A synopsis of Thai Apocopis Nees (Poaceae, Panicoideae)

ATCHARA TEERAWATANANON1, SARAWOOD SUNGKAEW2, VEERAYA BOONTIA3 & TREVOR R. HODKINSON4

ABSTRACT. A synopsis of the genus Apocopis occurring in Thailand is presented, including a key to the species, correct nomenclature, descriptions and illustrations. Six species are recognised, of which four species are lectotypified.

KEY WORDS: Panicoideae, Apocopis, Thailand.

INTRODUCTION

The genus Apocopis Nees (Poaceae, Panicoideae) consists of about 15 species, chiefly distributed in India, China, Southeast Asia to Polynesia (Clayton and Renvoize, 1986; Watson and Dallwitz, 1992; Clayton et al., 2006). Apocopis was originally described by Nees von Esenbeck (1841) to include A. royleanus (now Apocopis paleacea (Trin.) Hochr.), using the specimen of Dr J. F. Royle, from India. It is characterised by an inflorescence which is composed of spike-like racemes consisting of a fragile rhachis that bears the imbricate fertile sessile spikelets with broadly truncate lower glumes and pedicelled spikelets which are normally suppressed (Bor, 1952, Clayton and Renvoize, 1986). In this paper, we present a detailed account of all Thai six Apocopis species. We also provide descriptions, a key to species and miscellaneous information for each species including typification notes.

APOCOPIS


Annual or perennial, tufted or shortly rhizomatous. Culms slender, erect or short ascending or prostate; nodes glabrous to hirsute. Leaf-blades lanceolate to linear-lanceolate or linear, usually hairy with tubercle-based hairs, rarely glabrous, margins thick. Ligule an eciliate membrane or a ciliate membrane. Inflorescence of (1–)2 (–4) digitate racemes, rhachis internodes fragile, hairy at apex, margins hirsute. Spikelets in pairs, heteromorphous, basal pairs almost barren, dorsally compressed; florets 2, without rachilla extension. Sessile spikelets usually fertile (sterile in A. intermedius); spikelet callus obtuse, attached

1 Natural History Museum Thailand (THNHM), National Science Museum, Technopolis, Pathum Thani 12120, Thailand. e-mail: teerawa@gmail.com
2 Department of Forest Biology, Faculty of Forestry, Kasetsart University, Bangkhen, Bangkok 10900, Thailand. e-mail: fforsws@ku.ac.th
3 Suan Luang Rama 9, Bangkok, Thailand. e-mail: veeraya_mod@hotmail.com
4 Department of Botany, School of Natural Sciences, Trinity College, University of Dublin, Dublin 2, Ireland. e-mail: hodkinst@tcd.ie
* Corresponding author
transversely, hairy; lower glumes chartaceous to coriaceous, oblong-obovate, glabrous to hairy, truncate or emarginate, (5–)7–9-nerved, parallel or arched, free or united in various patterns; upper glumes chartaceous, truncate or obtuse or emarginate, upper margin ciliate, 3-nerved, the two outer flaps folded round the florets; lower florets male; lower lemma hyaline, truncate or obtuse or emarginate to bifid, upper margin ciliate, nerves obscure or 1-nerved; lower paleas hyaline, truncate or obtuse or bifid, upper margin ciliate, nerveless; upper florets barren or male or female or hermaphrodite; upper lemmas narrowly oblong, nerves obscure or 1-nerved, awned from entire or bifid apex, awns geniculate with brown twisted columns, scaberulous; upper paleas hyaline, upper margin ciliate; lodicules absent; stamens 2; styles 2, stigmas plumose. Caryopsis with adherent pericarp, oblong, hilum punctiform. Pedicelled spikelets normally suppressed (developed in *A. intermedius*); pedicels usually hirsute, partly adnate to the margin of the lower glume of sessile spikelet.

About 15 species, distributed in temperate and tropical Asia. Six species are found in Thailand of which one is endemic: *A. siamensis* A.Camus.

### Key to Species of Thai *Apocopis*

1. Peduncles hirsute in uppermost part
   - Pedicelled spikelets present. Sessile spikelets 6–9 mm long
   - Pedicelled spikelet absent. Sessile spikelets to 5 mm long

2. Pedicelled spikelets present
   - Pedicelled spikelet absent. Sessile spikelets to 5 mm long

3. Pedicelled spikelets absent
   - Spikelets awned or awned, awns less than 10 mm long
   - Spikelets awned; awns longer than 10 mm long

4. Median nerve or side nerves reaching the upper margin of the lower glumes and produced as a small point

5. All nerves ending below the upper margin of the lower glumes
   - Annual. Spikelets to 3–4 mm long
   - Perennial. Spikelets 4.5–6 mm long

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Perennial, tufted. Culms 20–40(–50) cm tall, erect; nodes glabrous. Leaf sheaths 2–5 cm long, glabrous to pilose with tubercle-based hairs especially on the upper part. Ligule a ciliate membrane, 0.5–1 mm long. Leaf blades linear, 5–9 by 0.2–0.4 cm, pubescent or pilose with tubercle-based hairs on both surfaces, rarely glabrous, margins thick, scabrous. Racemes 1–2, 2–4 cm long, slightly swollen below the racemes; joints of rachis 1.5–2 mm long; peduncles 6–15 cm long, glabrous. Sessile spikelet fertile except the lowest, greenish red or purplish with narrow brownish apex; oblong-obovate, 5–5.5 by 1.8–3 mm; spikelet callus hairy, hairs to 1.5 mm long; lower glumes oblong-obovate, 5–5.5 by 1.8–3.5 mm, glabrous or granular on dorsal surface, round or truncate, upper margin ciliate, 7-nerved, anastomosing, nerves not reaching upper margin; upper glumes oblong-lanceolate, 5–5.5 by ca 1 mm, glabrous to pubescent on upper part, truncate; lower lemmas oblong to ovate-lanceolate, 4.5–5 mm long, truncate, 1-nerved; lower paleas lanceolate, 4.5–5 mm long, margins ciliolate, truncate; anthers purple, 2–3 mm
long; upper florets female or hermaphrodite; upper lemmas oblong-lanceolate, 4.5–5 mm long, truncate, upper margin ciliate, awns to 7 mm long, short geniculate, nerves obscure or 1-nerved; upper paleas oblong-lanceolate, 3.5–4 mm long, truncate; styles 2, stigmas purple, ca 3.5 mm long. Pedicelled spikelets suppressed; pedicels 1.5–2 mm long. Caryopsis not seen.

Thailand.— NORTHEASTERN: Udon Thani [Nong Han, 26 Feb. 1924, **Kerr 8584 (BM, K)]; EASTERN: Roi Et [Thung Kula Rong Hai, 22 June 1969, **Smitinand 10756 (BKF)]; Ubon Ratchathani [Khong Chiam, 22 May 2001, **Greijmans 60 (BKF)]; SOUTH-EASTERN: Sa Kaeo [Aranyaprathet, 10 Aug. 1930, **Kerr 19624 (BM, 2 sheets K); Ta Phraya, 8 July 2001, **Teerawatananon s.n. (THNRM)]. Watthana Nakhon, 11 Nov. 2006, **Teerawatananon & Kritsanachande 977 (TCD)].

Distribution.— Tropical Asia: Indochina and Malesia.

Ecology.— Open grassy and wet areas, fire prone deciduous dipterocarp forests, 50–200 m altitude.

Notes.— The specimens of **Kerr 19624 housed in BM and K have lemmas with short awns or are awnless. Among the cited specimens examined, the Borneo specimens (**Lucas 586 and **Forster F23) have pedicelled spikelets and the lower glumes of the sessile spikelets are hirsute. The specimens of **Kerr 8584 (BM, K) were misidentified as **Apocops royleana Nees (now **A. paleacea).

Typification notes.— When Ridley (1910) first published **Apocops borneensis, he cited **Winkler 3392 collected from Borneo as the type specimen but he did not indicate where it was kept. According to Stafleu and Cowan (1988), Winkler’s herbarium is deposited in B, BM, C, G, K, L, MO, NY, P, PC, PRE, WRL and Z. We have found two sheets of **Winkler 3392, one is kept in K (K 290140) and another is kept in L (L 43626). Therefore, we hereby designate **Winkler 3392 in K as the lectotype, because of its high quality condition and regard the remaining duplicate as an isolecotype.


Perennial. Culms to 80 cm tall, erect or short ascending, branched; nodes glabrous. Leaf sheaths 5–11 cm long, densely pilose with tubercle-based hairs, margins scarious. Ligule a lacerate membrane or a ciliate membrane, to 2 mm long. Leaf blades linear-lanceolate, 5–15 by 0.5–0.6 cm, pilose with tubercle-based hairs on both surfaces, margins thick, scabrous and pilose with tubercle-based hairs. Racemes 2, 3–6 cm long; joints of rachis 1.5–2 mm long; peduncles 10–15 cm long, glabrous. Sessile spikelet fertile, brownish-green to brown with reddish band across apex, oblong-obovate, 5–6 by 3.5–3 mm; spikelet callus hairy, hairs to 3 mm long; lower glumes oblong-obovate, 4.5–5 by 3–3.5 mm, almost glabrous, slightly emarginate, upper margin ciliate, margins sometimes hirsute, 7(−9)-nerved, nerves anastomosing, the median nerve reaching the upper margin and exserted as a small point, sometimes the two intramarginal nerves almost reaching the upper margin; upper glumes lanceolate-oblong, 4.5–5 by 1–2 mm, sparsely pubescent on the dorsal surface, truncate to slightly emarginate, the two outer flaps folded round the florets; lower lemmas lanceolate-oblong, 4.5–5 mm long, almost glabrous, obtuse, nerveless; lower paleas lanceolate-oblong, 4–4.5 mm long, bifid; anthers yellow to purple or reddish pink or greyish purple, 3–3.8 mm long; upper florets hermaphrodite or female; upper lemmas lanceolate-oblong, 4.5–5 mm long, pubescent along the margins, awns 1.8–2.5 cm long, columns 0.8–1.3 cm; upper paleas ovate-oblong, 3–3.5 mm long, slightly emarginate; styles 2, stigmas creamy white to old-rose colour, 4–5.5 mm long. Pedicelled spikelets suppressed; pedicels 1.8–2.5 mm long. Caryopsis oblong, 1.3–1.5 mm long.

Distribution.—Tropical Asia from India to Indochina.

Ecology.—Open areas or partly shady places, deciduous dipterocarp-oak forests, tropical grasslands, 500–600 m altitude.

Vernacular.—Ya Khon Bung (หญุ้ง) (Forest Herbarium, 2001).


Perennial, shortly rhizomatous. Culms to 50 cm tall, erect; nodes glabrous. Leaf sheaths 1–3 cm long, glabrous to densely hirsute. Ligule a ciliate membrane, 1–1.5 mm long, with a dense row of hairs behind ligule. Leaf blades linear-lanceolate, 5–20 by 0.3–0.5 cm, pilose to densely hirsute with tubercle-based hairs on both surfaces, margins thick, pilose with tubercle-based hairs. Racemes 2, 4–6.5 cm long; joints of rhachis 2–2.5 mm long; peduncles 5–20 cm long, usually glabrous, sometimes hirsute at uppermost part. Sessile spikelets male, yellowish green to pale yellow with red or brown band across apex, oblong, 6–9 by 2.5–3 mm; spikelet callus hairy, hairs 2.5–3 mm long; lower glumes oblong-obovate, 6–8 mm long, ca 3 mm wide, glabrous to densely hirsute on the dorsal surface, truncate to slightly emarginate, upper margin ciliate, (5–)7-nerved, all nerves ending below the apex; upper glumes oblong, 7–9 by 1–1.5 mm, pubescent on the dorsal surface, truncate; lower lemmas lanceolate-oblong, 6–8 mm long, truncate to obtuse, 1-nerved; lower paleas lanceolate-oblong, 6–8 mm long, truncate to obtuse; anthers brownish yellow, 3.5–5 mm long; upper florets usually barren or male and hermaphrodite if pedicelled spikelet wanting; upper lemmas narrowly oblong, 5–7 mm long, awns to 3.5 cm long, columns 0.6–1.5 cm; upper paleas ovate-oblong, 4–5 mm long, obtuse; styles 2, stigmas purple, 4–5 mm long. Pedicelled spikelets usually present, female, lanceolate, 4.5–5.5 mm long, ca 1 mm wide, caducous; pedicels 1.5–3.5 mm long; spikelet callus hairy, hairs to 2 mm long; lower glumes lanceolate-oblong, 5–5.5 by 0.8–1 mm, hirsute, obtuse, upper margin ciliate, 3-nerved; upper glumes lanceolate-oblong, 4.5–5 by 0.5–0.8 mm, hirsute, truncate to obtuse, upper margin ciliate, 3-nerved; lower florets suppressed; upper lemmas linear, 3.5–4 mm long, awned, awns to 3 cm long, columns 6–1.5 cm long; upper paleas oblong, 3.5–4 mm long, obtuse, upper margin ciliate; styles 2, stigmas purple, to 10 mm long. Caryopsis oblong, 2.5–3 mm long.

Thailand.—NORTHERN: Phitsanulok [Thung Salaeng Luang National Park, 12 Aug. 2003, Chantaranonthai et al. s.n. (KKU); 30 Nov. 2005, Teerawatananon & Sungkaew 850 (TCD, THNHM); 26 March 2006, Teerawatananon & Sungkaew 905 (TCD); 26 March 2006, Teerawatananon & Sungkaew 908 (THNHM); 7 Nov. 2006, Teerawatananon &

Distribution.— Temperate and tropical Asia from China to Indochina.

Ecology.— Open sandy areas, tropical grasslands; 0–500 m altitude.

Figure 1. Apocops spikelet-silhouettes: A. A. collinus; B. A. courtalhumensis; C. A. intermedius; D. A. mangalorensis; E. A. siamensis; F. A. wrightii.
Typification notes.— When Camus (1919) published Lophopogon intermedius, she cited Balansa 394, Mouret 542 and Godefroy 935 from Vietnam (Tonkin), as the type specimens. After that, Roberty (1960) transferred L. intermedius to Apocopis as A. tridentatus var. intermedius. He cited the specimen of Balansa 394 as the holotype, but did not mention where it was kept. This species was later transferred to Apocopis intermedius by Chai-Anan (1972). According to Roberty (1960), his citation of Balansa 394 as the holotype did have the effect of establishing that specimen as the lectotype of A. intermedius. However, we have found four sheets of Balansa 394 kept in K and L. Therefore to ensure that the type is easily accessed, Balansa 394 in K (K 433917) is selected as the lectotype and the remaining duplicates are regarded as isolectotypes.


Annual. Culms usually less than 30 cm tall, slender, short ascending, often prostrate, branched; nodes glabrous. Leaf sheaths 1–3 cm long, inflated, slipping from the culm, glabrous to pilose with tubercle based hairs at the upper part. Ligule an eciliate membrane, ca 0.5 mm long. Leaf blades lanceolate, 1–3(–4) by to 0.4 cm, pilose to densely hispide with tubercle-based hairs on both surfaces, margins thick, pilose with tubercle-based hairs. Racemes 2, 4–6.5 cm long; joints of rachis 1–1.5 mm long; peduncles to 10 cm long, glabrous. Sessile spikelet fertile, oblanceolate, 3–4 by ca 3 mm; spikelet callus hairy, hairs to 2 mm long; lower glumes oblong-obovate, 3–4 by 2–3 mm, truncate to slightly emarginate, upper margin ciliate, hyaline and often reddish, 7-nerved, all nerves not reaching the top of the glume; upper glumes lanceolate-oblong, ca 4 by ca 1 mm, with two lateral flaps folded round the florets, pubescent on the dorsal surface, truncate; lower lemmas lanceolate-oblong, 3–4 mm long, emarginate to bifid, nerveless; lower paleas lanceolate-oblong, 3–4 mm long, bifid; anthers 2–2.2 mm long; upper florets female; upper lemmas narrowly oblong, 3.5–4.5 mm long, awns 1.5–2 cm long, columns 0.6–0.8 cm; upper paleas oblong, 2.5–3 mm long, acutely 2-lobed; styles 2, stigmas 3–3.5 mm long. Pedicelled spikelets suppressed; pedicels 1.5–2 mm long. Caryopsis not seen.

Thailand.— NORTHERN: Chiang Mai [Doi Suthep, 21 Oct. 1912, Kerr 2745 (BM 2 sheets, K)].

Distribution.— Asia from India to Indochina.

Ecology.— Open gravel slopes, ca 335 m altitude.

Notes.— Three sheets of Kerr 2745, which are housed in K and BM, were identified as Apocopis cochinchinesis A.Camus and as Apocopis wightii Nees [now Apocopis courtallomensis (Steud.) Henrard], respectively. We have carefully examined all of them and found that they actually are Apocopis mangalorensis.

Apocopis mangalorensis differs from A. cochinchinesis in having a prostrate culm and differs from A. courtallomensis in having an annual habit and geniculate culms often prostrate at base. It also differs from both species in having lower glumes with no nerves reaching the upper margins. Among the cited specimens examined, the Indian specimens are more hairy than Kerr’s specimens. However, according to Bor (1952), the lower glumes can be glabrous and hairy.

Figure 3. *Apocopsis mangalorensis* (Hochst.) Henrard: A. habit; B. spikelets; C. lower glumes of sessile spikelets; D. upper glumes of the same; E. lower lemmas of the same; F. lower paleas of the same; G. upper lemma of the same; H. upper paleas of the same. All drawn from *Kerr* 2745 by A. Teerawatananon.

Annual, tufted. Culms slender, to 45 cm tall, erect; nodes usually glabrous, sometimes 1–2 nodes at uppermost part hairy below the nodes. Leaf sheaths 1–3 cm long, upper part pilose with tubercle-based hairs. Ligule an eciliate membrane, 0.5–0.8 mm long. Leaf blades linear-lanceolate, 3–5 by 0.2–0.3 cm, pilose with tubercle-based hairs on both surfaces, margins thick, scabrous and pilose with tubercle-based hairs. Racemes 2, 2–4 cm long; joints of rachis 1.5–1.8 mm long; peduncles 8–10 cm long, hirsute at uppermost part. Sessile spikelets fertile, brownish green, oblong, 4.5–5 by 1–1.8 mm; spikelet callus hairy, hairs 1–1.5 mm long; lower glumes oblong or slightly wider upwards, 3.5–4.3 by 1–1.8 mm, scabrous on the dorsal surface, dentate, upper margin ciliolate, 5–7-nerved, nerves reaching the upper margin and exserted as small points; upper glumes oblong, 4–4.5 by 0.8–1 mm, with two lateral flaps wrapped round the florets, scabrous on the dorsal surface, truncate to slightly emarginate; lower lemmas narrowly oblong, 3.8–4 mm long, obtuse, nerveless; lower paleas narrowly oblong, 3.5–3.8 mm long, obtuse; anthers yellow to purple; 2–2.5 mm long; upper florets female or hermaphroditic; upper lemmas narrowly oblong, 4–(5.3) mm long, awns 2.5–3 cm long, columns 1–1.4 cm; upper paleas ovate-oblong, 2.8–3.3 mm long, truncate; styles 2, stigmas white or creamy, to 4 mm long. Pedicelled spikelets suppressed; pedicels 1.3–1.5 mm long. Caryopsis not seen.


Ecology.—Open moist sandy areas, deciduous dipterocarp forests, 5–50 m altitude.

Typification notes.—When Camus (1914) described Apocopis siamensis A.Camus, she cited Hosseus s.n. collected from Thailand as the type specimen when she did not mention where it was kept. Later, Bor (1952) stated that Hosseus 145 was the type specimen of A. siamensis. Thus, Hosseus 145 must be considered as the lectotype. We have found six sheets of Hosseus 145 housed in K, L and US. According to Staffeu and Mennega (1993), Bor was then the assistant director at Kew during 1948–1959, so, it is possible that he had used Hosseus 145 in K as the type specimen when he published his work. However, there are three sheets of Hosseus 145 in K: K 290134, K 290135 and K 290136. Therefore, we hereby designate Hosseus 145 (K 290134) as lectotype due to its high quality condition and regard the remaining duplicates as isolectotypes.


Perennial, tufted. Culms to 100 cm tall, erect, branched; nodes glabrous to hirsute with white hairs. Leaf sheaths 6–9 cm long, glabrous to densely hirsute, margins scarious. Ligule a ciliate membrane, to 1 mm long. Leaf blades linear-lanceolate, 10–20 by 0.3–0.7 cm, pilose to densely hirsute with tubercle-based hairs on both surfaces, uppermost much reduced, margins thick, pilose
with tubercle-based hairs. Racemes 2, 2–4.5 cm long; joints of rachis 1.5–2 mm long; peduncles 8–15 cm long, glabrous. Sessile spikelet fertile, oblong, 4.5–6 by ca 3 mm; spikelet callus hairy, hairs to 3 mm long; lower glumes oblong-obovate, 4.5–5.5 by 2.5–3 mm, almost glabrous, truncate to slightly emarginate, upper margin ciliate, 7–9-nerved, all nerves not reaching the upper margin; upper glumes lanceolate-oblong, 4.5–6 by 1.3–1.8 mm, pubescent on the dorsal surface, truncate to slightly emarginate; lower lemmas lanceolate-oblong, 4–5 mm long, truncate to obtuse; anthers 2.5–3 mm long; upper florets hermaphrodite; upper lemmas lanceolate-oblong, 4.5–5.5 mm long, pubescent along the margins, awns 2–3 mm long, columns 1–1.5 cm; upper paleas ovate-oblong, 3–5 mm long, obtuse; styles 2, stigmas ca 4 mm long. Pedicelled spikelets suppressed; pedicels 1.5–2.5 mm long. Caryopsis not seen.


Distribution.— Temperate and tropical Asia from China to Indochina.

Ecology. — Open areas, gravelly places, deciduous dipterocarp forests, 100–180 m altitude.

Notes.— Among the specimens of Kostermans 1281, only the one in GH seems different from the others in having a few lower glumes with median nerve reaching the apex.

Typification notes.— When Munro (1860) published Apocopis wrightii, he cited Wright s.n. collected from Cum-sing-moon, Hong Kong, as the type specimen, but he did not mention where it was kept. According to Stafleu & Cowan (1988), corresponding general collections of Wright were kept in GH. However, we have found three duplicates of Wright s.n. specimens housed in GH, K and NY, all of which were labelled by Munro as “Apocopis wrightii n. sp. Munro”. However, only the specimen in GH bears a label with Munro’s handwriting indicating the reason why he recognised this plant as a new species. Therefore, we select Wright s.n. housed in GH (UHU 23071), as the lectotype and regard the remaining duplicates as isoelectotypes.

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