 227 pp.

Ming, T.L. and W.J. Zhang. 1996. The evolution and distribution of genus *Camellia*. Acta Bot. Yunnanica 18(1): 1-13. (in Chinese with English abstract)

Ogura, Y. 1943. Notes on fossil woods from Japan and Manchoukuo. Jpn. J. Bot. 13: 345-365.

Suzuki, M. and K. Terada. 1996. Fossil wood flora from the lower Miocene Yanagida Formation, Noto Peninsula, central Japan. IAWA 17(4): 365-392.

Yang, K.C. and Y.H. Yang. 1987. Minute structure of Taiwanese woods. Taipei, Hua Shiang Yuan Publishing Co 172 pp.

Wang, C.C. 2000. A taxonomic study of the Symplocaceae of Taiwan. Ph.D. thesis, Chung-Hsing University, Taichung, Taiwan. 358 pp. (in Chinese with English abstract)

Watari, S. 1943. Studies on the fossil woods from the Tertiary of Japan III. A large silicified trunk of *Phyllanthinium pseudo-hobashiraishi* Ogura from the Palaeogene of Tobata city. Jpn. J. Bot. 13: 255-260.

# 臺灣北部早中新世闊葉樹木化石兩種

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根據木材解剖特徵比對，兩種採自臺灣北部桃園縣龜山鄉中新世下部公館凝灰岩中的木材化石分別屬於大戟科與山茶科，命名爲茄苳型木（*Bischofia javanoxyla*）與龜山茶樹（*Camellia kueishanensis* sp. nov.）。這兩個樹種爲生活在溫暖潮濕的環境。

關鍵詞：山茶屬，公館凝灰岩，木材化石，早中新世，重陽木屬。



# Ceramic Remains from Kueishan and Discussions Relating to the Relationship of Formosan Aborigines in Southern Taiwan

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**Abstract.** The main purpose of this paper is to report on ceramic materials unearthed from the Kueishan site, Pingtung County, southern Taiwan during archeological excavations carried out in 1993 and 1994. Additionally, I argue that insights into the ceramic remains of the Kueishan Cultural Phase and the style of decorated potsherds may provide essential information for studying the dispersal of Formosan aborigines in southern Taiwan. In addition to other archaeological artifacts and ecofactual remains, approximately 17,000 potsherds were recovered from the site, all remains of the Kueishan Phase. The Kueishan Phase can be dated to 1,500 B.P. Although only 6% of the remains were decorated wares, they are useful for distinguishing the Kueishan Culture. The decorative patterns of Kueishan can be classified into 22 categories. This paper focuses on human figure designs. Vessels marked with these designs suggest not only labor-intensive manufacturing, but also that these were high-value or "prestige" objects within the society. As a result, such decorative motifs may reflect social and cultural contexts of prehistoric Kueishan inhabitants. Together with the archeological remains and ethnographic materials, I argue that prehistoric Kueishan inhabitants and the Paiwan have a common inheritance from early Austronesian-speaking individuals.

**Key words:** Ceramic remains, Kueishan, Formosan aborigines, Southern Taiwan.

## INTRODUCTION

Ceramic analysis has provided important information for the interpretation of the regional prehistory of Taiwan since the early decades of the last century. In particular, diagnostic ceramic assemblages, e.g., the Corded Ware of the Tapenkeng Culture and Fine Red Ware of the Kenting Culture, define most archaeological cultural components in the prehistory of Taiwan. In fact, in response to the growing sophistication of archeological issues being addressed and our technological ability to investigate ceramics, the role of ceramic analysis has increased in complexity and diversity. The main purpose of this paper is to report on ceramic materials unearthed from the Kueishan site (Fig. 1, Plate 1) in archaeological excavations carried out in 1993 and 1994.

Additionally, I argue that insights into the ceramic remains and the style of decorated potsherds may provide essential information for studying the dispersal of Formosan aborigines in southern Taiwan. Over the years, many archaeologists have attempted to correlate archaeological culture with existing groups of aborigines in Taiwan (Chang, 1986; Tsang, 1992; Bellwood, 1997). Unfortunately, no concrete evidence is strong enough to link any group with a given archaeological cultural component. Nevertheless, based on building remains and burial patterns, some archaeological sites on the Hengchun Peninsula of the later time period, such as the Nanrenshan site and the Kueitzuchiao site, can be recognized as Paiwan. But since no historic documents place the Paiwan in the area and no modern Paiwan tribes inhabit the area (Fig. 2), the link between the site and the Paiwan remains an unproven hypothesis. In the present study, the results of ceramic investigations provide additional evidence to suggest links between a "community of culture" and extant vessels.

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### The Setting

The Kueishan site is situated on Kueishan, a hill running N-S, 400 m southwest of Sheliao Village in Checheng, Pingtung County. The hill