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Two new taxa of *Galagete* (Lepidoptera, Autostichidae) from the Galápagos Islands, Ecuador

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Two new taxa of *Galagete* (Lepidoptera, Autostichidae) from the Galápagos Islands, Ecuador. - A new species and a new subspecies of the genus *Galagete* (Lepidoptera, Autostichidae) from the Galápagos Islands are described and illustrated. *Galagete griseonana* sp. n., known only from males, is endemic to the island of Santa Cruz. *Galagete pecki flavofasciata* ssp. n., known from both sexes, occurs on the islands of Santa Cruz and Santiago, where it is also believed to be endemic.

Keywords: Micro moths - Autostichidae - new species - new subspecies - endemic - Galápagos Islands.

INTRODUCTION

Autostichidae are gelechioid moths characterised by the gnathos being an articulated band with an unarticulated mesial hook, and by the presence of spiniform setae in a band across the abdominal terga. The caterpillars feed on dead or decaying plant or animal tissue (Hodges, 1998).

With a total of 13 species (one of which is not described), the genus *Galagete* Landry represents the first documented case of an extensive radiation of endemic Lepidoptera in the Galápagos Islands comparable in size to the radiation of the Darwin's finches with some species confined to one single island (Landry, 2002). The second largest radiation in Galápagos Lepidoptera found so far contains only three species (genus *Utetheisa* Hübner, Arctiidae).

For the purpose of enabling recognition and documentation of the elements of the *Galagete* radiation, and because we were able to obtain sufficient material in early 2004, we are describing below a new species of *Galagete* and a new subspecies of *Galagete pecki* Landry.

MATERIAL AND METHODS

The 51 specimens forming the basis of this study were collected by ourselves mostly during one expedition to the Galápagos in March-April 2004. Three of the specimens were collected by the second author in 1989 and 1992. The moths were collected at light, either with an ultra-violet light or a mercury vapour light suspended next to a white sheet.

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In listing the label data of the holotypes, the information is copied as found on the labels with slashes to express changes of lines, and abbreviations spelled out in square brackets, except "m" for "meters." As regard the lists of paratypes, the specimens' data are listed first in alphabetical order of island collected and then in order of dates collected, the information is recorded without indications of line changes, the abbreviations, except for distances, "GPS" (= Global Positioning System), and cardinal points, are spelled out only once at first encounter, collecting localities are reported without accented letters, dates are standardised, and collectors' information is standardised and placed in parentheses. For each taxon's holotype the data label is printed in black on white card stock while the holotype label is hand-written in black ink on red card stock. Other than the above mentioned, the following acronyms are used: BMNH for The Natural History Museum (London, England), CNC for Canadian National Collection of Insects, Arachnids, and Nematodes (Ottawa, Ontario, Canada), CDRS for Charles Darwin Research Station (Santa Cruz Island, Galápagos), MHNG for "Muséum d'histoire naturelle de Genève" (Geneva, Switzerland), and USNM for National Museum of Natural History (Washington, D. C., USA).

Genitalia were dissected after the abdomen had macerated in a cold 20% KOH solution overnight. The dissected parts were kept in lactic acid stained with orange G for description purposes. They were subsequently stained with chlorazol black and mounted on slides in Euparal. The forewing lengths were measured with a reticule on a stereomicroscope. The illustrations of the moths and genitalia were made with the AutoMontage® system using a JVC® video camera mounted on a Leica MZ APO stereomicroscope or a Zeiss Axioskop compound microscope. Illustrations of all *Galagete* species can be viewed on the web site of the MHNG at www.geneva-city.ch/musinfo/mhng/.

RESULTS

Our expedition to the Galápagos in 2004 brought only one new island record for previously described *Galagete* species: *G. turritella* Landry is also present on San Cristobal Island. Contrary to what is recorded in Landry (2002, p. 848) the holotype of *G. consimilis* Landry is not dissected and in the diagnosis for *G. consimilis* (same page of Landry, 2002), the 3rd line should read "*G. darwini*" instead of "*G. consimilis*". One of the paratype females of *G. seymourensis* Landry was wrongly associated with slide number BL 1344; the correct slide number is BL 1343.

DESCRIPTIONS

Galagete griseonana sp. n. Figs 1, 3-5

Galagete sp.; Landry, 2002: 819, 820, fig. 15.

Holotype ♂, [1] "ECU[ADOR], Galápagos, Santa Cruz/ C[harles] D[arwin] R[esearch] S[tation]/ base of El Barranco/ GPS: S 00°44.305' W 90°18.105'/ 18.iii.2004, u[ltra] v[iolet] l[ight]/ *leg[it]*. B[ernard]. Landry, P[atrick]. Schmitz". [2] "HOLOTYPE/ Galagete/ griseonana/ Schmitz & Landry". Specimen in perfect condition deposited in the MHNG.

Paratypes, Ecuador: 30 ♂, from the island of Santa Cruz, Galápagos Islands, collected at UVL by B. Landry and P. Schmitz, unless specified otherwise. 1 ♂ (dissected, slide MHNG 2703), CDRS, arid zone, 3.ii.1989, M[ercury] V[apour] L[amp] (B. Landry); 2 ♂, with same

data as holotype; 7 ♂ (one dissected, slide BL 1596), CDRS wall of Invert[ebrate]s. Lab[oratory]., GPS: S 00°44.478' W 90°18.132', 19.iii.2004; 20 ♂ (one dissected, slide BL 1595), same locality but 6.iv.2004. Deposited in the BMNH, CNC, CDRS, MHNG, and USNM.

Diagnosis. Among the species of *Galagete*, *G. griseonana* can be distinguished by its very small size (wingspan: 5.7-7.1 mm) and by its forewing appearing uniformly grey-brown. This combination of size and colour is unique. Some specimens of *Galagete darwini* Landry (wingspan: 7.0-9.0 mm) and *Galagete pecki* Landry (wingspan: 7.5-8.7 mm) are only slightly larger, but their background colour is brown or beige respectively with distinct markings (see Landry, 2002, figs 7, 8, and 13). *Galagete cinerea* Landry is also a grey-brown species, but it is much larger (wingspan: 8.5-11.2 mm) and has darker markings (see Landry, 2002, fig. 14).

Description. MALE (n=31) (fig. 1). Head grey-brown with whitish beige scales around eye. Haustellum and maxillary palpus whitish beige. Labial palpus grey-brown on first segment; second segment whitish beige medially and dorsally, laterally grey-brown except for apical whitish beige ring laterally and ventrally; third segment grey-brown ventrally, whitish beige dorsally. Antennal scape with few whitish beige scales apically; flagellum grey-brown. Thorax dorsally grey-brown except for shining whitish grey-brown metascutellum. Foreleg coxa grey-brown at base, whitish beige apically; femur, tibia, and tarsomeres mostly grey-brown with whitish beige at apex of tibia and apex of tarsomere I and V. Midleg femur whitish beige with grey-brown on dorsal edge apically; tibia pale grey-brown with whitish beige apically and on spurs; tarsomeres I-V mostly whitish beige with grey-brown at base of each segment. Hindleg whitish beige. Male wingspan: 5.7-7.1 mm (Holotype: 6.8 mm). Forewing grey-brown, with sometimes slightly darker grey-brown markings as small spots submedially and in cubital fold and postmedially at the end of cell; fringe grey-brown. Hindwing pale greyish brown, fringe pale whitish beige. Abdomen whitish beige, without modified scales.

Male genitalia (n=3) (figs 3-5). Basal half of uncus only slightly angled from second half; second half not produced dorsally, apical margin only slightly concave; arms slightly laterally compressed, triangular, short, apically rounded; dorsal crests broadly rounded, poorly demarcated. Median hook of gnathos rather short and thick, very slightly upturned and pointed apically. Dorsal connection of tegumen wide; pedunculi short and broad. Lateral arms of transtilla moderately long, broad, rounded, median surface with fan-shaped scales towards base and setae mostly apically, edges setose; median arm as long as or slightly longer than lateral arms, very narrow for whole length. Valva of medium length and width, dorsal margin angled ventrally very gently before apex; ventral margin angled dorsally from about 1/3 and with subbasal notch; apex broadly rounded; costa melanised from base to about 2/3; sacculus rather wide, of medium length, apically flattened and blunt. Juxta symmetrical, somewhat heart shaped, with rather shallow and broadly rounded median notch. Vinculum bulbous, short and rounded, not projecting dorsoapically. Aedeagus narrow, slightly arched, larger at base with very short coecum penis; apical 1/3 open ventrally, dorsal wall slightly bent to right, narrowly rounded; vesica with abundant spicules, without cornuti.

FEMALE. Unknown.

Etymology. From the Latin *griseus*, grey, and *nanus*, a dwarf, referring to the colour of the forewing and the size of this species.

Biology. Unknown although moths are attracted to light in the arid zone between February and April.

Distribution. Currently known only from the Galápagos island of Santa Cruz; presumed to be endemic to the archipelago and possibly to Santa Cruz.

Remarks. This species had been recognised as new by Landry (2002) but was not described then because only one damaged specimen was available. Based on our collecting experience, the available sample being made of males only may reflect a sexually-linked seasonality pattern, or that the females are flightless, or that they are not attracted to light, or that their flying period each night is later than that of the males. It remains to be tested.

Galagete pecki flavofasciata ssp. n. Fig. 2

Galagete sp.; Landry, 2002: 866, fig. 36 E, F.

Holotype ♂, [1] "ECU[ADOR], Galápagos, Santa Cruz/ C[harles] D[arwin] R[esearch] S[tation], wall of Invert[ebrate]s. Lab[oratory]./ GPS: elev[ation]. 11 m, S 00°44./478' W 90°18.132' 6.iv.2004/ u[ltra] v[iolet] l[ight]/ *leg[it]*. B[ernard]. Landry, P[atrick]. Schmitz". [2] "HOLOTYPE/ Galagete/ pecki flavofasciata/ Schmitz & Landry". Specimen complete except for small notch at apex of left forewing and few segments missing on left flagellum. Deposited in the MHNG.

Paratypes, Ecuador: 9 ♂, 10 ♀ from the Galápagos Islands, collected at UVL by B. Landry and P. Schmitz, unless specified otherwise. *Santa Cruz:* 1 ♂, 3 ♀, transition zone, recently cut road, GPS: S 00°42.528' W 90°18.849', 12.iii.2004; 1 ♂, 1 ♀, low agriculture zone, GPS: S 00°42.132' W 90°19.156', 13.iii.2004; 6 ♂ (one dissected, slide BL1600), 2 ♀ (one dissected, slide BL 1601), CDRS base of El Barranco, GPS: S 00°44.305' W 90°18.105', 18.iii.2004; 1 ♂, 1 ♀, CDRS wall of Inverts. Lab., GPS: elev[ation]. 11 m, S 00°44.478' W 90°18.132', 19.iii.2004; 1 ♀ (dissected, slide BL 1306), Finca Vilema, 2 km W [of] Bella Vista, 1.iv.1992, M[ercury] V[apour] L[amp] (B. Landry); 1 ♀, with same data as holotype. *Santiago:* 1 ♀, Aguacate, 520 m elev., 7.iv.1992, M[ercury] V[apour] L[amp] (B. Landry). Deposited in the BMNH, CNC, CDRS, MHNG, and USNM.

Diagnosis. Among the species of *Galagete*, *G. pecki flavofasciata* can be easily distinguished by its yellowish-orange (or whitish beige) forewing markings. Only *Galagete pecki pecki*, *G. levequei* Landry, and *Galagete cristobalensis* Landry are similar in wing markings (see Landry, 2002, figs 10-13), but the background colour of their forewings is white to beige or pale greyish brown.

Description. MALE (n=10) (fig. 2). Head whitish beige to yellowish-orange with few thin dark brown scales along posterior eye margin. Haustellum and maxillary palpus whitish beige. Labial palpus greyish brown, shining on first segment; whitish beige on second segment sometimes with brown scales laterally at base; third segment whitish beige except for pair of usually connected blackish brown spots on second half laterally and ventrally and with small blackish brown spot ventrally at base. Antennal scape and flagellum blackish brown. Thorax dorsally blackish brown at base to 1/5-1/3, less so on tegula, whitish beige to yellowish orange in middle including most of tegula and lateroposteriorly, dark greyish brown at apex medially; metascutellum greyish brown, shining. Foreleg coxa whitish beige; femur blackish brown with whitish beige at apex; tibia blackish brown with whitish beige at apex, base, and small patch medially; tarsomere I blackish brown with whitish beige at apex; tarsomeres II-IV

FIGS 1-2
Holotypes of *Galagete* species. 1. *Galagete griseonana* sp. n.; 2. *G. pecki flavofasciata* ssp. n.

blackish brown. Midleg femur and tibia as in foreleg, tibial spurs whitish beige; tarsomere I, II and V blackish brown with whitish beige at apex; tarsomere III and IV blackish brown. Hindleg femur whitish beige; tibia greyish brown with whitish beige apically, spurs whitish beige; tarsomere I, II, and V with whitish beige at apex; tarsomere III and IV blackish brown. Wingspan: 6.0-6.9 mm (Holotype: 6.5 mm). Forewing blackish brown with whitish beige to yellowish-orange as small basal spot, subbasal band of variable width sometimes separated by line of blackish brown scales in cubital fold, two small spots of variable shape, sometimes connected, one on coastal margin between 2/5 and 1/2 and one slightly larger on inner margin at 1/2, and a transverse band of variable width postmedially from costa to below cell or to inner margin; fringe dark greyish brown. Hindwing and fringe greyish brown. Abdomen greyish brown, shining, without modified scales, but whitish beige on valvae.

Male genitalia (n=1) (fig. 30 A-D in Landry, 2002) as in *Galagete pecki pecki*.

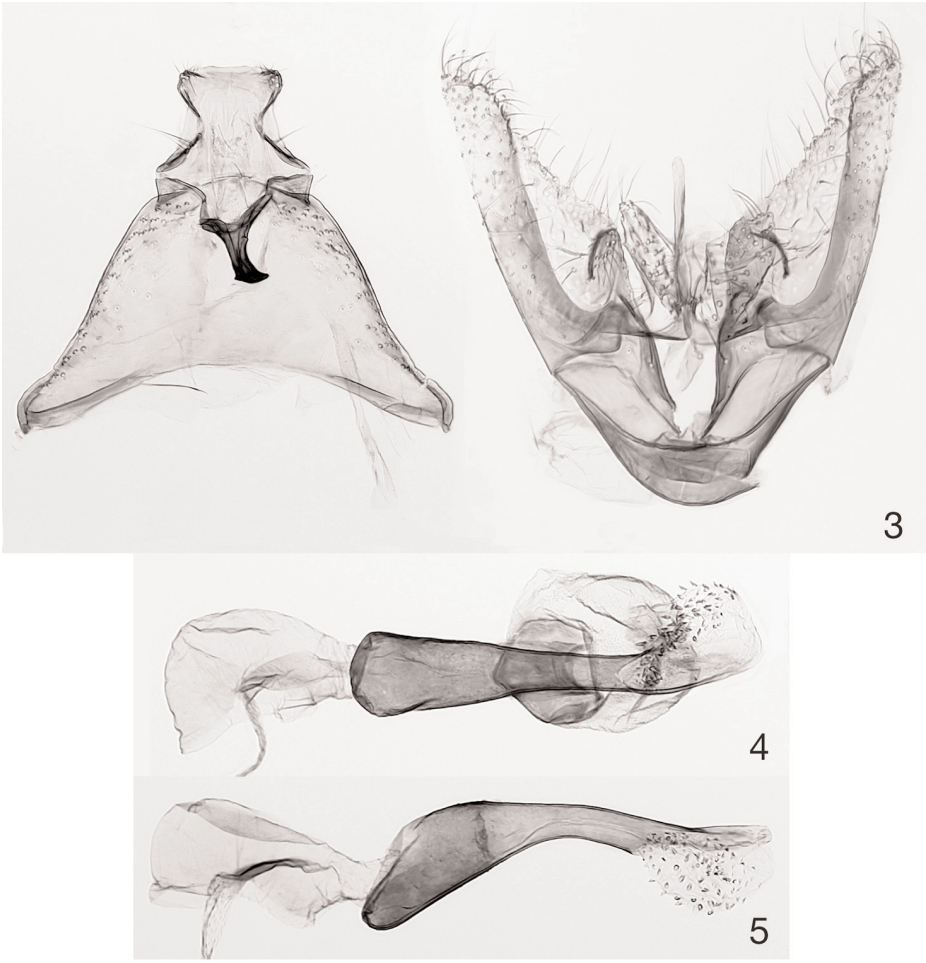
FEMALE. (n=10). Colour as in males but often with more extensive whitish beige to yellowish orange markings. Antenna slightly thinner than those of males. Forewing length: 6.4-8.2 mm.

Female genitalia (n=2) (fig. 36 E, F in Landry, 2002) as *Galagete pecki pecki* (fig. 32 A, B in Landry, 2002). Other dissected specimen differs from that illustrated on fig. 36 E, F (Landry, 2002) in having more broadly rounded lobes of sternum VIII, more broadly emarginated apical margin of tergum VIII, and more distinct scobination on membrane posterad ostium. Both dissected specimens differ from *G. p. pecki* in having a more simple signum, without smaller spines at base of lateral spines, and no scobination on corpus bursae.

Etymology. From the Latin *flavus*, yellow, and *fascia*, band, referring to the colour and pattern of the forewings.

Biology. Unknown except for the fact that adults come to light and fly from March to April in habitats between near sea level to 520 m in elevation.

Distribution. Presently known only from the islands of Santa Cruz and Santiago, the subspecies is presumed to be endemic to the Galápagos.



FIGS 3-5
Male genitalia of *Galagete griseonana* sp. n. 3. Whole genitalia without aedeagus (slide BL 1595); 4. Aedeagus in dorsal view (slide BL 1595); 5. Aedeagus in lateral view (slide BL 1596).

Remarks. The absence of noticeable differences in the genitalia was the first reason we decided to recognise this species as part of *Galagete pecki*. However, the male (6.0-6.9 mm) and female (6.4-8.2 mm) wingspans of *Galagete pecki flavofasciata* are smaller than those of the respective sexes (7.5-8.7 and 8.2-8.3 mm) of *G. pecki pecki*, which is known only from Isabela Island. These differences in wing size and forewing coloration in addition to their allopatry were the reasons we decided to describe the *G. pecki* specimens collected on the islands of Santa Cruz and Santiago as a distinct subspecies (*G. pecki flavofasciata*). We were also comforted in this decision when we found that a specimen of *G. pecki flavofasciata* had a 2.7 % sequence diver-

gence in a 1.4-kb fragment of the Cytochrome Oxidase I (COI) gene with *G. p. pecki* (P. Schmitz, unpublished). This amount of intraspecific divergence in this gene is within the range of results obtained in other Lepidoptera studies (Landry *et al*., 1999). In comparison, the smallest amount of interspecific divergence in the same fragment of COI between *Galagete* species that are easily recognised on the basis of genitalic characters is 4.9 % (P. Schmitz, unpublished). Hopefully these subspecies of *Galagete pecki* will not be united by anthropogenic factors that would alter their evolutionary paths.

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