



Revision of the Australian species of *Agrotera* Schrank (Lepidoptera: Pyraloidea: Crambidae: Spilomelinae)

KAI CHEN¹, MARIANNE HORAK², XICUI DU³ & DANDAN ZHANG^{1,4}

¹Institute of Entomology/ State Key Laboratory of Biocontrol/The Museum of Biology, Sun Yat-sen University, Guangzhou, Guangdong 510275, China. E-mail: chenk8@mail2.sysu.edu.cn; zhangdd6@mail.sysu.edu.cn

²CSIRO NRCA, GPO Box 1700, Canberra, ACT 2601, Australia. E-mail: Marianne.Horak@csiro.au

³College of Plant Protection, Southwest University, Chongqing 400715, China. E-mail: duxicui@hotmail.com

⁴Corresponding author

Abstract

The genus *Agrotera* Schrank, 1802 is revised for Australia and the generic definition is refined based on the male genitalia. The genera *Leucinodella* Strand, 1918 **stat. rev.** with *L. leucostola* (Hampson, 1896) **comb. nov.**, *Nistra* Walker, 1859 **stat. rev.** with *N. coelatalis* Walker, 1859 **comb. rev.**, *Sagariphora* Meyrick, 1894 **stat. rev.** with *S. magnificentalis* (Hampson, 1893) **comb. nov.**, and *Tetracona* Meyrick, 1884 **stat. rev.** with *T. amathealis* (Walker, 1859) **comb. rev.** and *T. pictalis* Warren, 1896 **comb. rev.** are removed from synonymy with *Agrotera*, as they lack the synapomorphies of *Agrotera*. Two new species, *Agrotera genuflexa* **sp. nov.** from Northern Territory, Queensland and New South Wales, and *A. longitabulata* **sp. nov.** from Queensland, are described. The taxonomic status of the Australian species of *Agrotera* is discussed, and a key to all species, based on males, is provided. The adults and genitalia of the new species and some related species are figured.

Key words: *Agrotera*, taxonomy, Australia, generic definition, new species

Introduction

The genus *Agrotera* was erected by Schrank (1802) for a single species, *Phalaena nemoralis* Scopoli, 1763, on the basis of the presence of a triangular scale tuft at the third labial segment. Hampson (1899) confirmed the taxonomic utility of this characteristic labial palpus and described it as "the 3rd [segment] triangularly scaled and set at an angle" and included 18 species (2 species *auctorum*) in *Agrotera*. Since then, more species have been added to this genus, e.g. by Kenrick (1907), Wileman (1911), Turner (1913), Rothschild (1915), Hampson (1917), Wileman & South (1917), Caradja (1925), Marion & Viette (1956), Viette (1958) and Maes (2003), mostly without justifying the placement in *Agrotera* based on genus-specific characters. Currently, *Agrotera* comprises 27 species, with the majority distributed in the Oriental and Austral-Asian regions (Nuss *et al.* 2003–2017). In Australia, five species are recorded: *A. amathealis* (Walker, 1859), *A. basinotata* Hampson, 1891, *A. glycyphanes* Turner, 1913, *A. ignepicta* Hampson, 1899 and *A. pictalis* (Warren, 1896) (Shaffer *et al.* 1996). External examination of the type specimens of species placed in *Agrotera* reveals that the similarity of many of them to *A. nemoralis* is only superficial, whereas examination of the genitalia of those species indicates their misplacement in this genus. In the case of *Agrotera flavobasalis* Inoue, 1996, the author even points out the dissimilarity of the genitalia to those of the typical species, but nonetheless places the species in *Agrotera* (Inoue 1996).

In this study focusing on the Australian *Agrotera* species, the definition of the genus is refined, two new species from Australia are described, a key to the Australian *Agrotera* species is provided, and the taxonomic division of some species in *Agrotera* is discussed.

Material and methods

The specimens studied, including the types of the newly described species, are all deposited at the Australian National Insect Collection (ANIC) except where stated otherwise (Natural History Museum, London, United Kingdom (NHMUK), Queensland Museum, Brisbane, Queensland (QMBQ), The Museum of Biology, Sun Yat-sen University, Guangzhou (SYSBM)). Genital dissection follows Robinson (1976), and genitalia follow Klotz (1970), Munroe (1976), Maes (1995) and Kristensen (2003). Specimen images at different focal levels were made using a Visionary Digital BK-Plus Lab System; source images were then aligned and stacked in Zerene Stacker v. 1.02 to obtain a fully sharpened composite image. Genitalia pictures were taken using a Zeiss Axio Scope.A1 in combination with a Zeiss AxioCam camera and the Axio Vision SE64 programme on a Windows PC. All pictures were edited using Adobe Photoshop CS5.

Taxonomy

Agrotera Schrank, 1802

Agrotera Schrank, 1802: 163. Type species: *Phalaena nemoralis* Scopoli, 1763, by monotypy.

Diagnosis. External diagnostic characters of *Agrotera* comprise a modified labial palpus with the third segment triangularly scaled with a very narrow base, a relatively broad triangular forewing with a usually sinuate termen, the purplish grey wing ground colour, a pale yellow forewing base sprinkled with orange scales, often a similar yellowish patch on the hindwing base, and a yellowish dorsal base of the abdomen. The male genitalia are characterized by a small, weakly sclerotized uncus with few simple, hair-like setae, a deeply divided or simple, distally pointed valva with a large, hook-like sclerotized fibula-like process from below the base of the costa, a large, shield-shaped, dorsally bifid juxta, and a well-developed saccus varying from short and triangular to long and rod- or band-shaped.

Description. Head. Frons rounded, with short scales, vertex with moderately raised scales projecting between antennae. Labial palpus upcurved, sickle-shaped, ventral margin with strongly projecting scales, often as three distinct, triangular tufts, with the third segment triangularly scaled (Figs. 2, 3). Maxillary palpus small. Proboscis well-developed. Antenna in male with cilia as long as or slightly longer than diameter of antenna. Thorax. With appressed scales, pale yellow sprinkled with orange scales. Legs usually not modified. Forewing. Subtriangular, costa straight to 3/4, then curved to apex, termen usually sinuate. Retinaculum a tuft of curved bristles from within discal cell, no frenulum hook in male. Ground colour purplish grey, base always pale yellow sprinkled with orange scales, distally edged by antemedial line, often a variably developed purplish grey spot beyond base on costa. Venation (Fig. 6) with R_1 free, R_2 free but adjacent to stem of R_3+R_4 in basal 2/3, R_3 and R_4 stalked to just beyond 2/3, R_4 to just before apex, R_5 parallel to stalked R_3+R_4 at base, then curved and diverging; M_1 moderately close to R_5 at base, M_2 widely separate from M_1 , closing vein concavely curved; M_2 , M_3 and CuA_1 equidistant and parallel from posterior angle of cell, then diverging; CuA_2 distant from CuA_1 ; only trace of CuP near wing margin; 1A faintly sinuate to tornus, 2A forming complete loop and distally recurved before joining 1A. Hindwing. Nearly fan-shaped or triangular. Frenulum single in male, with 2 acanthae in female. Ground colour purplish grey, basal 1/3 usually pale, sometimes pale yellow patch sprinkled with orange scales. Venation (Fig. 6) with $Sc+R_1$ and Rs anastomosing for 1/3 beyond end of discal cell, Rs and M_1 short-stalked, closing vein concave, angled; M_2 and M_3 close and parallel at base, M_3 and CuA_1 adjacent to each other from posterior angle of cell; CuA_2 from below 3/4 of cell; CuP complete but weaker towards base; 1A+2A without basal loop; 3A present. Male genitalia. Anal tube long, often extending beyond uncus. Uncus short to elongate conical, weakly sclerotized, set with few hair-like setae. Vinculum V- to U-shaped, saccus well-developed, sometimes very long. Valva deeply divided with projecting costa and sacculus processes, or simple, elliptic with narrow and pointed apex; always with a long and slender, hook-like sclerotized fibula-like process from inner surface near base of valva. Transtilla arms usually triangular, meeting medially, sometimes with thin hairs. Juxta large shield-shaped, distally bifid and with spinulose caulis. Phallus with cornuti in vesica. Female genitalia. Hind margin of 7th sternite unmodified. Ovipositor lobes narrowly crescent-shaped, evenly set with setae. Posterior apophysis short and slender, anterior apophysis longer

than posterior apophysis, sometimes thickened in basal part with a lateral process. Antrum membranous or sclerotized, cup- or funnel-shaped, colliculum ring-shaped, sometimes with spike-shaped posterior processes. Bursae copulatrix variously divided into ductus bursae and corpus bursae, but nearly always with an area of sclerotized spinules at posterior end and anterior end of corpus bursae; ductus seminalis usually originating from anterior end of colliculum.

Biology. Larvae of *A. nemoralis* feed in spun leaves mainly of *Carpinus betulus*, *Carpinus japonica*, *Castanea sativa*, *Corylus heterophylla*, *Deutzia crenata*, *Quercus pubescens* (Simchuk *et al.* 2012), *Sorbus* spp. and *Betula* spp. (Slamka 2013), and pupate in a shelter of leaves spun together with silk (Slamka 2013). *Agrotera basinotata* feeds on *Melastoma malabathricum*, *Lagerstroemia* spp., *Castanopsis*, *Cleistocalyx operculatus*, *Eugenia aquea* and *Pavetta indica* (Krauss 1965; Robinson *et al.* 2010; Gupta & Lokhande 2013).

Distribution. *Agrotera* occurs in the Palaearctic, Oriental and Australian regions. Additional six African species are placed in *Agrotera*, but as yet they have not been revised regarding their correct placement in this genus.

Monophyly of *Agrotera* and putative apomorphies. Investigation of the genitalia revealed an unexpected morphological diversity among the externally superficially similar *Agrotera* species, indicating that the genus represents a polyphyletic group rather than a monophylum. Consequently, those investigated species that were found to be in disagreement with the diagnosis of *Agrotera* given above were removed from the genus.

Species of *Agrotera* share these synapomorphies, the relatively broad triangular forewing with pale yellow base sprinkled with orange scales and with sinuate termen, the small, weakly sclerotized uncus set with sparse setae, the large, hook-like sclerotized fibula-like process from below the base of the costa, a large, shield-shaped, dorsally bifid juxta and the long, well-developed saccus. Based on the generic synapomorphies, we consider *A. nemoralis*, *A. genuflexa*, *A. longitabulata*, *A. basinotata*, *A. discinotata* Swinhoe, 1894 and *A. posticalis* to form the monophyletic *Agrotera* core group, to which we also refer as the *nemoralis* group.

Taxonomic status of taxa misplaced in *Agrotera*. *Leucinodella* Strand, 1918, *Nistra* Walker, 1859, *Sagariphora* Meyrick, 1894 and *Tetracona* Meyrick, 1884 were treated as synonyms of *Agrotera* (Hampson 1899, Shaffer *et al.* 1996). None of the type species of the four genera agrees with the diagnosis of *Agrotera sensu stricto*, as given above, and the four genera are consequently removed from synonymy with *Agrotera* and reinstated as valid genera:

Leucinodella agroterodes Strand, 1918, type species of *Leucinodella* **stat. rev.** and synonym of *Leucinodella leucostola* (Hampson, 1896) **comb. nov.** (Figs 11, 17, image of cotype could be found at http://www.imdap.entomol.ntu.edu.tw/InsectSampleImage.php?TI_ID=955&L=E), differs from *Agrotera* by the arched forewing termen and the whitish forewing without a pale yellowish wing base with orange scales, as well as in the male genitalia by the short, rod-like, bilobate, distally rounded uncus, apically densely set with flat, short setae, and the tongue-shaped valva without a sclerotized fibula-like process emerging from near the costa base.

Nistra coelatalis Walker, 1859 **comb. rev.** (Fig. 12, image of cotype could be found at http://www.imdap.entomol.ntu.edu.tw/InsectSampleImage.php?TI_ID=954&L=E), type species of *Nistra* **stat. rev.**, has a wing pattern similar to *L. leucostola*, with an arched forewing termen and the absence of the pale yellowish forewing base sprinkled with orange scales. The genitalia of *N. coelatalis* were not investigated.

Sagariphora heliochlaena Meyrick, 1894 (Figs 13, 18), type species of *Sagariphora* **stat. rev.** is a junior synonym (Hampson 1896) of *Sagariphora magnificalis* (Hampson, 1893) **comb. nov.** (Fig. 14, illustration of adult could be found at <https://www.biodiversitylibrary.org/item/180014#page/229/mode/1up>). This species differs from *Agrotera* in the arched forewing termen and in the large, lobe-shaped, laterally setose uncus and the presence of several patches of dense setae on the valva of the male genitalia.

Tetracona amathealis (Walker, 1859) **comb. rev.** (Figs 15, 19), type species of *Tetracona* **stat. rev.**, differs from *Agrotera* in the lobe-shaped, laterally densely setose uncus, the presence of a bundle of bristles emerging from near the valva base, and the weakly sclerotized fibula-like process emerging from the base of the valva. *Tetracona amathealis* shares with *A. pictalis* and an unnamed species the narrow triangular forewing with an arched termen, the large lobe-shaped, laterally densely setose uncus, the bundle of bristles emerging from near the valva base and the weakly sclerotized fibula-like process from the base of the valva. We consider all three species congeneric, and consequently transfer *A. pictalis* back to its original combination with *Tetracona*, as *T. pictalis* Warren, 1896, **comb. rev.** (Figs 16, 20). The species of *Tetracona* resemble *Aetholix flavibasalis* (Guenée, 1854), the type species of *Aetholix* Lederer, 1863. *Aetholix flavibasalis* (image of adult could be found at http://www.imdap.entomol.ntu.edu.tw/InsectSampleImage.php?TI_ID=954&L=E).

www1.ala.org.au/gallery2/main.php?g2_itemId=11696), which also occurs in Australia, is distinguished from the externally similar *Agrotera* by the large lobe-shaped uncus with dense, persistent scales on the ventral surface and along the lateral margins, by the bundle of bristles arising from near the valva base, by the weakly sclerotized fibula-like process emerging from the base of the valva and by the ventrally narrow and dorsally complete (non-bifid) juxta. A future taxonomic revision of *Aetholix* and *Tetracona* might find the two genera synonymic with each other.

Key to the Australian *Agrotera* species based on males

- 1 Wingspan small (12–15 mm); valva divided *A. genuflexa* sp. nov.
- Wingspan large (more than 17 mm); valva not divided 2
- 2 Valva distally pointed, saccus long, ban-shaped *A. longitabulata* sp. nov.
- Valva distally not pointed, saccus short, triangular 3
- 3 Wingspan 17–22 mm; forewing with a large pale yellow spot distal to reniform stigma beyond middle of wing; hindwing with postmedial line followed by curved yellow band in dorsal half; male genitalia without sclerotized fibula-like process from base of valva *A. glycyphanes*
- Wingspan 22.5–26 mm; forewing with a partially orange spot distal to reniform stigma beyond middle of wing; hindwing with postmedial line not followed by yellow band; male genitalia with a spanner-shaped sclerotized fibula-like process from base of valva *A. ignepicta*

Agrotera genuflexa Chen, Horak & Zhang, sp. nov.

Figs 1, 2, 4, 7, 9

Diagnosis. *Agrotera genuflexa* resembles the Oriental-Palaeartic *A. nemoralis* and the Australian *A. longitabulata* sp. nov. in the sinuate termen and the simple, continuous and dark brown postmedial line of the forewing, and in the long, slender, sclerotized fibula-like process emerging from near the valva base in the male genitalia. With *A. nemoralis* it also shares a deeply divided valva. However, it can be distinguished from *A. nemoralis* by the smaller wingspan (12–15 mm), a conspicuous dark brown costal spot in the basal field of the forewing, a yellow hindwing base, and the shorter, much less strongly curved sclerotized fibula-like process in the male genitalia. Its differences with *A. longitabulata* are given in the diagnosis of that species.

Description. Vertex and thorax yellow with orange scales, frons grey, labial palpus laterally grey with ventrally projecting tufts; legs in male unmodified. Abdomen in male long, slender, pale yellow touched with orange and with blackish distal margin on segments 3–8, segment 6 and sometimes 7 grey. Wingspan 12–15 mm. Forewing subtriangular, termen moderately sinuate; purplish grey ground colour darker towards termen and suffused with orange along distal half of costa; basal third yellow and sprinkled with orange scales, edged by scalloped, brown, lightly curved antemedial line, with conspicuous dark grey spot at 1/10 of costa; reniform stigma a round orange spot edged with intermittent brown scales; postmedial line sinuate, brown but darker on costa, from 3/4 of costa to 2/3 of posterior margin; fringe grey-brown and yellow with dark basal scales, with narrow yellow triangle below apex closely followed by yellow rectangle before middle and yellow patch before tornus. Hindwing fan-shaped with convex termen; basal 2/5 yellow and sprinkled with few orange scales, extending along anal margin, remainder purplish grey; postmedial line sinuate, reduced in pale apical area; terminal margin dark brown; fringe grey and yellow as forewing. Male genitalia (Fig. 7). Uncus short and wide, triangular, distally rounded, with few hair-like setae at apex. Tegumen short, ovate. Vinculum V-shaped. Saccus slender, rodlike, widest in middle. Transtilla two subtriangular lobes from base of costa, their points slightly downcurved, meeting in the middle. Valva deeply divided, dorsal part with wide base, then slightly bent ventrally and ending in a long, narrowly triangular process bearing a tuft of persistent scales at base; ventral part gradually narrowing into a slender, tongue-shaped process with a distal tuft of bristles; a long, slender, curved, sclerotized fibula-like process from base of costa to inner margin of divided valva. Juxta shield-shaped, distal third divided. Phallus slender, distally abruptly widened, with three groups of spinules. Female genitalia (Fig. 9). Antrum large and wide, funnel-shaped, membranous, with two large serrate, strongly sclerotized spikes extending from its base, no distinct colliculum, and ductus bursae very short, slightly dilated, with longitudinal, sclerotized wrinkles; corpus bursae long and very slender in posterior half, anterior part spinulose; ductus seminalis originating from posterior end of corpus bursae.



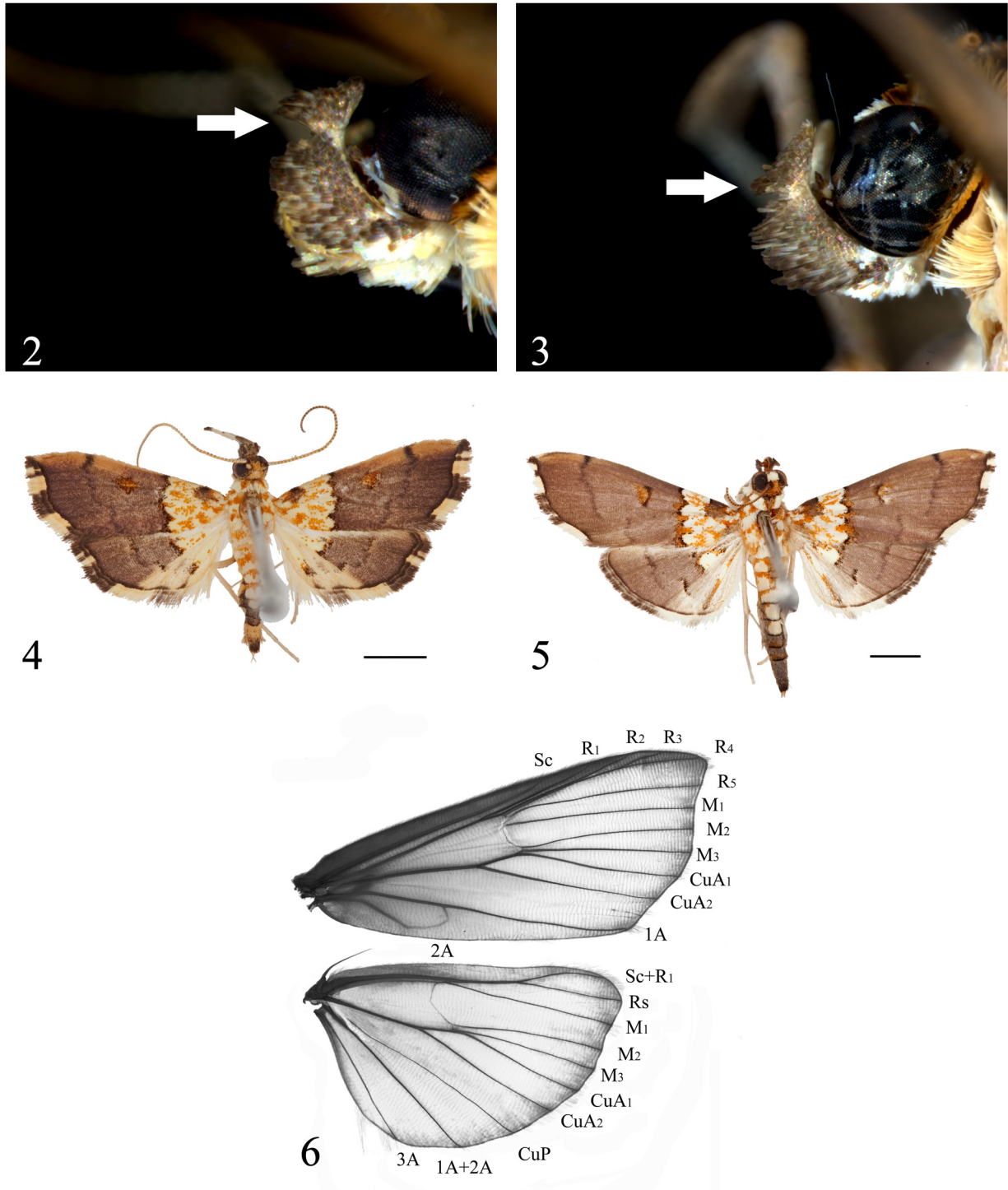
FIGURE 1. Distribution of the Australian *Agrotera* spp.

Material examined. Holotype: ♂, **Australia, Queensland:** 13.44°S 143.20°E, Golden Nugget Ck. Camp Site, Mcllwraith Ra., 520 m, 8.vii.1989, Nielsen, Edwards & Horak, genital slide no. ANIC 8835. **Paratypes:** **Australia, Northern Territory:** 1♀, 11.09°S 132.09°E, Black Point Cobourg Pen., 28.i.1977, E. D. Edwards; 1♂, Mandorah Rd. 42 km SSE of Darwin, 11.vi.1973, E. D. Edwards; 1♂, 12.22°S 133.01°E, 6 km SSW of Oenpelli, 30.v.1973, E. D. Edwards & M. S. Upton; 1♀, 12.31°S 132.58°E, 9 km NE of Mudginbarry H. S., 26.v.1973, E. D. Edwards & M. S. Upton; 1♀, 12.35°S 132.52°E, Magela Ck., 2 km N of Mudginbarry H. S., 25.v.1973, E. D. Edwards & M. S. Upton; 1♂, 13.21°S 131.08°E, Robin Falls, 8.vi.1993, E. D. Edwards. **Queensland:** 1♀, Silver Plains, Cape York Pen., 14.iv.1959, J. L. Wassell; 1♀, 11.58°S 142.55°E, Harmer Creek, 22.v.1993, at light, riverine forest, P. Zborowski & A. Roach; 1♀, 12.42°S 141.55°E, Beening Creek, 16.ii.1994, at light, P. Zborowski; 1♂, 13.43°S 143.19°E, Weather Stn. Mcllwraith Ra., 420 m, 29.vi.1989, Nielsen, Edwards & Horak; 3♂, 13.44°S 143.20°E, Golden Nugget Ck. Camp Site, Mcllwraith Ra., 520 m, 28, 30.vi., 2.vii. 1989, Nielsen, Edwards & Horak (ANIC, QMBQ, NHMUK); 1♀, 13.44°S 143.20°E, Golden Nugget Ck. Camp Site, Mcllwraith Ra., 520 m, 7.vii.1989, Nielsen, Edwards & Horak; 1♀, 13.45°S 143.22°E, Mango Tree, Mcllwraith Ra., 500 m, 11.vii.1989, Nielsen, Edwards & Horak, genital slide no. ANIC 8849; 1♂, 15.12°S 143.52°E, Hann River Crossing, 520 m, 2.vi.1989, Nielsen, Edwards & Horak; 1♂, Cooran, 12.ii.1955, V. J. Robinson; 1♂, Brisbane, v.[19]34, [Turner]; 1♀, Brisbane, 17. iv.[19]34, [Turner]; 1♀, Brisbane, [19]34, [Turner]; 1♀, Stradbroke,

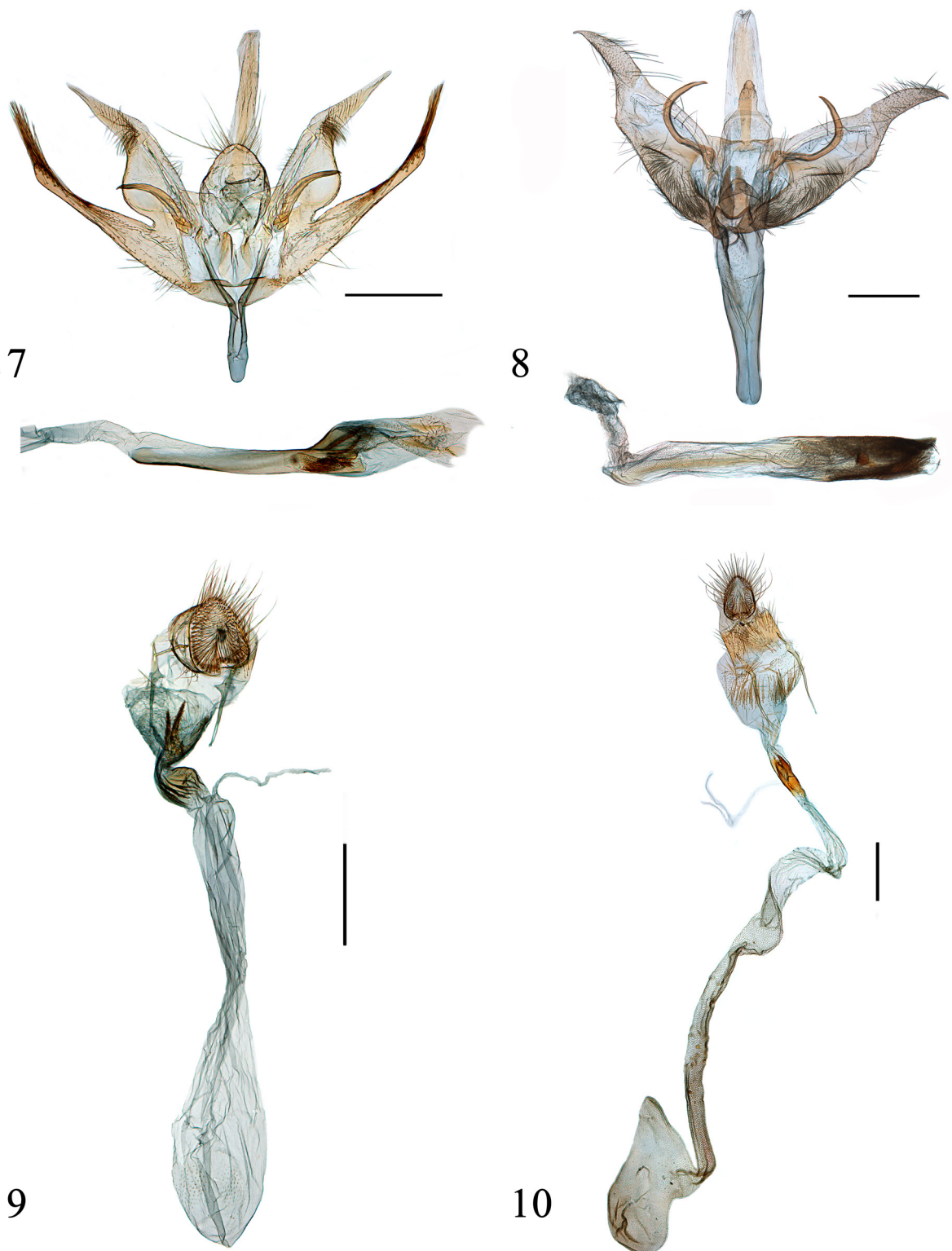
14.viii.[19]10; 1♀, Coolangatta, 9.iii.[19]13. **New South Wales:** 1♂, Tweed R., 25.i.[19]22; 1♂, Rous, Richmond River, 16.ii.1923, V. J. Robinson.

Distribution. Australia (Northern Territory; Queensland; New South Wales).

Etymology. The specific name is derived from the Latin word *genuflexus* = geniculate, referring to the valva with its dorsal part bent ventrally.



FIGURES 2–6. 2–3. Inverted, triangularly scaled third segment of labial palpus of *Agrotera* spp.. 2. *A. genuflexa* sp. nov.. 3. *A. longitabulata* sp. nov.. 4–5. Adults of *Agrotera* spp. 4. *A. genuflexa* sp. nov., paratype, ♂, 6 km SSW of Oenpelli. 5. *A. longitabulata* sp. nov., paratype, ♂, Iron Range. 6. Venation of *A. nemoralis*. Scale bars = 2.0 mm.



FIGURES 7–10. Genitalia of *Agrotera* spp. 7–8. Male genitalia of *Agrotera* spp. 7. *A. genuflexa* sp. nov., genitalia slide no. ANIC 8835. 8. *A. longitabulata* sp. nov., genitalia slide no. ANIC 8903. 9–10. Female genitalia of *Agrotera* spp. 9. *A. genuflexa* sp. nov., genitalia slide no. ANIC 8849. 10. *A. longitabulata* sp. nov., genitalia slide no. ANIC 8840. Scale bars = 0.5 mm.

***Agrotera longitabulata* Chen, Horak & Zhang, sp. nov.**

Figs 1, 3, 5, 8, 10

Diagnosis. *Agrotera longitabulata* resembles *A. nemoralis* and *A. genuflexa* in the sinuate termen and the simple, continuous and dark brown postmedial line of the forewing, but can be distinguished from *A. nemoralis* by a pale yellow hindwing base and a conspicuous dark brown costal spot in the basal field of the forewing, and from both *A. nemoralis* and *A. genuflexa* by the undivided valva and a long, slender and band-shaped saccus in the male genitalia. In the female genitalia, *A. longitabulata* differs from *A. genuflexa* by the long ductus bursae, the long narrow colliculum and the small, laterally attached corpus bursae. *Agrotera longitabulata* resembles *A. posticalis* Wileman, 1911 and *A. basinotata* (illustration of adult could be found at <https://www.biodiversitylibrary.org/item/180088#page/187/mode/1up>) in wing pattern, but can be distinguished by the band-shaped saccus and the sickle-shaped upcurved fibula-like process emerging from below the base of the costa.

Description. Frons pale yellow, vertex orange, thorax yellow with orange scales; labial palpus laterally grey with long, ventrally projecting scales; legs in male unmodified. Abdomen in male long, slender; segments 1–5 pale yellow with orange scales, terminal 3 segments grey, 3–8 with blackish hind margin. Wingspan 17–22.5 mm. Forewing subtriangular, termen sinuate; basal third pale yellow, reticulated with orange, distally edged by a scalloped antemedial line of orange and brown scales, remainder of wing purplish grey; terminal margin brown; conspicuous dark fuscous spot at 1/10 of costa; reniform stigma crescentic, outwardly followed by ovate orange spot; postmedial line grey-brown but darker on costa, from 4/5 of costa slightly sinuate to CuA_1 , bent to middle of CuA_2 then to 3/4 of posterior margin; fringe grey-brown and pale yellow, with yellow bars below apex, before middle and before tornus. Hindwing fan-shaped; basal third pale yellow with few orange scales outwardly edged by brown scales, pale yellow along anal margin with an orange longitudinal streak, remainder of wing purplish grey; postmedial line pale brown, weak, darkest on edge to pale yellow anal margin, then vanishing; terminal margin brown; fringe grey-brown in costal half, remainder pale yellow. Male genitalia (Fig. 8). Uncus small, subtriangular, rounded at apex. Tegumen trapezoidal, with obvious shoulders. Vinculum V-shaped. Saccus extremely long (approximately of valva length), slender, band-shaped, slightly tapering to truncate tip. Valva narrowly elliptical with acinaciform apex, undivided; transtilla two triangular lobes from base of costa, their points slightly downcurved, meeting in the middle; costa broadly sclerotized to beyond middle of valva; sacculus to 3/5 of valva, broad, densely setose on inner side, inner margin projecting as triangular point; with a very slender, sickle-shaped upcurved fibula-like process from ventral base of costa. Juxta shield-shaped, distal half bifid. Phallus long, nearly parallel-sided, slightly downcurved at base; vesica in distal third with long, dense, sclerotized spinules and a large band-shaped sclerite. Female genitalia (Fig. 10). Antrum membranous, funnel-shaped, colliculum long, sclerotized, with two spinulose spikes. Ductus seminalis originating from anterior end of colliculum. Ductus bursae long, posterior part slightly wrinkled; corpus bursae small, laterally attached, without signum; ductus bursae and corpus bursae spinulose.

Material examined. Holotype: ♂, **Australia, Queensland:** Iron Range, 12.iv.1964, I. F. B. Common & M. S. Upton, genital slide no. ANIC 8903. **Paratypes: Australia, Queensland:** 1♂, 10.12°S 142.49°E, Warraber (Sue) Island, 26.i.1978, R. Lewis; 1♀, 11.45°S 142.35°E, Heathlands, 19–23.v.1993, at light, P. Zborowski & A. Roach; 1♀, 12.43°S 143.18°E, Gordons Mine Claudie Riv., 20.ii.1985, E. D. Edwards & B. Hacobian; 1♂, 12.44°S 143.18°E, Phillip Hill Claudie Riv., 16.ii.1985, E. D. Edwards & B. Hacobian, genital slide no. ANIC 8901; 2♂, 12.44°S 143.18°E, Phillip Knoll, Claudie Riv., 21.ii.1985, E. D. Edwards & B. Hacobian, genital slide no. ANIC 8836 (ANIC, QMBQ); 1♂, Claudie. R. Nth., 5/16.v.[19]61, J. Macqueen; 1♂, 13.53°S 143.11°E, 6 km NNE Coen, 22.iv.1994, at light, P. Zborowski; 1♂, 2♀, Iron Range, 12, 14, 15.iv.1964, I. F. B. Common & M. S. Upton; 1♀, Iron Range, 12.iv.1964, I. F. B. Common & M. S. Upton, genital slide no. ANIC 8840; 1♂, 15.35°S 144.30°E, 7 km E Laura, 12.xii.1992, at light, sandstone escarpment, P. Zborowski & W. Dressier.

Distribution. Australia (Queensland).

Etymology. The specific name is derived from the Latin *longi-* = long and *tabulatus* = band-shaped, referring to the long, band-shaped saccus.

Remark. According to Shaffer *et al.* (1996), *A. basinotata* occurs in Australia. However, our examination of genitalia reveals that specimens identified as *A. basinotata* by Shaffer, are indeed the new species *A. longitabulata*. The differences of these two superficially similar species are given above at the diagnosis of *A. longitabulata*. Currently, no specimen of *A. basinotata* is collected in Australia.



11



A

B

12



13



14



15



16

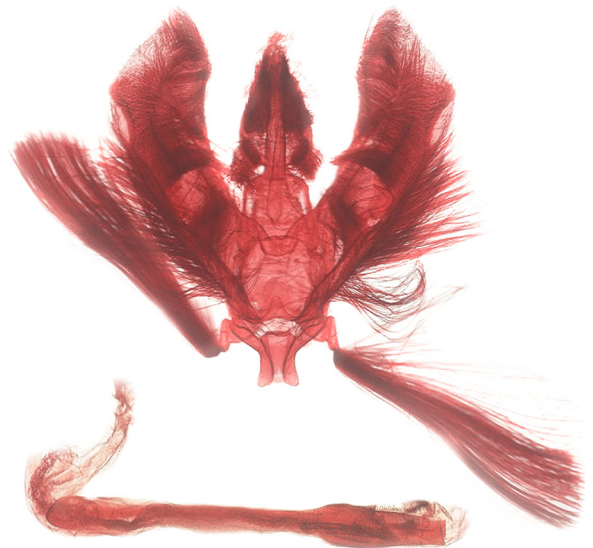
FIGURES 11–16. Adult specimens of some species misplaced in *Agrotera*. 11. *Leucinodella leucostola* **comb. nov.**, ♂, Jiangxi, China (SYSBM). 12. *Nistra coelatalis* **comb. rev.**, holotype (green-circled label), abdomen lost, Ceylon (NHMUK), A. left side; B. right side. 13. *Sagariphora heliochlaena* (junior synonym of *S. magnificalis* **comb. nov.**), holotype (red-circled label), ♂, Sumbawa, Indonesia (NHMUK). 14. *Sagariphora magnificalis* **comb. nov.**, holotype (red-circled label), ♀ Ceylon (NHMUK). 15. *Tetracona amathealis* **comb. rev.**, ♂, Mt. Borradaile, Australia. 16. *T. pictalis* **comb. rev.**, ♂, Kuranda, Australia. Scale bars = 2.0 mm.

Discussion

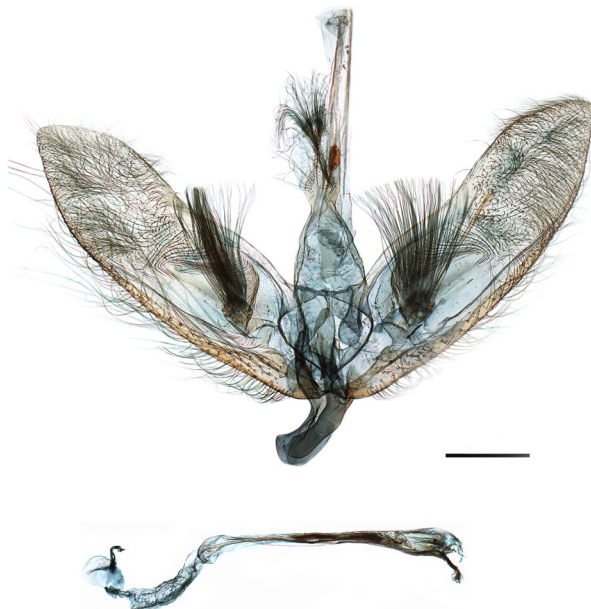
With the addition of the two newly described species and the omission of *Tetracona amathealis* and *T. pictalis*, *Agrotera* comprises four species in Australia.



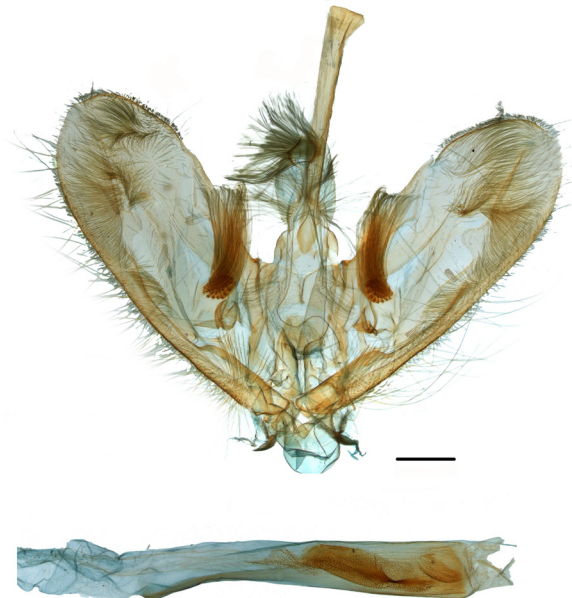
17



18



19



20

FIGURES 17–20. Male genitalia of some species misplaced in *Agrotera*. 17. *Leucinodella leucostola* **comb. nov.**, genitalia slide no. SYSU0146 (SYSUBM). 18. *Sagariphora heliochlaena* (junior synonym of *S. magnificalis* **comb. nov.**), Pyralidae Brit. Slide no. 2137(NHMUK). 19. *Tetracona amathealis* **comb. rev.**, genitalia slide no. ANIC 8900. 20. *T. pictalis* **comb. rev.**, genitalia slide no. ANIC 8828. Scale bars = 0.5 mm.

From our examination of genitalia of Australian, Oriental and African (Dr Koen V. N. Maes personal communication) *Agrotera* species we conclude that apart from an apparently monophyletic core group around *A. nemoralis*, the genus contains several groups that are not closely related to *Agrotera*, despite the rather uniform external appearance of the imagines. Our study reveals a considerable heterogeneity in genitalia, especially those of the males. This calls for a global revision of the genus, which is, however, beyond scope of the present study.

In this study, we evaluate external characters such as the basal forewing pattern and the characteristic labial palpus, used by Schrank (1802) and Hampson (1899) for classification, as homoplastic, and they do not allow a reliable recognition of *Agrotera*. However, the relatively broad triangular forewing shape and the sinuate termen are externally visible characters that allow the separation of *Agrotera* species from those of other genera which have similar wing pattern.

Within the *A. nemoralis* group, some species are difficult to distinguish from each other based only on wing pattern. The male genitalia prove informative both at distinguishing between species within *Agrotera* and between *Agrotera* and superficially similar genera. The species that do not share the generic synapomorphies of the core *Agrotera* group, i.e. the species of the *nemoralis* group, have to be transferred to other genera. However, as long as no suitable genus for transfer is found, we preliminarily retain those misplaced species in *Agrotera*.

Among the species that we consider misplaced in *Agrotera*, *A. ignepicta* (image of adult could be found at http://www1.ala.org.au/gallery2/main.php?g2_itemId=11792), *A. ornata* Wileman & South, 1917, *A. scissalis* (Walker, 1866), *A. lienpingialis* Caradja, 1925 and *A. fumosa* Hampson, 1899 share similar characters, like the laterally setose uncus, the narrow rectangular tegumen, the densely setose patches on the valva and the distinct, well-sclerotized costa and sacculus. *Agrotera ignepictoides* Rothschild, 1915, superficially very similar to *A. ignepicta*, could also belong to this group. The monophyly of this *ignepicta* group should be investigated in a phylogenetic study.

The generic placement of *A. glycyphanes* (image of adult could be found at http://www1.ala.org.au/gallery2/main.php?g2_itemId=11780) remains uncertain. On one hand, it is similar to species of *Agrotera* (*nemoralis* group) by the broad triangular forewing with a weakly sinuate termen, by the small triangular, though densely setose, uncus and the large, shield-shaped, dorsally bifid juxta. On the other hand, it resembles some species of the *ignepicta* group in the dense hair of the valva. Considering the lack of additional (e.g. genetic) data and incomplete examination of all genitalia of the named species, we are currently unable to comment on the status and the generic placement of the remaining *Agrotera* species.

As Sutrisno & Horak (2003) point out, the Australian pyraustines (sensu lato) are poorly defined at the generic level as previous taxonomic studies, largely from 19th century (Hampson 1896, 1899), were only based on external characters (Common 1990). However, the revision of the North American pyraloid fauna (Munroe 1976) has shown that the inclusion of genitalia structures can produce a more natural classification. Munroe also pointed out that because of the uniformity of external characters throughout the group, attempts to use the few tangible external differences have led to completely artificial arrangements. Our investigations of *Agrotera* confirm Munroe's opinion. Comprehensive study, combining external and genitalic characters, along with the analysis of genetic data if possible, would help to move towards a natural generic classification of Spilomelinae and Pyraustinae. With the continuing revision of species on the basis of genitalia examination, we expect the generic circumscription of *Agrotera* to improve, and to discover additional overlooked species like *A. genuflexa* and *A. longitabulata*, especially in the Oriental region.

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