

## The Family Sapotaceae in Taiwan

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**ABSTRACT:** This is a taxonomic study on Taiwanese Sapotaceae. Two genera, i.e. *Palaquium* and *Planchonella*, including 3 species, are recognised. A key, taxonomic descriptions and distribution maps for each taxon are also given.

**KEY WORDS:** Sapotaceae, *Palaquium*, *Planchonella*, Taxonomy, Taiwan.

### INTRODUCTION

The Sapotaceae is a tropical family and is considered to variously have about 35-75 genera and 800 species (Willis, 1985), 53 genera (Brummitt, 1992) or 107 genera and over 1,000 species (Mabberley, 1987).

The first report of the family Sapotaceae in Taiwan was made by Forbes and Hemsley (1889). Since then Henry (1896), Matsumura and Hayata (1906), Hayata (1911, 1917), Sasaki (1928), Kanehira (1936), Masamune (1954), Liu (1962), Li (1963, 1978) have been successively published. According to the above publications and those reported by Herrmann-Erlee and Royen (1957), Royen (1957, 1960), Bakhuizen V.D. Brink and Koster (1963), Chuang (1987) and Li and Pennington (1996), there are 3 taxa, separately belonging 2 genera (*Palaquium* and *Planchonella*), in Taiwan. A key, taxonomic description and distribution maps for the taxa are given in the present study.

### TAXONOMIC TREATMENT

#### SAPOTACEAE Juss. 山欖科

Trees or shrubs, usually with latex. Branchlets and young growth often ferruginous-tomentose. Leaves spirally arranged or alternate, sometimes clustered at apex of branchlets; margin entire, petiolate or sessile; stipules early deciduous or absent. Flowers bisexual or unisexual, usually in axillary clusters, rarely solitary; cluster pedunculate or in raceme-like inflorescence, bracteolate. Calyx 1 whorl of usually 4-6 sepals, imbricate, or 2 whorls each

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with 2–4 sepals, valvate, persistent. Corolla lobes 1 or 2 times as many as sepals, usually entire. Stamens as many as and opposite corolla lobes to many and in 2 or 3 whorls; filaments usually short, inserted on throat of corolla tube; staminodes scaly to petal-like, alternate with stamens, or absent. Ovary superior, 2–8-locular, placentation axile; ovules 1 per cell, anatropous; style 1, often apically lobed. Fruit an indehiscent berry or drupe, 1–8-seeded. Seeds ellipsoid, often compressed; seed coat hard, shiny, rich in tannin; seed scar lateral and linear to oblong or basal and rounded; endosperm usually oily; embryo straight.

A pantropical family of about 107 genera and over 1,000 species; only 2 genera and 3 species in Taiwan.

### Key to genera

1. Sepals 6-lobed in 2 series; stamens usually 12–18 or more; staminodes absent ..... 1. *Palaquium*  
 1. Sepals 5-lobed in 1 series; stamens less than 8, usually 5; staminodes present ..... 2. *Planchonella*

### 1. PALAQUIUM Blanco 膠木屬

Trees usually very lactiferous. Branchlets with terminal scaly bud. Leaves often clustered, coriaceous; stipulate. Flowers axillary, fascicled or solitary, pedicellate, white, fragrant; sepals (4-)6, in 2 whorls; corolla 4–6-lobed, imbricate or twisted; stamens (8-)12–18(-36), in 2 or 3 whorls, inserted on corolla throat, anthers ovate, staminodes absent; ovary villous, 6(-11)-celled, style subulate, ovules pendulous. Fruits berry, fleshy, globose to globose, 1–4-seeded. Seeds large, with scar covering half of surface, without endosperm.

About 115 species in tropical Asia, India, Sri Lanka, Cambodia, Thailand, Malaysia, Vietnam, the Philippines, Taiwan, Papua New Guinea and Pacific islands. Only one species distributed in Taiwan.

1. *Palaquium formosanum* Hayata, Journ. Coll. Sci. Tokyo **30**(1): 184. 1911; Kanehira, Form. Trees rev. ed. 570. f. 528. 1936; Royen, Blumea **10**: 472. 1960; Liu, III. Nat. Intr. Lign. Pl. Taiwan **2**: 1012. f. 839. 1962; Li, Woody Fl. Taiwan 725. f. 296. 1963, Fl. Taiwan (1st ed.) **4**: 94. 1978; Chuang, Fl. Reipub. Popul. Sin. **60**(1): 52. 1987; Li & Pennington, Fl. China **15**: 207. 1996.

Fig. 1 大葉山欖(台灣膠木)

*Palaquium polyandrum* Hayata, Journ. Coll. Sci. Tokyo **30**(1): 185. 1911; non C. B. Robinson, Philipp. Journ. Sci. **3**: 212. 1908.

*Palaquium paucivenosum* H.J. Lam, Bull. Jard. Bot. Buitenzorg, ser. III, **7**: 101. f. 29. 1925.

*Palaquium hayatae* H.J. Lam, Bull. Jard. Bot. Buitenzorg, ser. III, **8**: 414. 1927.

*Palaquium ellipticum* auct. non Engler: Matsum. & Hayata, Journ. Coll. Sci. Univ. Tokyo **22**: 227. 1906.

An evergreen tree up to 20 m high; branchlets browned puberulous, glabrescent or nearly so, distinctly leaf-scarred. Leaves clustered at end of branches, thickly coriaceous, oblong, obovate or narrowly obovate, (9.0-)10.1–13.0(-19.8) cm long, (4.6-)5.0–7.6(-12.5) cm wide; apex acute, rounded to submarginate, base obtuse; margin entire; glabrous or nearly so and shining dark green on upper surface, partially pubescent and slightly paler on lower surface; the midrib and veins subconspicuous above, raised beneath, the lateral veins 7–9(-10) per

side; petioles short, 0.3–0.7(-1.1) cm long. Flowers in axillary clusters, 0.8–1.2 cm in diameter; calyx 2-whorled, each 3-lobed, the outer brown-pubescent, the lobes obtuse; corolla pale yellow, 6-lobed, lanceolate; long pedicels, 1.2–2.8 cm long. Fruits freshy, globoid, (2.4-)3.4–4.0(-4.5) cm long, 1.2–2.5 cm in diameter, olive colour when young, becoming black at maturity. Seeds usually 1, large, 2.5–3.0 cm long, dark brown.

The Philippines (Luzon, Isls. Batan and Babuyan) and Taiwan. Limited distribution in tidal forests in the north and south of Taiwan and on Lanyu (Botel Tobago) and Lutao Islands. Very common species cultivated in park or as avenue trees in Taiwan.

**Specimens examined:** TAIWAN: Taipei City: Nankang Area, campus of Academia Sinica, *W.P. Leu* 517 (TNM), Taipei Bot. Gard., *K.C. Yang* 4657 (TAIF). Keelung: Keelung (Kiirun), *S. Sasaki* s.n. Dec 1911 (TAI), Pachihmen, *I. Simozawa* s.n. Sept 1932 (TAI). Ilan: Suao (Suwo), *S. Suzuki* s.n. Oct 1931 (TAI). Pingtung: Hengchun (Koshun), *S. Sasaki* s.n. May 1932 (TAI), Kengting, *C.C. Chuang & Kao* 3964-A (TAI), *H. Keng* s.n. Oct 1950 (TAI), Kengting Park, *C.C. & R. Hsu* 4164 (TAI), Kueitsuchiao (Kuraru), *T.I. Chuang* 1074 (TAI), *K. Yamada* s.n. May 1916 (TAI), Ooluanpi, *T.I. Chuang* 4895 (TAI), *M.T. Kao* 7346 (TAI), Wanlitung (Banritoku), *R. Kanehira* s.n. Dec 1918 (TAIF); Manchou, Kaoshifo (Kuskus), *Y. Kudo & Suzuki* s.n. Dec 1928 (TAI). Taitung: Lanyu Is., *C.E. Chang* 2865 (PPI), *H.Y. Cheng* s.n. Oct 1983 (PPI), *C.F. Hsieh* 1642 (TAI), *T. Kawakami & Nakahara* s.n. 1906 (Type of *P. polyandrum* Hayata; TAIF!); *S. Sasaki* s.n. Jun 1919 (TAI), *T. Sata* s.n. Apr 1932 (TAI), *J.T. Wu* 1642 (TAI), Hongtou, *T.C. Huang et al.* 9231 (TAI), Mt. Hongtoushan, 150 m, *T.Y.A. Yang et al.* 8135 (TNM), 100-250 m, *T.Y.A. Yang et al.* 8667 (TNM), Hongtou to Pond Tienchi, *S.F. Huang* 2678 (TAI), Lantao, *T.C. Huang & Kao* 6454 (TAI), Pond Hsiaotienchih, 150-180 m, *T.Y.A. Yang et al.* 8612 (TNM), Tungchin, Bridge Longmenchiao, *T.Y.A. Yang et al.* 10017 (TNM), Mt. Yehyingshan, *C.E. Chang* 18596 (PPI), Yehyiu, en route of Pond Hsiaotienchih, *T.Y.A. Yang et al.* 9919 (TNM); Lutao Is., *C.C. Chen* 45 (PPI), *T.I. Chuang & Hsu* 2317 (TAI), Chungliiao (Churo), *Y. Kudo & Mori* s.n. Jul 1930 (TAI); Peinan, *T. Kawakami* 4920 (TAIF).

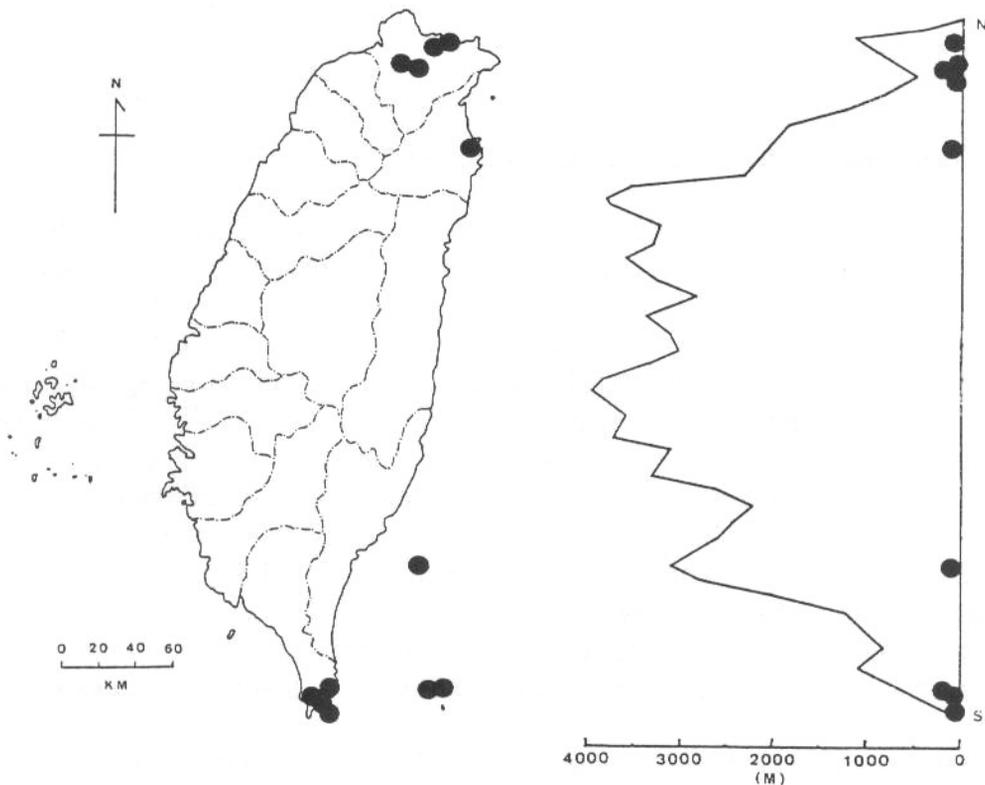


Fig. 1. Distribution of *Palaquium formosanum* Hayata in Taiwan.

## 2. *PLANCHONELLA* Pierre 山欖 (樹青) 屬

Medium or small trees. Branchlets pubescent but glabrescent. Leaves alternate, opposite, or clustered at end of branchlets, coriaceous or subcoriaceous; petiolate; estipulate. Flowers bisexual or seldom unisexual, axillary, fascicled; sessile or pedicellate, pubescent; sepals (4-)5(-6), imbricate; corolla 5(-6)-lobed, imbricate, glabrous, rarely pubescent outside; stamens 5(-6), inserted on throat and opposite corolla lobes, anthers ovate or lanceolate, staminodes 5(-6), petal-like, alternate to corolla lobes; disc absent or cupulate, ring-like, pubescent; ovary villous, rarely glabrous, (4-)5(-6)-celled, ovules laterally attached. Fruits berry, sometimes woody, ellipsoid to globose. Seeds 1-6, compressed, elliptic, scar oblong, lateral.

About 100 species in tropical and subtropical Southeast Asia, southern China, Taiwan, Japan, Pakistan, India, Cambodia, Thailand, Malaysia, Vietnam, Indonesia, Papua New Guinea, New Caledonia, Australia, New Zealand, the Hawaii Islands, Seychelles and South America. Three species in mainland China (Province Hainan) and two in Taiwan.

### Key to species

1. Leaves chartaceous, more than 5.5 cm in width; fruits more than 2.5 cm long ..... 1. *P. duclitan*  
 1. Leaves coriaceous, less than 5.5 cm in width; fruits less than 1.5 cm long ..... 2. *P. obovata*

### 1. *Planchonella duclitan* (Blanco) Bakh. f., Bakh. f. & Koster, *Blumea* **12(1)**: 62. 1963.

Figs. 2-6 蘭嶼山欖

*Sideroxylon duclitan* Blanco, Fl. Filip. 129. 1837.

*Sideroxylon nitidum* Blume, Bijdr. 675. 1825; *non* Lamk, Tabl. Enc. Meth. 2: 42. 1794.

*Planchonella nitida* (Blume) Dubard, Ann. Mus. Colon. Marseille 20: 62. 1912; Royen, *Blumea* 8: 362. 1957.

*Pouteria duclitan* (Blanco) Baehni, *Candollea* 9: 283. 1942.

A large evergreen tree up to 40 m tall; branchlets pale yellowish or whitish puberulous, glabrescent or nearly so. Leaves chartaceous, oblong, elliptic or obovate-oblong, (10.0-)10.6-24.4(-49.5) cm long, (5.7-)6.3-11.7(-17.8) cm wide; apex rounded, obtuse, acute or obtuse-acuminate, base narrowly or broadly cuneate; margin entire; petioles (2.1-)2.8-5.8(-7.4) cm long. Inflorescence (6-)8-10(-12)-fascicles, forming axillary elongate racemes, up to (3.5-)5-12(-15) cm long. Flowers small, ca. 5 mm in diameter, pale yellow to yellowish-green; calyx 5(-6)-lobed, imbricate, glabrous inside, pubescent outside; corolla campanulate, 5(-6)-lobed, glabrous on both sides or nearly so; stamens 5(-6), anthers ovate; staminodes 5(-6), triangle, petal-like, alternate to corolla lobes; ovary villous; pedicels 4-8(-10) mm long. Fruits berry, ellipsoid, dark purplish-red at maturity, 3.1-4.5(-5.4) cm long, 1.2-1.6 cm in diameter. Seeds usually 1, dark brown.

Malaysia, Indonesia (Sumatra, Java etc.), the Philippines (Mindanao, Luzon etc.), Borneo, Taiwan and New Guinea. Taiwan only found on Lanyu Is. at low altitude forests.

**Specimens examined:** TAIWAN: Taitung: Lanyu Is., *C. E. Chang* 2754 (PPI), 16722 (PPI, TAI), 18302 (PPI), 18445 (PPI), 18450 (PPI), Hongtong, Bridge Chungaichiao, *T. Y. A. Yang et al.* 8458 (TNM), *T. Y. A. Yang & Hsu* 10018 (TNM), Tungchin, Yehying, Longmen, *C. E. Chang* 9136 (PPI), *W. P. Leu et al.* 2138



Fig. 2. New leaves of *Planchonella duclitan* (Blanco) Bakh. f.



Fig. 3. Flowers of *Planchonella duclitan* (Blanco) Bakh. f.



Fig. 4. Fruit (immatured) of *Planchonella duclitan* (Blanco) Bakh. f.

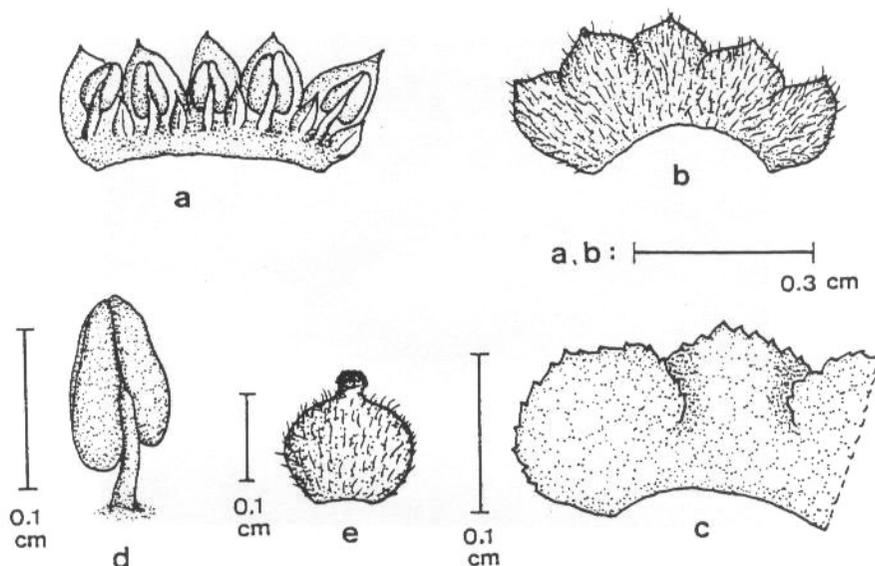


Fig. 5. Flower parts of *Planchonella duclitan* (Blanco) Bakh. f.; a. petals (adaxial) with stamens; b. & c. sepals, b. abaxial side and c. adaxial side; d. stamen; e. carpel.

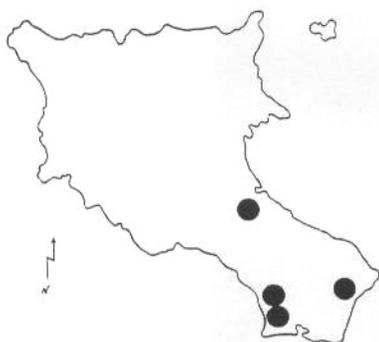


Fig. 6. Distribution of *Planchonella duclitan* (Blanco) Bakh. f. in Lanyu Island.

(TNM), Mt. Yehyingshan, C. E. Chang 19651 (PPI), 19652 (PPI), 19653 (PPI), s.n. Aug 1975 (PPI). The **PHILIPPINES**: Laguna, Forestry Campus, 115 m, E. Canicasa 1191 (fl. & fr. PPI). **INDONESIA**: Ambon, Netherl. Ind. For. Service (NIFS) b.b. 10137 (L); Sumatra: Asjeh en Inderh, NIFS b.b. 5874 (L); Celebes en Ond., Raha, Tobi, 20 m, NIFS b. b. 21092 (L), Wasalangka, 5 m, NIFS b.b. 21311 (L); Molukken, Zuid Wester Eilanden, Eiland Wetar, Klisana, 5m, NIFS b.b. 27289 (L); Bali en Lombok, 1250m, NIFS b.b. 16994 (L); Zamboanga: Mindanao, San Ramon Prov., H. Hallier 4734 (L). **NEW GUINEA**: Mt. Wakobi, Atasrip 71 (L). **BORNEO**: East Borneo, E. Kutei; Sg. Kerajaan, A. Kostermans 5865 (L); Z.O. Borneo: Berouw Betemoe air, 25m, NIFS b.b. 19075 (L).

2. *Planchonella obovata* (R. Br.) Pierre, Not. Bot. Sapot. 1: 36. 1890; Royen, Blumea 8: 368. 1957; Chuang, Fl. Reipub. Popul. Sin. 60(1): 72. 1987; Li & Pennington, Fl. China 15: 211. 1996.

Fig. 7 山欖(樹青)

- Planchonella glabra* (Ridley) H.J. Lam, Bull. Jard. Bot. Buitenzorg, ser. III, 7: 217. 1925.  
*Planchonella obovata* (R. Br.) H.J. Lam, Bull. Jard. Bot. Buitenzorg, ser. III, 7: 209. 1925.  
*Pouteria obovata* (R. Br.) Baehni, Candollea 9: 324. 1942; Li, Fl. Taiwan 4: 96. 1978.  
*Selsalisia ferruginea* (Hook. & Arn.) Nakai var. *dubia* (Koidzumi ex Nakai) Nakai, Bull. Tokyo Sci. Mus. 22: 31. 1948.  
*Selsalisia ferruginea* (Hook. & Arn.) Nakai, Bull. Tokyo Sci. Mus. 22: 31. 1948.  
*Selsalisia liukiense* (Nakai) Nakai, Bull. Tokyo Sci. Mus. 22: 31. 1948.  
*Sersalisia obovata* R. Br., Prodr. 529. 1810.  
*Sideroxylon attenuatum* DC., Prod. 8: 178. 1844.  
*Sideroxylon dubium* Koidzumi ex Nakai, Rigakkai 26(5): 9. 1928.  
*Sideroxylon ferrugineum* Hook. & Arn., Bot. Beech. Voy. 6: 266. t. 55. 1841; Kanehira, Form. Trees rev. ed. 571. f. 529. 1936.  
*Sideroxylon glabrum* Ridley, Journ. As. Soc. Str. Br. 61: 476. 1912.  
*Sideroxylon liukiense* Nakai Bot. Mag. Tokyo 33: 209. 1919, p. p.

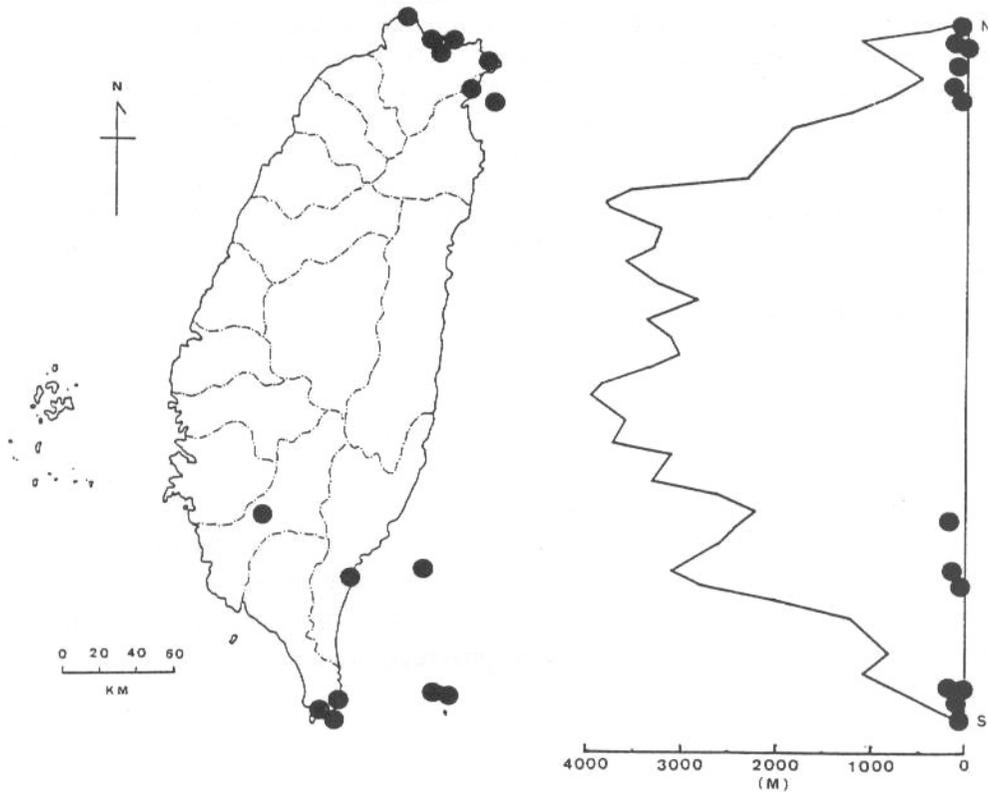


Fig. 7. Distribution of *Planchonella obovata* (R. Br.) Pierre in Taiwan.

A medium-sized evergreen tree; branchlets ferruginous-pubescent. Leaves thickly coriaceous, obovate, obovate-oblong, or oblong, (4.5-)6.9-10.8(-15.7) cm long and (1.6-)2.9-4.7(-6.1) cm wide, rounded or slightly emarginate at apex, cuneate at base, entire; petioles 5-10 mm long. Flowers axillary, solitary or 2-4-fascicles, small; pedicels *ca.* 10 mm long; calyx 5-lobed; corolla campanulate, 3-4 mm long, 5-lobed; stamens 5; staminodes 5. Fruits berry, ellipsoid, *ca.* 12 mm long, 4-9 mm in diameter. Seeds 1 or 2.

India, Pakistan, Burma, Malay Peninsula, Hainan, Malaysia, the Philippines, Taiwan, the Ryukyus, Bonin, Indonesia, New Guinea, Seychelles, the Solomons and Australia. Taiwan, at low altitude forests from north to south; also on Lanyu and Luta Islands.

**Specimens examined:** TAIWAN : Taipei: Kongliao, Northeastern Station, *M.F. Kao* 596 (PPI), *S.Y. Lu* 20176 (TAIF); Shihmen, *W.F. Ho* 306 (PPI, TAIF, TNM), Shihmendong, *T.Y.A. Yang et al.* 1980 (TNM); Yeiliu, *Y.H. Lin s.n.* s.d. (PPI). Keelung: Keelung (Kiirun), *K. Odashima & Sata* 17811 (PPI, TAI), *S. Sasaki s.n.* May 1932 (TAI); Chungcheng Area, Hopingtao, *K.C. Yang* 1587 (TAI), *S.Z. Yang* 2221 (PPI), 20 m, *S.M. Chaw* 701 (TNM), 5-25 m, *S.M. Liu & Leu* 49 (TNM), 0-50 m, *W.P. Leu* 1239 (TNM). Ilan : Toucheng, Peikuan, *C.H. Chen & Sang* 777 (TNM), *C.K. Lin & Chen* 85 (TNM), 86 (TNM), 87 (TNM), *C.M. Wang s.n.* Aug. 1992 (TNM); Isl. Kueishantao (Insl. Kizan), *G. Masamune & Suzuki s.n.* Jul 1932 (TAI). Kaohsiung: Chishan, Liukwei, *C.E. Chang* 1752 (PPI). Pingtung: Hengchun (Koshun or Kosyun), *E. Matuda* 522 (TAI), *G. Nakahara s.n.* Feb 1906 (TAIF), *C.H. Ou et al. s.n.* Apr. 1983 (TNM), *S. Sasaki s.n.* 1932 (TAI), Banana Bay, *C.E. Chang* 1549 (PPI), *T.C. Huang & Huang* 8374 (TAI), Kenting Park, 253 m, *S.T. Chiu & Chu* 2588 (TNM), Nanwan, *P.N. Wang* 106 (PPI), Ooluanpi, *N. Fukuyama s.n.* Dec 1931 (TAI), *T. Kawakami & Sasaki s.n.* Feb 1911 (TAI), *Y. Kudo & Mori s.n.* Apr 1930 (TAI), 0-40 m, *W.P. Leu s.n.* Apr. 1989 (TNM), Kueitsuchiaio (Kuraru), *T.I. Chuang* 1072 (TAI); Manchou, Chialoushuei, *S.Z. Yang* 27317 (PPI, TNM), *T.Y.*

*Yang 185* (TAI); Kuaru, *K. Yamada s.n.* Jun 1916 (TAI). **Taitung:** Lanyu Is., *C.E. Chang 2214* (PPI), 2919 (PPI), *s.n. s.d.* (PPI), *T.I. Chuang & Hsu 2412* (TAI), *E. Hanada s.n.* May 1943 (TAI), *T.C. Huang & Kao 5448* (TAI), *T. Kano s.n.* Jun 1935 (TAI), *J.C. Wang 1497* (TAI), Hongtong, Pond Tienchi, *T.K. Chang s.n.* Apr 1989 (TAIF), Mt. Auopenshan, *C.E. Chang 3111* (PPI), Mt. Hongtoushan, *T.Y.A. Yang et al. 8103* (TNM), Mt. Tashenshan, *T. Kano s.n.* Jul 1935 (TAI), Lantao, Mt. Jiengtushan, *T.Y.A. Yang & Yen 8162* (TNM), Lantao to Tungchin, *T.S. Liu et al (LKH&C) 305* (TAI), Tungchin, Yungshin Farm, *C.L. Yeh 644* (PPI); Lutao Is., *C.E. Chang 4107* (PPI), *Y. Kudo & Mori s.n.* Jul 1930 (TAI), Chungliiao (Churyo or Churo), *Y. Kudo & Mori s.n.* Jul 1930 (TAI), *C.K. Lin 3030* (TNM), Takou, *C.K. Liao 304* (PPI); Taimali, *C.H. Ou et al. s.n.* Jul. 1985 (TNM); Baboei, *S. Kobayashi 5130* (TAIF). **CAROLINE ISLANDS:** Palao, Yoror, *R. Kanehira s.n.* Mar 1915 (TAIF). **JAPAN: RYUKYUS:** Isl. Okinawa, Ohgimi-son, Shioya, 3 m, *Y. Miyagi 10207* (PPI); Isls. Yasyama, Unarizaki, Sumiyoshi, Isl. Iriomote, 20 m, *H. Okada & Ueda 2101* (PPI).

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## 臺灣山欖科植物

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### 摘 要

本文是有關臺灣山欖科 (Sapotaceae) 植物的分類學研究報告，包括二個屬：膠木屬 (*Palaquium*) 及山欖屬 (*Planchonella*) 等共三個種。文中對每一分類群皆有詳細描述，並附其檢索表及在臺灣之分布圖。

關鍵詞：山欖科、膠木屬、山欖屬、分類學、臺灣。

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