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***Agrotis* Ochseneimer (Lepidoptera, Noctuidae): a systematic analysis of South American species**

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Abstract

The genus *Agrotis* Ochsenheimer, 1816 (Lepidoptera, Noctuidae) contains about 300 described species distributed worldwide, excepting the Poles. For South America 93 species have been described. Different diagnostic characters have been proposed for species from the northern Hemisphere, mostly from male genitalia. Recently, numerous South American species of the genus have been transferred to other genera. In this work, a systematic revision was undertaken of the South American species of *Agrotis*, restricting to 20 the number of species of this genus for the region and transferring the other species to different genera and/or synonymizing with other species. Based on a detailed study of the external morphology and genitalia of both sexes, several nomenclatural changes are proposed. New generic synonymy: *Mesembreuxoa* Hampson = *Feltia* Walker. New *Agrotis* synonymies include: *Scotia forsteri* Köhler = *A. propriens* (Dyar); *Agrotis peruviana hampsoni* Draudt, *Rhizagrotis triclava* Draudt, and *Euxoa andina* Köhler = *A. peruviana* (Hampson); *Lycophotia achromatica* Hampson, *Feltia malefida patagiata* Aurivillius, Prout and Meyrick, *Agrotis psammophila* Köhler, and *Scotia (Feltia) canietensis* Köhler = *A. malefida* Guenée; *Chorizagrotis benefida* Draudt = *A. experta* (Walker); *Agrotis livens* Köhler and *Agrotis capayana* Köhler = *A. araucaria* (Hampson). Species transferred to *Feltia* Walker tent. include: *Scotia aspersula* Köhler, n. comb.; *Porosagrotis brachystria* Hampson, n. comb.; *Agrotis carrascoi* Köhler, n. comb.; *Mesembreuxoa chilensis* Hampson, n. comb.; *Euxoa clavisigna* Dognin, n. comb.; *Euxoa conifrons* Draudt, n. comb.; *Agrotis consternans* Hayes, n. comb.; *Euxoa coquimbensis* Hampson, n. comb.; *Mesembreuxoa fascicola* Dyar, n. comb.; *Chorizagrotis forasmicans* Köhler, n. comb.; *Agrotis giselae* León, n. comb.; *Agrotis gypaetina* Guenée, n. comb.; *Agrotis hispidula* Guenée, n. comb.; *Euxoa incarum* Cockerell, n. comb.; *Agrotis india* Köhler, n. comb.; *Scotia mansa* Köhler, n. comb.; *Scotia picata* Köhler, n. comb.; *Agrotis rondanelli* León, n. comb.; *Euxoa senta* Draudt, n. comb.; and *Agrotis submontana* Köhler, n. comb. New *Feltia* tent. synonymies include: *Agrotis*

daguerrei Köhler, *Porosagrotis atricentrica* Hampson, and *Agrotis llanoi* Köhler = *F. brachystria*; *Lycophotia baeckstroemi* Aurivillius = *F. deprivata* (Walker); *Agrotis raveni* Köhler = *F. fascicola*; *Agrotis gentilii* Köhler = *F. forasmicans*; *Scotia nyei* Köhler, *Euxoa australis* Köhler, and *Scotia liniclinans* Köhler = *F. hispidula*; *Euxoa bosqui* Köhler and *Euxoa griseosparsa* Köhler = *F. lutescens* (Blanchard); *Euxoa praeocupata* Köhler, *Agrotis andinicola* Köhler, and *Scotia songoensis* Köhler = *F. subandina* (Köhler); *Agrotis maldonadoi* Köhler = *F. submontana*. New combinations of *Agrotis* species: *Anicla albiorbis* (Dyar), n. comb.; *Noctubourgognea chimaera* (Köhler), n. comb.; *Noctubourgognea dissociata* (Staudinger), n. comb.; *Pseudoleucania nigrocollaris* (Köhler), n. comb.; and *P. wittmeri* (Köhler), n. comb. One lectotype and one paralectotype are designated for *A. edmondsi* Butler. The 20 species of South American *Agrotis* are redescribed using characters of color pattern, external morphology of head and thorax, and internal morphology of male (including vesica) and female genitalia. This is the first time complete eversions and description of male genitalia (aedeagus and vesica) and female genitalia are done for almost all the South American species. Images of all described characters and dichotomous keys to identify South American species of *Agrotis* are included.

Key words: *Feltia* Walker, male genitalia, female genitalia

Introduction

Genus *Agrotis*. Genus *Agrotis* Ochsenheimer, 1816 includes about 300 species worldwide, 93 of which were described from South America (Poole 1989). *Agrotis* species are characterized by the vesica shape of the male genitalia. The vesica is an elongate, membranous, and scobinated tube, with a basal spined band. This is in accordance with the appendix bursae of female genitalia, which is longer than the corpus bursae and turns between one and several times inside the female abdomen (Common 1954). Lafontaine (2004) identifies the following diagnostic characters: in male genitalia vesica long and looping, with a basal swelling with numerous lobes, and absence of medial and apical diverticula; hook-like aedeagus apex on right side; valve with a differentiated round swelling between clasper base and costa; and appendix bursae of female genitalia long and looping, corresponding to aedeagus vesica.

Taxonomic history. *Agrotis* was described by Ochsenheimer (1816) to include 46 species, three new species and 43 species previously associated with other genera. Ochsenheimer (*op. cit.*) gives no explanation of why he groups these species into the same genus. Many of the species he included in *Agrotis* belong to different genera, even different subtribes.

Hübner (1821) regroups *Agrotis* species into other genera, some of them new, some later synonymized with *Agrotis*.

Curtis (1827) designates *Agrotis segetum* (Denis & Schiffermüller) as the generic type species. He also mentions the difficulty to characterize this group of variable species and makes three species groups based on types of the male antenna.

Boisduval (1829) publishes a checklist of European Lepidoptera. He includes within *Agrotis* many species that Hübner (1821) associated with other genera (e.g., *Peridroma saucia* (Hübner) and *Ochropleura plecta* (Linnaeus)), which were correctly associated according to the current classification.

Guenée, in Boisduval & Guenée (1852), mentions that only a few generic groups recognized by Hübner are natural and that his division of genera into many smaller genera is unjustified, since many of these groups are so structurally similar that many of Hübner's genera have been synonymized. He groups all the agrotids (*Agrotis*, *Heliophobus* Boisduval, *Chersotis* Boisduval, *Opigena* Boisduval, and *Spaelotis* Boisduval) into *Agrotis* to make more natural subdivisions of the genus. He also mentioned that it is not the time to group species into smaller genera because neither larva nor pupa nor adult seems to have differentiated generic-level characters.

Walker releases a series of publications on the British Museum Lepidoptera collection between 1854 and 1866. In volume IX, issued in 1856, he deals with noctuids and follows Guenée's classification. He admits that there are no characters that can group the species into smaller genera, which is why he follows Guenée.

Smith (1890) also mentions that past efforts to group *Agrotis* species have been poor, almost arbitrary, and dependent on the researcher. Those efforts had resulted in several divisions of *Agrotis* into numerous new genera, most of which had been previously synonymized. He stresses that there are no true characters that support those species groups. Despite this, Smith establishes various new genera, many of which are valid today. Also, he suggests that genitalic characters are very important for species identification. He points out that there are no characters useful for all groups and sometimes they show as much variability as non-sexual characters, but they are

El Bolsón, Cerro Piltriquitrón, 1000m, ♂ 2 ♀ 22-XII-1981 (M. y P. Gentili) (IADIZA); El Tronador, ♀ II-1946 (Vellard) (IMLA); San Carlos de Bariloche, Colonia Suiza, 810m, ♂ 9-I-1979 (Misión Científica Danesa) (CNC). Salta. Salta, ♂ (Breyer) (IMLA). Santa Cruz. 1 km S Perito Moreno, 422m, (46°34'18.9"S, 70°53'27.1"O) ♂ 17-I-2007 (GSB & A. Srur) (IADIZA); El Turbio, 200m, ♂ 20-I-1976 (M. Gentili) (IADIZA); Punta Bandera-Lago Argentino, 3 ♂ I-1963 (IMLA). Santiago del Estero. Frías, ♂ 21-IV-1961 (IMLA); La Banda, ♂ (IMLA), ♂ 20-V-1963 (IMLA). Tucumán. Quebrada de Lules, 2 ♂ II-1925 (IMLA); Río Nío, 1000m, 2 ♀ 12-V (IMLA); San Pedro de Colalao, 2 ♂ 22-IV-1961 (IMLA); Sunchal, ♂ IV-1964 (IMLA); Tafi Viejo, Siambón, 2000m, 2 ♀ 11-V-1965 (IMLA), 3 ♂ 13 ♀ 16-V-1965 (IMLA), 20 ♂ 4 ♀ V-1965 (Köhler) (IMLA), 2 ♀ 16-V-1965 (IMLA), 2 ♀ 11-V (IMLA). CHILE. Metropolitan region. Santiago, La Granja, 2 ♂ ♀ 15-III-1969 (IMLA). Region VII, Maule. Curicó, 1km N Curicó, 7 ♂ 2 ♀ 29-XI-1982 (R.L. Brown) (USNM). Region VIII, Bio Bio. Nuble, Alto Tregualemu, 500 mtrs, ca. 20 km SE Chovellen, 3 ♂ 5 ♀ 26–27-I-1979 (D.M. Davis & B. Akebergs) (USNM); Nuble, Las Trancas, ♀ I-III-1967 (CNC). Region IX, Araucanía. Cautín, Fundo el Coigue, 500 mtrs 27 km NE Villarrica, 379m, 3 ♂ 4 ♀ 28-II-3-III-1979 (D.M. Davis & B. Akebergs) (USNM); Malleco, Curacautín, Río Blanco, 1100m, ♂ ♀ II-1964 (Peña) (CNC); Malleco, nr. Los Gringos Camp., Parque Nacional Nahuelbuta, 1300m, 10 ♂ ♀ 6–11-I-1982 (D.R. Davis) (USNM), 30 ♂ 8 ♀ 29-I-5-II-1979 (D. & M. Davis & B. Akebergs) (USNM); Malleco, Parque Nacional Nahuelbuta, Pichinahuel, 500m, ♂ 16–20-XII-1993 (G. & M. Wood) (CNC); Temuco, Fundo La Selva, 48km NW Nueva Imperial, 700m, 8 ♂ ♀ 9–11-XII-1981 (D.R. Davis) (USNM). PARAGUAY. Caaguazú. Carumbé, 2 ♂ 28-I-10-III-1965 (IMLA).

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