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I.N.G.A.

Newsletter of the

International Network of

Gelechioid Aficionados

Aeolanthes *sp. near* erebomicta, *Hong Kong. Photo by R.C. Kendrick*
http://www.flickr.com/photos/hkmoths/sets/72157616900373998/

Dear Readers,

The editorial members are thankful to you for your readership and support of the I.N.G.A. newsletter. Within the first year of I.N.G.A., many contributions have been made, and also more subscriptions were requested. The newsletter would not be possible without your support, and we hope this continues. All are invited to submit on any article relevant to our newsletter's mission. All submitted manuscripts will be reviewed and any suggested changes will be with permission of the authors. The I.N.G.A. newsletter is a biannually distributed electronic newsletter (published on June and December). Please feel free to check the guidelines for submission on the website:

http://mississippientomologicalmuseum.org.msstate.edu/Researchtaxapages/Lepidoptera/Gelechioidea/INGA/Submissions_Guidelines.pdf

In the meantime, please enjoy the issue, and if you get a chance, send us your feedback and keep us informed about any changes or additions you would like to see with the newsletter.

Wish all of you have a warm and wonderful holiday season!

The editors of I.N.G.A. newsletter

David Adamski:

Moonlighting with Gelechioidea

I am a trained microlepidopterist who has been employed as a Support Scientist with the Systematic Entomology Laboratory (SEL), United States Department of Agriculture, Smithsonian Institution, Washington, DC for 23 years. I have worked with colleagues within SEL on various groups of Lepidoptera including Gelechioidea, Tortricoidea, Pyralidoidea, and Noctuoidea. In addition, I have contributed to studies of various taxa within the Auchenorrhyncha and Sternorrhyncha, and phytophagous Acari. Although I keep a busy schedule as a support scientist, on my own time, I continue studies on the Gelechioidea, especially the Blastobasidae.

My interests emphasize alpha taxonomy, life-histories, and morphology of the Gelechioidea, and I intend to expand on my published dissertation and initiate a cladistic analysis of the world Blastobasidae, collecting data from about 550 species. From this study I expect to present phylogenetic-classification for the family at a global level with emphasis on the evolution of host preferences within a biogeographical context. Significant discoveries have been made on the biology of the Blastobasidae since I started studying this group. For example, macromorphological and molecular studies have corroborated the monophyly of the group. And new evidence, about host preferences within the family, suggests that this taxon is now considered less of a scavenger-group and more of a phytophagous-group.

I was invited by the Wedge Entomological Research Foundation to author a fascicle on the Blastobasidae of North America as part of the Moths of America North of Mexico Series. Already in production, this work will include more than 200 species, two-thirds of which will be new to science. In addition, images, distribution maps, and illustrations of the male and female genitalia will be provided.

Adamski working in office. Photo by David Adamski

David Adamski continues

Below is a chronological list of my publications on Lepidoptera.

1. Adamski, D. and R. Mankowski. 1978. The psychid moth *Apterona helix* (Siebold) - A new state record. *In*, Cooperative Plant Pest Report. USDA 3:662.

2. Adamski, D. and T.M. Peters. 1982a. Axillary structure of the Tortricidae (Lepidoptera). Proceedings of the Entomological Society of Washington 84(2):397-401.

3. Adamski, D. and T.M. Peters. 1982b. External morphology of *Apotomis albeolana* (Zeller) (Lepidoptera: Tortricidae: Olethreutini). Annals of the Entomological Society of America 75:366-375.

4. Adamski, D. 1982c. Sonication as a technique for scale removal aiding in morphological and taxonomic studies of Blastobasidae (Lepidoptera). Journal for Mississippi Science 27:72 (abstract).

5. Adamski, D. 1985. An unusual ovipositional site for *Amphipyra tragopoginis* (L.) (Noctuidae). Journal of the Lepidopterists' Society 38:317-318.

6. Adamski, D. and T.M. Peters. 1986. Review of Nearctic *Apotomis* Hübner (Lepidoptera: Tortricidae: Olethreutini) Canadian Entomologist 118:649-689.

7. Adamski, D. and R.L. Brown. 1987. A new Nearctic *Glyphidocera* with descriptions of all stages (Lepidoptera: Blastobasidae: Symmocinae). Proceedings of the Entomological Society of Washington . 89(2):329-343.

David Adamski with non-gelechioid moth in Thailand. Photo by David Adamski

8. Adamski, D. 1989a. A new North American *Anoncia* Hbn. (Lepidoptera: Cosmopterigidae). Journal of the Lepidopterists' Society 43(2):108-113.

9. Adamski, D. 1989c. Book Review. The Guild Handbook of Scientific Illustration. Elaine R. S. Hodges (Ed.). Van Nostrand Reinhold. xv + 575 pp. Proceedings of the Entomological Society of Washington 91(4):641-644.

10. Adamski, D. and R.L. Brown. 1989d. Morphology and systematics of North American Blastobasidae (Lepidoptera; Gelechioidea). Mississippi Agricultural Forest Experiment Station Technical Bulletin 165. Mississippi Entomological Museum Bulletin Series No. 1:1-70pp.

11. Adamski, D. 1990. BLASTOBASIDAE. *In*, Primary types of Microlepidoptera in the Museum of Comparative Zoology (with a discussion on V.T. Chambers' work). Bulletin of the Museum of Comparative Zoology 152(2):56-60.

12. Adamski, D. 1994. Book Review. Order and Diversity in the Living World: TeachingTaxonomy and Systematics in Schools. Crisci, J.V. et al. National Association of Biology teachers. American Society of Plant Taxonomists. 8(4):21-23.

13. Adamski, D. 1995. Review of the Blastobasidae of the Republic of the Seychelles (Lepidoptera: Gelechioidea). Proceedings of the Entomological Society of Washington 97 (3):489-499.

14. Adamski, D. and R.W. Hodges. 1996a. An annotated list of North American Blastobasinae (Lepidoptera: Gelechioidea: Coleophoridae). Proceedings of the Entomological Society of Washington 98(4):708-740.

15. Hodges, R.W. and D. Adamski. 1996b. The Identity of *Filatima ornatifimbriella* (Clemens 1864) (Gelechioidea, Gelechiidae). Journal of the Lepidopterists' Society. 51(1):32 -46.

16. Adamski, D. and B. Landry. 1997. Review of the Blastobasinae (Lepidoptera: Gelechioidea: Coleophoridae) of the Galápagos Islands. Proceedings of the Entomological Society of Washington 99(2):348-358.

17. Adamski, D. 1998a. A new species of *Pigritia* Clemens from Costa Rica (Lepidoptera: Gelechioidea: Coleophoridae). Proceedings of the Entomological Society of Washington 100 (3):497-503.

18. Solis, M.A. and D. Adamski. 1998b. Review of the Costa Rican Glaphyriinae (Lepidoptera: Pyraloidea: Crambidae). Journal of the New York Entomological Society 106(1):1-55.

David Adamski continues

19. Adamski, D. 1998c. On the identity of *Holcocera guilandinae* (Busck, 1900) (Lepidoptera: Gelechioidea: Coleophoridae: Blastobasinae). Proceedings of the Entomological Society of Washington 100(4):731-741.

20. Adamski, D. 1999a. *Blastobasis graminea*, new species (Lepidoptera: Gelechioidea: Coleophoridae: Blastobasinae): A stem borer of sugar cane in Colombia and Venezuela. Proceedings of the Entomological Society of Washington 101 (1):164-174.

21. Adamski, D. and O. Karsholt. 1999b. New brachypterous Macrolepidoptera from Peru (Lepidoptera: Blastobasinae: Agonoxenidae: Gelechioidea). Steenstrupia 24(1):67-75.

22. Adamski, D. 1999c. Two Neotropical *Hypatopa* Walsingham (Gelechioidea: Coleophoridae: Blastobasinae) with retractile labial palpi: a previously unknown lepidopteran feature. Proceedings of the Entomological Society of Washington 101(2):438-448.

23. Adamski, D. 1999d. Humbugs, type specimens, and the identity of *Asaphocrita pineae* (Amsel 1962) new combination (Gelechioidea: Coleophoridae: Blastobasinae). Proceedings of the Entomological Society of Washington 101 (3):694-696.

24. Adamski, D. 1999e. A new *Hypatopa* from Costa Rica (Gelechioidea: Coleophoridae: Blastobasinae). Journal of the Lepidopterists' Society 53(1):29-31.

25. Adamski, D. and E.H. Metzler. 2000a. A new species of *Glyphidocera* Walsingham from southwestern Ohio (Lepidoptera: Gelechioidea: Glyphidoceridae). Proceedings of the Entomological Society of Washington 102(2):301-307.

26. Adamski, D. 2000b. Book Review. The Garden is in, the Plants are up, now what? Asked the teachers (Butterfly Garden Activities/Ideas/Tips for Teachers). Virginia Kincaid. 44 pp. Newsletter, Lepidopterists' Society 42(2):50.

27. Adamski, D. 2000c. A new species of *Glyphidocera* from south-central Colorado (Lepidoptera: Gelechioidea: Glyphidoceridae). Fabreries 25(4):69-76.

28. Adamski, D. 2000d. *Gelechia glandulella* Riley, 1871 (currently *Blastobasis glandulella*) to have precedence over *Holcocera modestella* Clemens, 1863 (Case 2997) *In*, Bull. Zoological Nomenclature 57(1):8. (Published Title).

29. Adamski, D. And R.L. Brown. 2001a. *Glyphidocera* Walsingham (Lepidoptera: Gelechioidea: Glyphidoceridae) of Cerro de la Neblina and adjacent areas in Amazonas, Venezuela. Proceedings of the Entomological Society of Washington . 103(4):968-998.

30. Adamski, D. and J.W. Brown 2001b. Systematic review of the *Ecdytolopha* group of genera (Lepidoptera: Tortricidae: Grapholitini). Entomologica Scandinavica, Suppl. No. 58:1-86.

31. Adamski, D. 2002a. A new species of *Glyphidocera* Walsingham (Lepidoptera: Gelechioidea: Glyphidoceridae) from Costa Rica. Proceedings of the Entomological Society of Washington 104(1):119-125.

32. Adamski, D. 2002b. Book Review. Sesiidae - Clearwing Moths. Špatenka, K., O. Gorbunov, Z. Laštůvka, I. Toševski, and Y. Arita. 1999. Handbook of Palaearctic Macrolepidoptera. Gem Publishing Co., Wallingford, Oxfordshire, UK. xv + 569 p. *In*, Journal of the Lepidopterists' Society 55(3):124-126.

33. Metzler, E. and D. Adamski. 2002c. A new species of *Gnorimoschema* Busck, 1900 (Lepidoptera: Gelechiidae: Gelechiinae) from Ohio and Illinois. Fabreries 27(1):59-68.

34. Adamski, D., J.W. Brown, J.A. Villanueva-Jiménez, and M. Méndez López. 2002d. First records of the sugar cane pest, *Blastobasis graminea* Adamski (Lepidoptera: Coleophoridae: Blastobasinae), from Mexico and Central America. Proceedings of the Entomological Society of Washington 104(3):812-813.

35. Adamski, D. and R.L. Brown. 2002e. New species of *Blastobasis* Zeller from New Caledonia and Fiji (Lepidoptera: Coleophoridae: Blastobasinae). Insecta Koreana 19(2):137-145.

36. Adamski, D. 2002f. A synopsis of the Neotropical Blastobasinae (Lepidoptera: Gelechioidea: Coleophoridae). Thomas Say Publications in Entomology, Monographs. Entomological Society of America, Lanham, MD, 150 pp.

37. Adamski, D. and J.W. Brown. 2002g. A new species of *Frumenta* on *Solanum elaeagnifolium* in Mexico: a potential biocontrol agent for this noxious weed in southern Africa (Lepidoptera: Gelechiidae: Gnorimoschemini). Proceedings of the Entomological Society of Washington 104(4):1029-1035.

38. Adamski, D. 2002h. Holcocerini of Costa Rica (Lepidoptera: Gelechioidea: Coleophoridae: Blastobasinae). Proceedings of the Entomological Society of Washington, Memoirs, No. 24, 147 pp.

39. Villanueva-Jimenez, J.A., D. Adamski, J.M. Mendez, and J.W. Brown. 2002i. Nueva plaga blastobastina llega a las

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regiones caneras del Pacifico y del Golfo de Mexico. Entomologica Mexicana 1:353-355.

40. Adamski, D. 2002j. Blastobasinae of Thailand (Lepidoptera: Gelechioidea: Coleophoridae), Part I. Four new species of *Calosima* Dietz, 1910. Insecta Koreana 19(3, 4):233-239.

41. Brown, J.W. and D. Adamski. 2003a. A new species and new combination in *Netechma* Razowski (Lepidoptera: Tortricidae: Euliini). Journal of the New York Entomological Society 110(1):247-254.

42. Adamski, D. and C. T. Maier, C. 2003b. A new North American *Holcocera* from northeastern North America associated with Pinaceae (Lepidoptera: Gelechioidea: Coleophoridae: Blastobasinae). Proceedings of the Entomological Society of Washington 105(1):144-148.

43. Adamski, D. 2003c. Blastobasinae (Lepidoptera: Gelechioidea: Coleophoridae) of Thailand, Part II. Four species of *Blastobasis* Zeller, 1855. Insecta Koreana 20(1):1-6.

44. Adamski, D. and O. Pellmyr. 2003d. Immature stages and redescription of *Blastobasis yuccaecolella* Dietz (Lepidoptera: Gelechioidea: Coleophoridae: Blastobasini), with notes on its biology. Proceedings of the Entomological Society of Washington 105(2):388-396.

45. Brown, J.W. and D. Adamski. 2003e. Systematic revision of *Anopinella* Powell (Lepidoptera: Tortricidae: Euliini) and phylogenetic analysis of the *Apolychrosis* group genera. Zootaxa 200:1-93.

46. Adamski, D. 2003f. A new North American *Calosima* Dietz (Lepidoptera: Gelechioidea: Coleophoridae: Blastobasinae). Tropical Lepidoptera 11(1-2):46-48.

47. Adamski, D. 2003g. Blastobasinae (Lepidoptera: Gelechioidea: Coleophoridae) of Thailand, Part III.. Description of the princess moth, *Sirindhorn thailandiensis*, n. gen., n. sp. Insecta Koreana 20(3-4):343-347.

48. Wagner, D.L., D. Adamski, and R.L. Brown. 2004a. A new species of *Mompha* Hübner. from Mississippi (Lepidoptera: Gelechioidea). Proceedings of the Entomological Society of Washington 106(1):1-18.

49. Nishida, K., and D. Adamski. 2004b. Two new gall-inducing Tortricidae from Costa Rica (Lepidoptera: Cochylini). Proceedings of the Entomological Society of Washington 106(1):133-139.

50. Adamski, D. 2004c. A new North American *Blastobasis* associated with acorns (Lepidoptera: Gelechioidea: Coleophoridae: Blastobasinae). Holarctic Lepidoptera 7 (2):51-53.

51. Brown, J.W., and D. Adamski. 2004d. A taxonomic review of *Lypothora* Razowski (Lepidoptera: Tortricidae: Polyorthini), with comments on polymorphism and a new synonymy. Pan-Pacific Entomologist 79(2):128-134.

52. Brown, J.W., D. Adamski, R.W. Hodges, and S.M. Bahr. 2004e. Catalogue of Type Specimens of Gelechioidea (Lepidoptera) in the Collection of the National Museum of Natural History, Smithsonian Institution, Washington, DC. Zootaxa 510:1-160.

53. Adamski, D. 2004f. A new *Holcocera* Clemens (Lepidoptera: Gelechioidea: Coleophoridae) from mountainous southeastern Arizona. Proceedings of the Entomological Society of Washington 106(3):649-653.

54. Landry, J.F., and D. Adamski. 2004g. A new species of *Nanodacna* Clarke (Lepidoptera: Elachistidae: Agonoxeninae) feeding on the seeds of *Austrocedrus chilensis* (Cupressaceae) in andean Argentina. Journal of the Lepidopterists' Society 58(2):100-113.

55. Adamski, D. 2005a. *Glyphidocera* Walsingham of Costa Rica (Lepidoptera: Gelechioidea: Glyphidoceridae). Zootaxa 858:1-205.

56. White, W.H., D. Adamski, G. Fine, M. Materne, and E.P. Richard. 2005b. Stemborers associated with smooth cordgrass, *Spartina alterniflora* (Poaceae), in nursery habitat. Florida Entomologist 88(4):390-394.

57. White, W.H., D. Adamski, J.W. Brown, T.E. Reagan, J.A. Villanueva-Jiménez, M. Méndez López, and Mo Way. 2005c. Survey results for the sugarcane pest, *Blastobasis graminea* (Lepidoptera: Coleophoridae), in Texas and Louisiana in 2002. Southwestern Entomologist 30(2):85-92.

58. Kawahara, A.Y. and D. Adamski. 2006a. Taxonomic and behavioral studies of a new dancing *Beltheca* Meyrick (Lepidoptera: Gelechiidae) in Costa Rica. Proceedings of the Entomological Society of Washington 108(2):253-260.

59. Adamski, D., J.W. Brown, and W.H. White. 2006b. Immature stages of *Pyroderces badia* (Hodges) (Lepidoptera: Gelechioidea: Cosmopterigidae). Proceedings of the Entomological Society of Washington 108(2):341-346.

60. Landry, B., and D. Adamski. 2006c. Redescription and

David Adamski continues

immature stages of *Taygate schecophila* from the Galápagos Islands. Revue Suisse de Zooligie:113(2):307-323.

61. Apple, J., and D. Adamski. 2006d. The biology of *Chionodes hibiscella* Busck (Lepidoptera: Gelechiidae), with description of immature stages. Proceedings of the Entomological Society of Washington 108(3):575-582.

62. Adamski, D., and B. Landry. 2007. Additions to the Blastobasinae (Lepidoptera: Coleophoridae) of the Galápagos Islands with description of a new *Holcocera* Clemens.. Acta Zoologica Hungaricae 53 (Supplement 1):13-20.

63. Sohn, Jae-Cheon, and D. Adamski. 2008a. A new *Wockia* Heinemann, 1890 (Lepidoptera: Urodidae) from Korea. Proceedings of the Entomological Society of Washington 110(3):556-561.

64. Adamski, D. 2008b. A new *Holcocera* Clemens, 1863 (Lepidoptera: Coleophoridae) associated with leguminous plants from the Brazilian cerrado. Proceedings of the Entomological Society of Washington 110(3):737-742.

65. Becker, V.O., and D. Adamski. 2008c. Three new cecidogenous *Palaeomystella* Fletcher (Lepidoptera: Coleophoridae: Momphinae) associated with Melastomataceae in Brazil. Revista Brasileira de Zoologia 52 (4):647-657.

66. Adamski, D., K. Boege, J-F. Landry, and J.-C. Sohn. 2009a. Two new species of *Wockia* Heinemann (Lepidoptera: Urodidae) from coastal dry-forests in western Mexico. Proceedings of the Entomological Society of Washington 111(1):166-182.

67. Adamski, D., G.F. Hevel, and A. Pultyniewicz. 2009b. New US record for *Promalactis suzukiella* (Matsumura) (Lepidoptera: Oecophoridae): Redescription and immature stages. Proceedings of the Entomological Society of Washington 111(1):204-214.

68. Adamski, D., and M. Hoddle. 2009c. A new *Holcocera* Clemens from Guatemala and redescription of *H. iceryaeella* (Riley) from the US (Lepidoptera: Gelechioidea: Holcocerini): two congeners with incidental preference on avocado. Proceedings of the Entomological Society of Washington 111(1):254-262.

69. Adamski, D., J. Apple, and J. Bishop. 2009d. A new *Filatima* Busck (Lepidoptera: Gelechiidae) associated with lupine during early herbivore colonization on Mount St. Helens. Proceedings of the Entomological Society of Washington 111(2):293-304.

70. Adamski, D., and K. Boege. 2009e. Two new *Compsolechia* Meyrick (Lepidoptera: Gelechiidae) from western Mexico, associated with *Casearia* (Salicaceae). Proceedings of the Entomological Society of Washington 111(2):305-321.

71. Prasifka, J.R., J.D. Bradshaw, A.A. Boe, D.K. Lee, D. Adamski, and M.E. Gray. 2009f. Symptoms, distribution and adbundance of the stem-boring caterpillar, *Blastobasis repartella* (Dietz), in switchgrass. Bioenergy Research DOI: 10.1007/s12155-009-9064-8 (On-Line)

72. Adamski, D., S.E. Miller R.S., Copeland, P.D.N. Hebert, K. Darrow, and Q. Luke. 2010a. A Review of African Blastobasinae (Lepidoptera: Gelechioidea: Coleophoridae), with new taxa reared from native fruits in Kenya. Smithsonian Contributions to Zoology, No. 630: vi + 68 pp.

73. Adamski, D. 2010b. A new *Neoblastobasis* Kuznetzov and Sinev, 1985 (Lepidoptera: Gelechioidea: Blastobasini) from the United Arab Emirates, pp. 525 - 531. *In*, A. van Harten (ed.). Arthropod Fauna of the United Arab Emirates. Vol. 3, Pensoft Publishers, Bulgaria, 700 pp.

74. Adamski, D., J.-F. Landry, S. Passoa, and R. Tracy. 2010c. Diagnosis of the life-stages of *Exoteleia dodecella* (Lepidoptera: Gelechiidae), and a recommendation for the study of *Exoteleia*. Proceedings of the Entomological Society of Washington 112(2):183-206.

75. Adamski, D., P. J. Johnson, A.A. Boe, J.D. Bradshaw, and A. Pultyniewicz. 2010e. Life-Stages and biology of *Blastobasis repartella* (Lepidoptera: Gelechioidea: Coleophoridae: Blastobasinae). Zootaxa 2656:41-54.

76. Adamski, D., and H. Li. 2010d. Three new species of blastobasine moths (Lepidoptera: Gelechioidea: Coleophoridae) from Beijing, China. SHILAP 38(151):341-351.

77. Adamski, D. 2011a. Description of larva, adults, and bionomics of *Filatima demissae* Keifer (Lepidoptera: Gelechiidae) in Washington. Entomological News 120 (5):453-463.

78. Nieukerrken, E.J., L. Kaila, I.J. Kitching, N.P. Kristensen, D.C. Lees, J. Minet, C. Mitter, M. Mutanen, J.C. Regier, T.J. Simonsen, N. Wahlberg, S.-H. Yen. R. Zahiri, D. Adamski, J. Baixeras, D. Bartsch, B.Å. Bengtsson, J.W.

Gelechioid Aficionados

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Brown, S.R. Bucheli, D.R. davis, J. De Prins, W. De Prins, M.E. Epstein, P. Gentili-Poole, C. Gielis, P. Hättenschwiler, A. Hausmann, J.D. Holloway,A. Kallies, O. Karsholt, A. Kawahara, S. Koster, M. Kozlov, J.D. Lafontaine, G. Lammas, J.-F. Landry, S. Lee, M. Nuss, C. Penz, J. Rota, B.C. Schmidt, A. Schintlmeister, J.-C. Sohn, M. A. Solis, G.M. Tarmann, A.D. Warren, S. Weller, R.Yakovlev, V. Zolotuhin, and A. Zwick. 2011b. Order Lepidoptera Linnaeus, 1758. *In*, Zhang, Z.-Q. (Ed.). Animal Biodiversity: An outline of higher-level classification and survey of taxonomic richness. Zootaxa 3148:212-221.

79. Adamski, D. and J.-C. Sohn. 2012a. Reassessment of the Identity and placement of *Amphiclada fervescens* Meyrick, 1912(Lepidoptera). Proceedings of the Entomological Society of Washington. 114(1):1-4.

80. Medeiros, M.J. and D. Adamski. 2012b. Three new species of Hawaiian moths from Kahoolawe island (Lepidoptera: Crambidae & Coleophoridae). Zootaxa 3341:59-63.

81. Adamski, D. 2013a. The Blastobasinae of Costa Rica (Lepidoptera: Gelechioidea: Blastobasidae). Zootaxa 3618 (1):1-226.

82. Adamski, D. 2013b. Two new Gelechioidea (Lepidoptera) from southeast Asia associated with Myrtaceae. Journal of the Lepidopteists' Society 67(2):111-127.

Meetings

XVIII European Congress of Lepidopterology held in Blagoevgrad, Bulgaria, 29 July – 4 August 2013

David Agassiz: A new sesiid from Africa with an interesting life history (and a puzzling Gelechioid).

Vasilii Anikin, Aleksandr, G. Demin & Maria V. Knushevitskaya: Molecular systematics of Palaearctic casebearer moths (Lepidoptera, Coleophoridae) based on analysis of gene sequence of the first subunit cytochrome c-oxidase (COI).

Peter Huemer, Gustav Elsner & Ole Karsholt: Revision of the *Eulamprotes wilkella* species-group based on morphology and DNA barcodes, (Lepidoptera, Gelechiidae).

Mari Kekkonen & Paul Hebert: DNA barcode-based species delineation enhances taxonomic workflow in endemic Australian hypertrophine moths (Gelechioidea).

Tomasz Rynarzewski: The significance of larval study of Coleophoridae relationships (Lepidoptera, Gelechioidea).

62nd Annual meeting of the Lepidopterists' Society held in Gainesville, FL, U.S.A., 27 – 30 June 2013

Daniel Rubinoff, William Haines and Akito Y. Kawahara: Deciphering diversity in Hawaii's most diverse moth group (Hyposmocoma).

61st Annual meeting of the Entomological Society of America held in Austin, Texas, U.S.A. 9 – 14 November 2013

Mohammed Belhamra, Tarai Nacer & Zone Ouest: Ecological study of *Tuta absoluta* (Lepidoptera, Gelechiidae) at Doucen, Biskra Oasis, Algeria.

Boyd A. Mori & Maya L. Evenden: The development of sex pheromone-mediated mating disruption to control *Coleophora deauratella* (Lepidoptera: Coleophoridae): a major pest of red clover, *Trifolium pratense* L., in Canada.

Daniel Rubinoff, William P. Haines & Patrick Schmitz: Patterns of Ancient Colonization in Hawaii's most diverse moths (Hyposmocoma: Cosmopterigidae).

Melissa S. Sisson & Sibyl, R. Bucheli: Preliminary phylogenetic analysis of North American *Agonopterix* and *Exaeretia* (Gelechioidea: Elachistidae: Depressariinae).

Alvaro Hernandez-Hernandez, Rabindranath Thompson -Farfan, Jose Marin-Sanchez and Enrique Ruiz-Cancino: Identification and control of tomato pinworm, *Keiferia lycopersicella* Walsingham, with *Melia azedarach* L. extracts on tomato in San Luís Potosi, Mexico.

Antonios Tsagkarakis & Antonios Margiotoudis: Effects of boron on feeding, survival and immature development of the Tomato Leafminer, *Tuta absoluta*.

An Introduction to the Hawaiian Fancy-cased Caterpillars (Cosmopterigidae: *Hyposmocoma*)

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Introduction

The Hawaiian Islands are truly the American Galapagos, with the highest rates of endemism in the United States and a remarkable array of species that have evolved into niches and forms seen nowhere else on the planet. Sadly, Hawaii is also an extinction capital, with huge portions of the endemic fauna obliterated since the arrival of humans, a process that was accelerated by the arrival of Europeans in the late 18th Century. One of the most diverse extant groups in the islands are the Hawaiian Fancy-cased caterpillars in the genus *Hyposmocoma.* While they undoubtedly suffered their own spasms of extinction over the past two centuries (Zimmerman 1978), they are still extremely diverse, with approximately 400 recognized species, and many more undescribed. Unlike many native insects, many species of *Hyposmocoma* still occur in almost every type of habitat in Hawaii, including low-elevation disturbed areas. They also have a very high degree of endemism: only one species has been found on more than one island, and we suspect it was moved with coast rubble as part of recent construction activities. Most caterpillars in this group create portable cases out of silk and debris, and they drag these cases along behind them as they forage for an array of banal and unusual food sources. Most species seem to graze on lichen or algae from rocks and bark, though they can be very particular about where they forage. Other taxa are more specialized, including some that ingest rotting wood of a very specific age and consistency. But perhaps the most unusual and specialized are the carnivorous species, all monophyletic, which have evolved to eat snails and, in some cases, other slow moving prey.

Adult *Hyposmocoma* are tiny moths, but the most commonly encountered life stage is the caterpillar. Caterpillars are small (typically less than 8 mm long), and different species build an amazing diversity of case types (Fig. 1), which can be classified into different groups that we have given (sometimes humorous) names (Fig. 2).

This is a brief introduction to recognizing the different groups, where they occur, and some basic information about their life histories. One of the most exasperating aspects of this research has been that most of the cases we find are old, from past generations, since old cases seem to last in the environment for months or years. It is often necessary to gather dozens of cases to end up with a few containing live caterpillars. These empty cases are still valuable, particularly for less common groups, and from remote or unusual areas. Often these empty cases are the only record we have for a case-type that represents an obvious new species existing on an island that becomes a tantalizing incentive to keep looking in that area to hopefully find the moth/caterpillar itself in the future.

The diversity of *Hyposmocoma* caterpillars and where they occur

Different case types, and their associated species, have different ecological specializations, so to some degree we can predict where they might be found. Most

Figure 1. An assortment of* Hyposmocoma *caterpillar cases, illustrating the diversity of the group. Photo by Rubinoff's lab

Hawaiian Fancy-cased caterpillars

continues

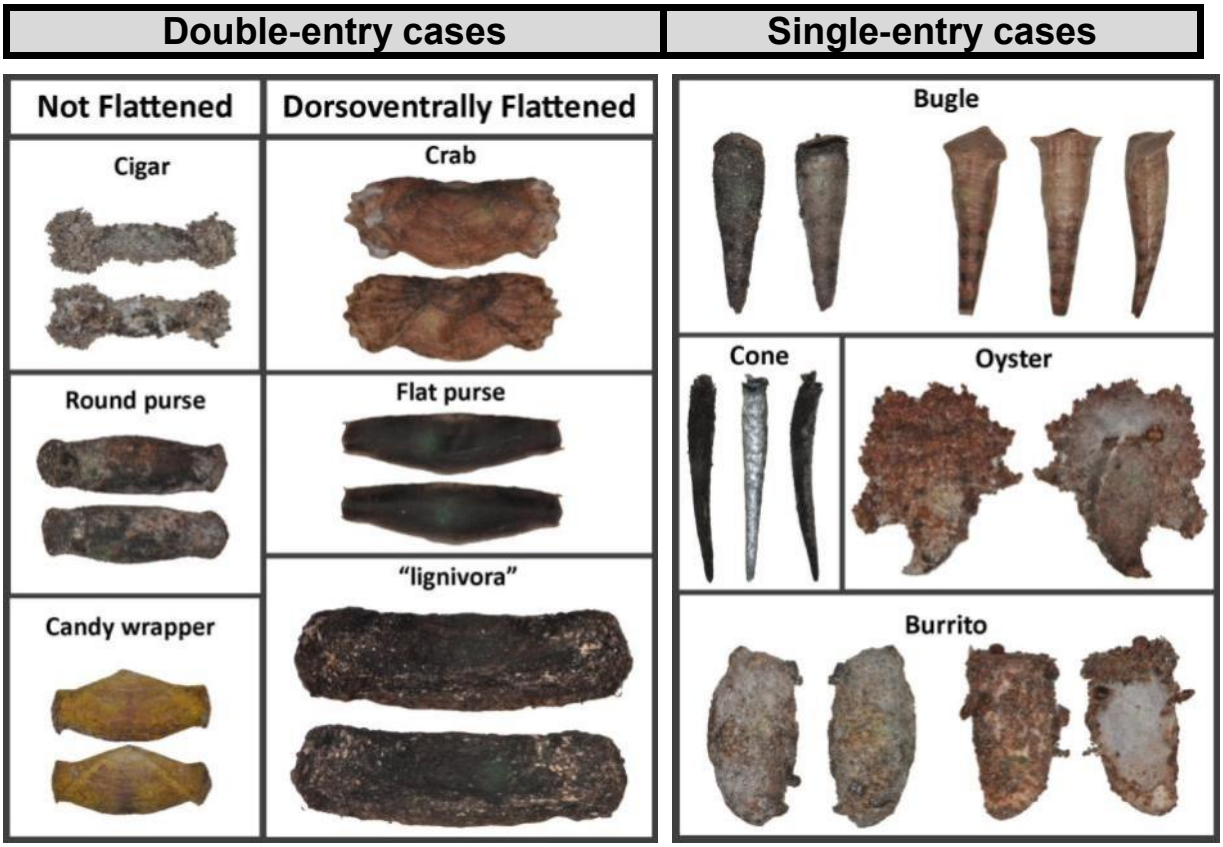

Figure 2. The distinctive case-types of* Hyposmocoma *caterpillars (upper and lower sides of cases\shown). Cases can be divided into single-entry and double-entry cases. Photos by Rubinoff's lab

Hyposmocoma are scavengers that feed on a specific food type, but not necessarily tied to specific plant species. Some graze on lichen or algae, others eat decaying wood, and others eat dead insects or live snails. Here are descriptions of the different case types and their typical habitats. Note that each case type has many different species on different islands, so there is some variation in the way they look.

Cone: This skinny, thorn-like case type (Fig. 3) is one of the most distinctive, and includes aquatic and terrestrial species. Cone caterpillars usually feed on algae growing on rocks, and therefore are usually on rocky surfaces of banks, boulders, or streambeds (many are amphibious), although they can also be found on tree trunks. They are often found in high numbers, tucked into the pukas (small holes) of boulders. The amphibious species in this group can be submerged for weeks at a time. They have been observed to graze on algae underwater in flowing streams. When dislodged from their rock, they hang from a dragline, and slowly but surely "reel themselves back in". We believe that the ability to remain submerged for long periods of time is an adaptation to flash flooding, which commonly occurs in Hawaiian streams. While waiting out the flood underwater, caterpillars tie down and avoid being

Figure 3. A cone case on a moss-covered stream boulder. Photo by Rubinoff's lab

Hawaiian Fancy-cased caterpillars continues

washed downstream, and in relatively short order, into the ocean.

Bugle: Bugle cases are similar to cones, but have a much broader entrance. There are two main types of bugles (Fig. 2). One type is grey and dull in color and is usually found on rocks in stream beds (another amphibious group). The other type is usually light brown, glossier, and ornately banded, and is found on the leaves or stems of trees and shrubs. During times of dormancy or pupation, these caterpillars often create a little "pedicel" out of silk that attaches to the front of the case and raises it off the leaf, possibly as a defense against predation, parasitism, or attack by pathogens. We believe these caterpillars graze on algae or fungi.

Burrito/Oyster: This is the most commonly encountered and diverse case type across the Hawaiian Islands, with the largest number of species, though the case type itself is paraphyletic in our phylogenies. They are little sacks, often with a twist on one end. These caterpillars can be found in a great many habitats from beaches to high elevations on the Mauna Kea volcano, and they are most often found on the surfaces of rocks or tree trunks. On rocks, they will often tuck themselves into a little puka on the rock. Some species cover themselves with pieces of lichen (Fig. 4A), whereas others are found on barren-looking rocks and appear to be little clods of dirt, or mouse droppings (which has led to some unfortunate cases of mistaken identity) (Fig. 4B). These species are often found in small groups. Frequently they hide out of the sun, or in crevices in the boulders. Oysters (Fig. 2) are phylogenetically nested within the burrito cases, and have a wide flange spreading out from the case which fits tightly against the rock or tree surface, making them look exactly like patches of lichen.

Candy wrapper: The candy wrapper case is so named because it is shaped like the wrapper around a piece of candy (which would logically then be the caterpillar). These are double sided and are usually covered with white or green lichens (Fig. 5), though they can also be smooth (Fig. 2). The most common place to find these is on the trunks of trees where lichen is growing. They occur in both wet and dry areas, and are occasionally found on lichen-covered rocks or banks.

Figure 5. A lichen-covered "candy wrapper" case on tree bark on Lāna'i. Photo by Rubinoff's lab

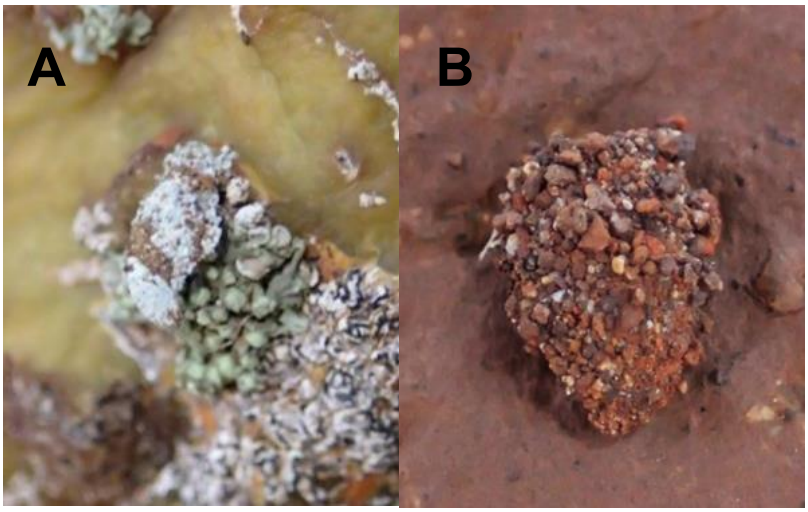

Figure 4. (A) Lichen-covered "burrito" case on a wiliwili trunk, and (B) a dirt-covered "burrito" case on a boulder, both from Kaho'olawe. Photos by Rubinoff's lab

Cigar: Cigar cases are the fiercest of the *Hyposmocoma* group, with their larvae being carnivorous scavengers on other insects, or predators on slow moving animals like snails. The evolution of feeding behavior in this group is the subject of some of our most active research. Cigar cases are relatively cylindrical, long, dull grey or brown, and lack much of the complexity of the other case types. They sometimes have "tufts" of material surrounding each of their entrances (Fig. 2), giving them a "dog bone" look, though these extensions can also be lacking. Because these larvae are carnivorous, cigar cases sometimes occur where insect carcasses are common, in the crags of tree bark or at the base of trees or rocks, especially if a lot of spider webs are nearby. Some species appear to be specialized predators of snails, and

Hawaiian Fancy-cased caterpillars continues

Figure 6. A "CSI" case from O'ahu. This is a specialized type of "cigar" case that covers itself with the body parts of other arthropods. Photo by Rubinoff's lab

these are typically found on tree leaves in wet habitats. One species, which we have termed the "CSI" case, covers its case with the exoskeletons of insects, spiders, and mites (Fig. 6), and has only been found at a single site in the Wai'anae Mountains of O'ahu. This species is its own very ancient offshoot from the cigar cases, and it seems possible that there are other related species undiscovered on other islands.

Round purse: These cases are roughly cylindrical, and usually shiny dark brown to black (Fig. 7) with a hinged "door" on either end, though some are a duller color (Fig. 2). Round purse caterpillars feed on dead plant tissue, and are often found on or under bark of trees or rotten logs, or in leaf litter. They do not appear to be very specialized on particular plant species. Recent publications have suggested that they are not monophyletic with the flat purse cases below, but rather, represent a case of convergent evolution (Kawahara and Rubinoff).

Flat purse: The flat purses usually are found on dead and decaying plant tissue, and are often more specialized on certain types of plants than those of the round purse caterpillars. For instance, there are multiple species of flat purses with larvae that feed on the live and dead fronds of Hawaiian loulu palm trees on the different islands (Fig. 8), and others only found boring inside the decaying stems (rachis) of endemic tree fern fronds. These are extremely flat cases that are almost like papery envelopes. We have samples of flat purses from loulu on O'ahu and Kaua'i, but have yet to collect this group from other islands.

***Hyposmocoma lignivora* (giant purse):** The "*lignivora*" species group, or giant purses, are similar to the flat purses in shape, but much larger, up to 2 cm long (Fig. 2). As such, they represent the largest species of moths and purses in the genus, no mean feat when there are more than 400 species to consider! Ecologically, these can be thought of as the "termites" of the Hawaiian insect fauna, since they bore through rotting wood. This case type is usually associated with large trees in wet forest. They are very localized in their distributions and appear to prefer some tree species over others. They bear an unfortunate resemblance to and are often mistaken for cockroach egg cases.

Crab: Crab cases are very distinctive ridged, flat cases (Fig. 2) usually found under the loose bark of dead or live trees where they presumably feed on the wood itself. These are typically found in wet, forested habitats. They hold themselves flat against the bark and can be very cryptic.

Conducting field work

Typically, to conduct our research, we try to document both larval and adult stages of each species, getting both ecological and genetic data from each sample. This entails collecting caterpillars, documenting the type of habitat they utilize, and rearing the caterpillars to adulthood in the lab.

Collecting of caterpillars is fairly simple. We search in the habitats outlined above to locate caterpillar cases, then use forceps to *gently* pick up the cases and place them in plastic vials. Because cases last for years after the caterpillar is gone, most of the cases we collect

Figure 7. A "round purse" case from the Northwest Hawaiian Islands, Papahānaumokuākea. Photo by Rubinoff's lab

Hawaiian Fancy-cased caterpillars continues

will be empty, with the caterpillar having already died or emerged as a moth. Additionally, a lot of the live caterpillars can be parasitized by tiny wasps from many different families, including Bethylidae, Eulophidae and probably Braconidae, consisting of both native and non-native species, and therefore will not emerge. Incidentally, a lot of these wasps are likely new species as well! When we encounter a lot of cases (>20), we try to include the ones that look freshest, and if possible, caterpillars that are still actively moving around. In the lab, we have good luck feeding most *Hyposmocoma* caterpillars on two main foods: raw carrot and flaked fish food. However, flat purses tend to be specific to their food type, and round purses, crabs, and *lignivora* are not necessarily specific to a single plant species, but likely require a certain stage of decomposition, so it is necessary to include a piece of bark, rotten wood, or whatever material they were collected on.

Phylogenetic research

Most of our research on *Hyposmocoma* has explored how they have diversified in Hawaii, and what they can tell us about the processes of island biogeography. Some of our studies have focused on specific groups, such as amphibious cone cases or purse cases.

The future

Our first foray into studying *Hyposmocoma* suggests there is a large number of species waiting to be described and probably many life histories that will border on unconventional. The sheer diversity of the species we have found and reared suggests that the original fauna before the introduction of ants and wide scale habitat loss would have been truly astounding. Hopefully, by picking up the considerable number of pieces still remaining in this remarkable group of moths, we'll be able to reconstruct an image of what a mega-diverse Hawaiian lineage really looked like. This is an opportunity that has been sadly lost in most of the remaining Hawaiian flora and fauna.

Figure 8. A flat purse case from loulu palm fronds (*Pritchardia *sp.) on O'ahu. Photos by Rubinoff's lab

The Remarkable Endemism of Moths at White Sands National Monument US with Special Emphasis on Gelechioidea

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Introduction

The White Sands formation is a snow-white gypsum dunes system that covers 744.6 sq km. It is the world's largest gypsum dune field. White Sands National Monument, encompassing the southern portion, protects about 40% of the dunes; the remaining 60% is under the jurisdiction of the White Sands Missile Range administered by the U. S. Army. The dunes, as they are known today, were formed ca. 8,000 years BP. Prior to 8,000 years BP the area covered by the dunes was a wet cool forest of the last glacial maximum in North America. The dunes were formed as a result of the hypsithermal, a warming and drying period that followed the most recent glacial maximum. The White Sands formation is located in south central New Mexico in the Tularosa Basin of SW United States.

The dunes were created from dissolved gypsum selenite crystals in large playas (dark blue in the illustration) at the southwestern boundary of the dune field. As water evaporates gypsum crystalizes out of solution and forms on the dry surface of the playa. As the crystals disintegrate, sand-sized crystals are formed. Winds, predominately from the southwest, blow the crystals from the dry lake bed onto the dune field. The dunes can be as high as 10 m. Plants and soils are successively covered and uncovered as the blowing sand moves the ridge crests from the southwest to the northeast as much as 9 m per year (McKee and Moiola 1975).

Figure 1. Pure white gypsum sand dunes, sample site #1. Photo by Eric H. Metzler

Plants respond to the harsh conditions of shifting pure gypsum soils in several ways. They add stem length rapidly to accommodate encroaching dunes, they extend lateral root systems, and they make dense root clusters to hold the sand in place as dunes advance across the landscape. Common examples of these

Figure 2. New species of* Chionodes *(#1, on left) and* Dichomeris *(#1, on right). Photos by Eric H. Metzler

Remarkable Endemism at White Sands National Monument continues

plants' adaptations at the Monument are *Yucca elata* Engelm. (Agavaceae), *Rhus trilobata* Nutt. (Anacardiaceae), *Poliomintha incana* (Torr.) Gray (Lamiaceae), and *Populus fremontii* var. *wislizenii* Wats. (Salicaceae). There are several common gypsophilous plants that are very faithful to gypsum habitats and will always indicate gypseous soils when found in the field. The New Mexico gypsum flora is often dominated by *Tiquilia hispidissima* (Torr. & Gray) A. Richards (Boraginaceae), *Sporobolus nealleyi* Vasey (Poaceae), *Bouteloua breviseta* Vasey (Poaceae), *Nerisyrenia linearifolia* (S. Watson) Greene (Brassicaceae), and *Calylophus hartwegii filifolius* (Eastw.) Towner & Raven (Onagraceae). Other common, but less abundant, species include *Anulocaulis gypsogenus* Waterfall (Nyctaginaceae), *Selinocarpus lanceolatus* Woot. (Nyctaginaceae), *Nama carnosum* (Woot.) C.L. Hitchc. (Hydrophyllaceae), *Dicranocarpus parviflorus* Gray (Asteraceae), and *Centaurium maryannum* B.L. Turner (Gentianaceae) (Sivinski, 1994).

At first glance much of the gypsum dunes may appear bleak and devoid of animal life, but a closer look reveals 30 species and seven subspecies that are endemic to the white sands. These taxa are specifically adapted to life in the white dunes by their permanent white color, or apparent lack of color. These are *Holbrookia maculata ruthveni* Smith (Squamata), *Sceloporus undulatus cowlesi* Lowe and Norris (Squamata), *Cnemidophrus inornatus gypsi* Wright and Lowe (Squamata), *Perognathus flavescens apache* Merriam (Rodentia), *Neotoma nicropus leucophaea* Baird (Rodentia), *Ammobaenites phrixocnemoides arenicolus* (Strohecker) (Orthoptera), *Daihinoides hastiferum larvale* (Strohecker) (Orthoptera), *Euxoa lafontainei* Metzler & Forbes (Noctuidae), *Schinia poguei* Metzler & Forbes (Noctuidae), and *Protogygia whitesandsensis* Metzler & Forbes (Noctuidae). Some species are variable in color, but individuals collected

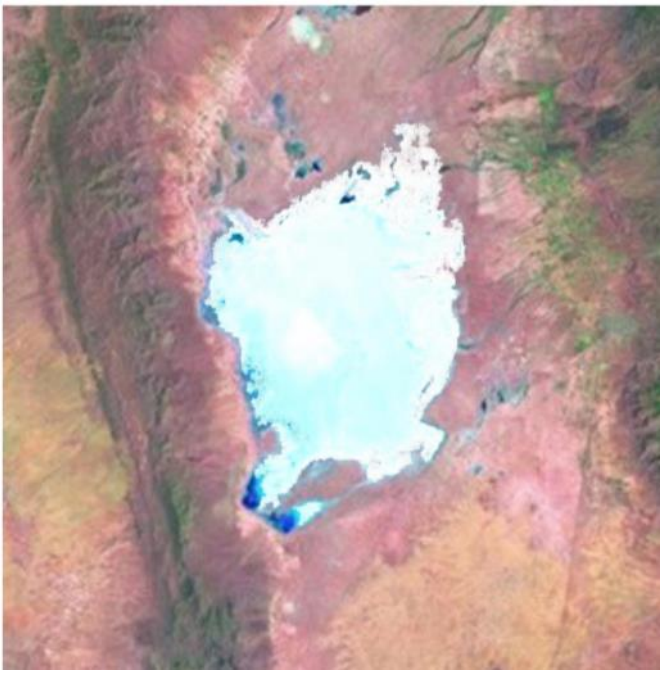

Figure 3. Landsat image of White Sands NM

on the white substrate at the Monument are pale, when compared to nearby populations that do not live in the dunes. These animals are *Spermophilus spilosoma* Bennett (Rodentia), *Cibolecris parviceps arida* (Brunner) (Orthoptera), *Phrynosoma cornutum* (Harlan) (Squamata) (Kain), *Eucosma columbiana* (Walsinghm), *Copablepharon serratigrande* Lafontaine (Noctuidae), and *Euxoa pleuritica* (Grote) (Noctuidae).

In 2006 the US National Park Service invited Eric Metzler to conduct a long term study of the Lepidoptera at White Sands National Monument. Prior to this study there was a dearth of research on the invertebrate fauna in the gypsum dune field in the Tularoa Basin of New Mexico. Highlights of previous research at White Sands National Monument pertinent to insects were Stroud (1950) who listed 452 species of insects and Strohecker (1947) who described 2 species of camel crickets endemic in the gypsum dunes.

Figure 4. New species of* Coleophora *(#168, on left; #285, on right).
Photos by Eric H. Metzler

Remarkable Endemism at White Sands National Monument continues

The Study

A transect three km long and approximately 300 m wide was established along the southeast edge of the dunes. Eleven sample sites were selected in four habitat types; open dunes with no vegetation, interdunal habitat, edge-of-dunes where the dunes abruptly end, and open basin desert habitat. Because vegetation types are markedly different in many of the interdunal habitats, more than one interdunal habitat was selected.

Adult moths were collected monthly in bucket-type blacklight traps. All moths were sorted to species, identified, and counted. Representatives of each species were mounted on pins with wings spread for permanent storage in research collections. Lepidopteran immatures were collected alive on food plants and reared in laboratory conditions. Representative larvae were preserved in ethanol.

Individual rear legs were removed from some pinned adults and submitted to the Barcode of Life Data System (BOLD) laboratory at the Biodiversity Institute of Ontario, University of Guelph in Guelph, Ontario, Canada. The resulting "Neighbour Joining Tree" cladograms were used to help delineate species and define new species.

The first few samples from the study sites contained several species of moths never before seen by anyone. Reassuringly, but not surprisingly, many of the undescribed species are white or very pale in color.

In response to the high number of undescribed species, the study was revised to concentrate on documenting and describing the new species. Seven new species were described, and manuscripts were prepared for the description of several other species.

Most primary types were deposited in the Smithsonian Institution in Washington, DC. All other moth specimens were deposited in the Museum of Southwestern Biology at the University of New Mexico; Albert J. Cook Arthropod Research Collection, Department of Entomology, Michigan State University; Arthropod Museum, New Mexico State University; and McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History. All non-lepidopteran insects were placed in ethanol and deposited at the University of New Mexico.

Results

Figure 5. The contents of one bucket trap. The volume of moths = about one liter. The yellow object is a damp sponge, which is placed in the trap to compensate for the very low (ca 15%) relative humidity in the desert. Photo by Eric H. Metzler

Because of the unusual physical and biological qualities of the New Mexico white gypsum dunes, I was especially aware of the possibility of finding undescribed species of moths. The results are exceeding my expectations. In 1950 Stroud reported 20 species of Lepidoptera from the Monument. In the period 9 February 2007 through 31 December 2012 I identified more than 500 species of Lepidoptera (unpublished data) from the Monument. The study of Lepidoptera at White Sands National Monument is projected to last approximately 10 years.

Thirty undescribed species of moths in seven families, including Gelechiidae, Coleophoridae, and Scythrididae were identified. Most specimens of Gelechioidea have yet to be examined by genitalic preparation. The descriptions of seven new species from two families, Noctuidae and Tortricidae, were published in peer reviewed journals (Metzler et al., 2009; Metzler & Forbes 2011, 2012; Wright

Remarkable Endemism at White Sands National Monument continues

2012). A paper describing a new Scythrididae was accepted, pending minor revisions, for publication. Manuscripts describing 2 new species of *Chionodes* are in preparation. Jean-François Landry identified two new species of *Coleophora* to be described by him. One new species of *Dichomeris* is represented by a single male, and it will be described when additional specimens are collected. More Gelechioidea, most are white or very pale in color, remain to be diagnosed.

Discussion

The data indicate that the study area is home to more endemic species of Lepidoptera than any other single habitat of similar size in North America. Several species of moths from several families have adults with whitish or paler phenotypes within the dunes (see above). New research shows the same species of plants in the dunes and outside the dunes have different chemical signatures and different microbes. These results mean that caterpillars in the dunes have adapted to a unique chemistry of their hosts compared to caterpillars eating the same plant species outside the dunes.

Future research on lepidopterans should attempt to capture gravid females to obtain ova for rearing on plants from within and outside the dunes. Attempts should be made to locate larvae in the dune field on their natural host plants.

Acknowledgments

The following Gelechioidea specialists magnanimously lent their time and expertise to help me; Jean-François Landry, David Adamski, Sangmi Lee, and Ronald W. Hodges. Other specialists determined, described or offered assistance to me in working on other families; J. Donald Lafontaine, B. Christian Schmidt, Donald J. Wright, Michael G. Pogue, Donald R. Davis, James S. Miller, John W. Brown, Richard S. Peigler, and Charles V. Covell, Jr. Special thanks goes to David Bustos, Resource Manager at White Sands National Monument for permitting and helping with my research.

Literature Cited

Kain, SM (2000) White Animals at White Sands. Unpublished manuscript, pages 48-1 through 48-18, *in* An Introduction to White Sands National Monument and the Tularosa Basin Employee and Volunteer Orientation Handbook. White Sands National Monument. 185 pp.

McKee, ED & RJ Moiola (1975) Geometry and Growth of the White Sands Dune Field, New Mexico. Journal of Research of the U.S. Geological Survey, No. 3: 59-66.

Metzler EH, Bustos D, & Forbes GS (2009) The Lepidoptera of White Sands National Monument, Otero County, New Mexico, USA 1. Two new species of Noctuidae (Lepidoptera, Noctuinae, Agrotini). ZooKeys 9: 47-62. Doi: 10.3897/ zookeys.9.182

Metzler, EH. & Forbes, GS (2011) The Lepidoptera of White Sands National Monument, Otero County, New Mexico, USA 4. A new species of *Schinia* Hübner, 1818 (Lepidoptera: Noctuidae: Heliothinae). *In:* Schmidt, B.C. & Lafontaine, J.D. (Eds.). Contributions to the systematics of New World macro-moths III. ZooKeys*,* 149, 135─144.

Metzler, EH. & Forbes, GS (2012) The Lepidoptera of White Sands National Monument 5: two new species cochylini (Lepidoptera, Tortricidae, Tortricinae). Zootaxa 3444: 51-60

Schneider-Hector, D (1993) White Sands, The History of a National Monument. The University of New Mexico Press. Albuquerque, NM. 270 pp.

Sivinski, RC (1994) Flora Neomexicana: Gypsophilous plants. Native Plant Society of New Mexico Newsletter, 19 (2):1-3

Strohecker, HF (1947) Some southwestern Gryllacrididae. Annals of the Entomological Society of America 40: 241-246.

Stroud CP (1950) A survey of the insects of White Sands National Monument, Tularosa Basin, New Mexico. American Midland Naturalist. 44(3): 659-677.

Wright, DJ (2012) Eight new species of *Eucosma* Hübner (Tortricidae) from western North America. Journal of The Lepidopterists' Society 66(1): 27-40.

Some Background Perspective to Recording Gelechioidea in Hong Kong

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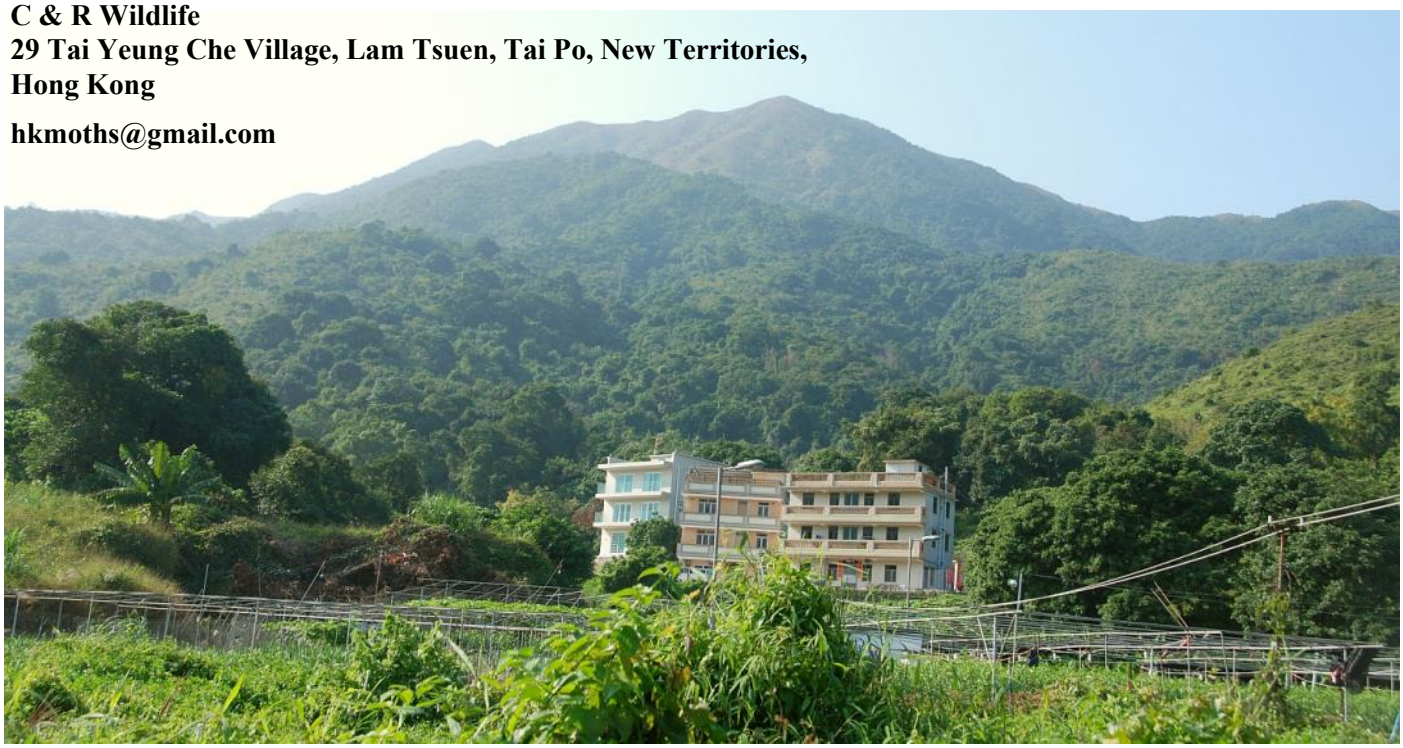

Figure 1. Tai To Yan rises to 567m elevation within Lam Tsuen Country Park, in the New Territories of Hong Kong. It is clothed with grassland near the summit, secondary forest is regenerating or established nearer the valley floor, where villages and agricultural land dominate. Since this photo was taken on Christmas Day 2012, works have started on three more buildings to the right and behind the three in shot, with the loss of some secondary forest, shrubland and orchards, as well as two further buildings to the left, with the loss of agricultural land. Photo by R.C. Kendrick

Hong Kong is a tiny enclave of islands and Chinese mainland on the southern Chinese coastline, approximately 22°N and 114°E, encompassing around 1,100 km^2 of cities, villages, country parks, islands, mountains, tropical seasonal monsoon forest, hill-streams, over seven million people and at least 2,300 moth species. It comes as a surprise to most visitors that there is room at all for the mountains and forests here!

I first visited Hong Kong in 1982 as a schoolboy. In the intervening time, the city has grown and changed, with many areas previously under agricultural management abandoned or converted to housing, as many people looked (and still do) to cash in on the property market here. The protected area network, including country parks and special areas, as well as sites of special scientific interest (which perversely have no legal protection from development!), accounts for almost 40% of Hong Kong's land area, though much of this land is above 200m elevation and difficult to build on due to the steep nature of the ancient volcanic landscapes that dominate the skyline here (Fig 1).

The country parks were designated mostly in the 1970s, primarily to serve as water catchments. Most of Hong Kong's natural vegetation was converted by humans to settlements, agriculture and fisheries industries between about 3,000 and several hundred years ago. Few original forest fragments (maybe none) remained intact; what forest species there were survived in small *fung shui* woods maintained by villagers. Following this almost total loss of forest, grassland dominated for several centuries, prior to afforestation projects taking place in the early 20th C and again, following deforestation during the Second World War, during the 1950s and 1960s. Naturally regenerating secondary forest recovered after the 1970s through much of the afforested land acting as nursery cover and this process continues apace in Hong Kong, such that it is now a regionally significant conservation resource (see Dudgeon & Corlett, 2011 for more historical background on the vegetation of Hong Kong).

Recording Gelechioidea in Hong Kong continues

Moth recording in general in Hong Kong has not been a prominent natural history pastime, with little documented or catalogued recording taking place prior to the 1960s. Notable exceptions to this are J. Bowring, an eminent entomologist and son of the third Governor of Hong Kong, who provided much invertebrate material described in the 1850s and 1860s, and R. Mell, who passed through Hong Kong early in the 20th C *en route* to Guangzhou, from where he travelled extensively through Guangdong Province, documenting many larger moth species, publishing important works, notably on Sphingidae (Mell, 1922). The first microlepidoptera recording done in earnest appears to have taken place in the 1960s, with a team collecting material in malaise traps (headed by Voss) — some 10,000 Hong Kong microlepidoptera specimens reside in the Bernice P. Bishop Museum, Honolulu as a result of this fieldwork, though most are in a rather battered condition. There was also some fieldwork undertaken by the Hong Kong government, recording primarily agricultural species, from the 1960s to the present, with material preserved at the Tai Lung Experimental Farm, Sheung Shui, which provided the basis for the first insect checklist for Hong Kong (So, 1967; updated by Lee & Winney, 1982). There are a few Gelechioidea mentioned in this list, though almost all are associated with human crops.

A more thorough approach to recording Hong Kong's microlepidoptera started with my general study of moths in Hong Kong for my Ph.D. at The University of Hong Kong (Kendrick, 2002), substantially augmented a few years later by the arrival of Mark Sterling, a prominent "amateur" microlepidopterist from England, who immediately set about recording and rearing microlepidoptera. Hundreds of evening and overnight light trapping sessions since 1997, and a fair few hours of searching for leaf mines, webbings, leaf rolls and other larval workings (M.Sterling, pers com.) have yielded a rich Gelechioidea fauna (at least 200 species to date, around 8% of all moth species in Hong Kong) that appears surprisingly lacking in widely distributed species, in stark contrast to the majority of "macro" moths and Pyraloidea found in Hong Kong, which appear to be primarily associated with a fauna that extends from the eastern Himalaya through northern Indochina to the south China coastal region, or even further south. It became clear that a better understanding of the global distribution of Hong Kong's moth fauna would provide some insight into this apparent distribution disparity. How best to go about researching these distributions?

When I started my studies, the available literature for the Oriental microlepidoptera was rather sparse. Combined with concerns about the loss of habitat im-

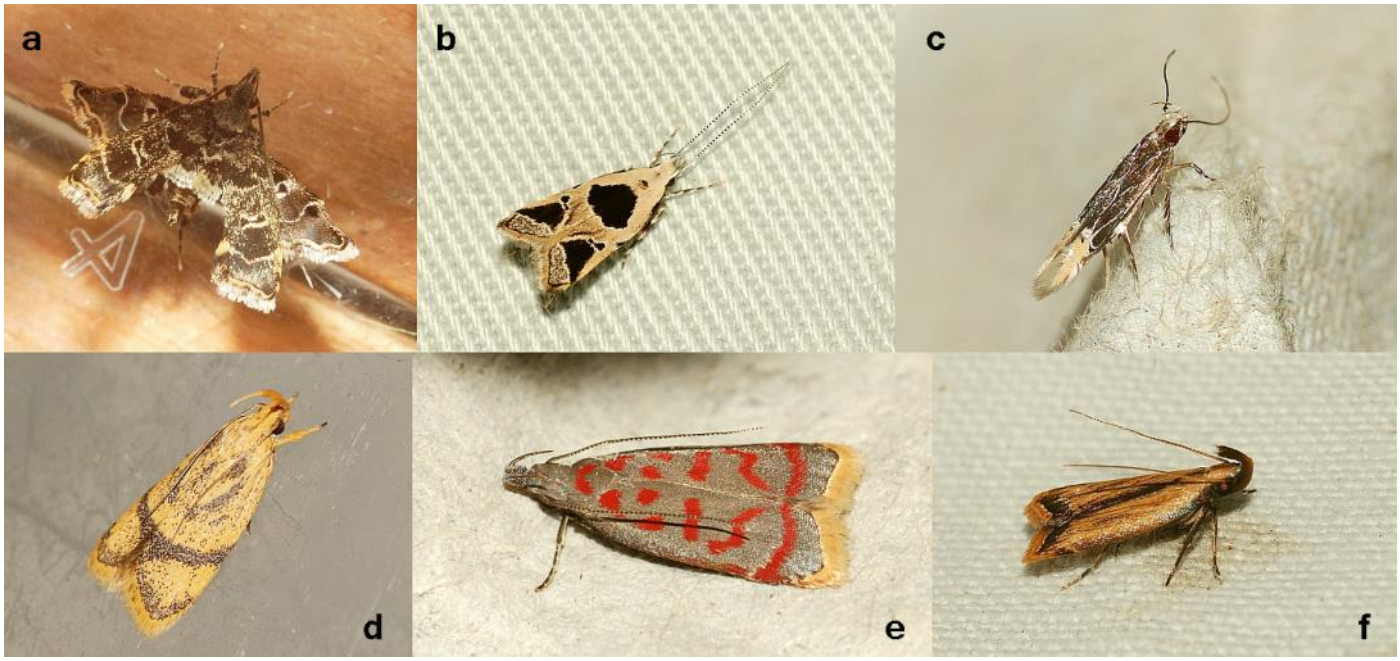

Figure 2. A small selection of Gelechioidea from Hong Kong: Lecithoceridae (a) **Nosphistica *sp. cf.* bisinuata *Park, 2002; (b)*** **Deltoplastis *sp. cf.* commatopa *Meyrick, 1932; Cosmopterigidae (c)*** **Cosmopterix *sp. indet.; Oecophoridae (d)*** **Periacma *sp. cf.* isanensis *Moriuti, Saito & Lewvanich 1989; Gelechiidae (e)*** **Dichomeris sandycitis *(Meyrick, 1907); (f)*** **Dichomeris parvisexafurca *Li, Zhen & Kendrick, 2010 (paratype).***
Photos by R.C. Kendrick

Recording Gelechioidea in Hong Kong continues

pinging upon the long term survival of many tropical forest species in Asia, especially in and adjacent to Hong Kong (and considering the fragmentation of forests, as well as how habitat fragmentation affects species metapopulations), I felt that searching existing museum collections would not provide sufficient information to help answer my questions. Consequently, I asked my then boss (the Head of Fauna Conservation Department at Kadoorie Farm & Botanic Garden [KFBG], an independent non-governmental organisation [NGO] in Hong Kong) if I could organise a symposium on Lepidoptera Conservation. KFBG hosted the first South-East Asian Lepidoptera Conservation Symposium in 2006 (Kendrick, 2007), attended by academics, conservation practitioners, Govt. staff and amateur Lepidopterists from India to Indonesia, Singapore to Tianjin, and with key speakers from as far off as Australia and Europe guiding us through some of the issues affecting the conservation of Lepidoptera. At this symposium, I met Prof. Li Hou Hun, a key figure in Gelechioidea (and "microlepidoptera" generally) taxonomy, especially of China (e.g. Li, 2002; Li *et al*., 2012). He agreed to investigate the mostly unidentified gelechioid material I collected for my Ph.D. (and subsequently for KFBG on their grounds adjacent to Tai Mo Shan, which, at 957m elevation, is the highest point in Hong Kong). This material was generously supplemented by Mark Sterling, who provided access to his *Dichomeris* and *Helcystogramma* specimens.

The collaboration with Prof. Li, his wife, Wang Siu Xia and their students at Nankai University, Tianjin has now yielded papers on six gelechioid genera (37 species) from Hong Kong: *Dichomeris* (three newly described species; Li *et al*., 2010); *Stereodytis* (two new species; Wang & Kendrick, 2009); *Ripeacma* (one new species; Yuan & Wang, 2009); *Variacma* (three new species; Wang *et al*., 2011); *Scaeosopha* (one new species; Li, Zhang & Sinev, 2012) and *Promalactis* (three new species; Wang *et al*., 2009); though since publication further *Dichomeris* and *Promalactis* species have been found! The symposium series (widened to all Asia, the Asian Lepidoptera Conservation Symposium [ALCS]) has continued, further establishing ties between academics, taxonomists and conservationists throughout Asia and beyond.

Since establishing my own wildlife consultancy company, C&R Wildlife, I have undertaken surveys of moths for the Hong Kong Government, environmental NGOs and private individuals, as well as attending the 4th ALCS, hosted by Prof. Li at Nankai University in June 2012 (just two months after suffering a mild stroke, which still leaves me with serious fatigue issues on a daily basis, though thankfully no long term physical impairment), giving a presentation on species arriving in Hong Kong since I started my Ph.D., looking at where these species originated. No Gelechioidea included, though, as there was no reliable recording of Gelechioidea when I started recording moths generally in Hong Kong for my Ph.D. The data gained in the 16 years since I started and still being added to, will in time (two or three more ALCS away), will be sufficient to assess the status of the Gelechioidea species found in Hong Kong rather more accurately. Since the start of the ALCS in 2006, there have been many publications on Oriental Gelechioidea, especially Lecithoceridae, Gelechiidae and Oecophoridae. I am looking forward to work appearing on Cosmopterigidae for China in the not too distant future, and am processing the species "catalogue" component of my thesis into an illustrated guide of Hong Kong moths. I hope that there will be far fewer "sp. indet." on the Hong Kong moth list (especially for Gelechioidea) by the time I publish the guide.

The ALCS has been invaluable to bring together specialist taxonomists and conservationists to allow a better understanding of regional faunas. So much so that I, as an end user of taxonomic information, am now in a much stronger position to provide advice on species

Figure 3. Delegates at the second Asian Lepidoptera Conservation Symposium, Penang, Malaysia, November 2008. "Conservation of Lepidoptera through Education and Research". Photo by Penang Butterfly Farm

Recording Gelechioidea in Hong Kong

continues

distribution and status. To this end, I have been asked to assist with the development of Hong Kong's own territory-wide Biodiveristy Strategy & Action Plan. The Gelechioidea is one group where such collaboration in Asia is now strong and still strengthening thanks in part to global focal action through I.N.G.A. I am grateful to Richard Brown for inviting me to write an article on the Gelechioidea of Hong Kong. Whilst I am field oriented rather than taxonomically trained, I am happy to collaborate with taxonomists for the benefit of the organisms being studied. Indeed, I would like to see more ecologists and conservationists collaborating with taxonomists across all the invertebrates - conservation needs taxonomy to provide a platform for nomenclature in conservation legislation, helping to act for solid conservation of habitats under threat and thereby conserve not just the target taxon, but all the other species that utilise the same habitat as their primary home.

Further on-line information on Hong Kong's Gelechioidea and the ALCS:

Hong Kong Gelechioidea on Flickr: http://www.flickr.com/photos/hkmoths/sets/72157616900373998/

Hong Kong Moths website (work always in progress!): http://www.hkmoths.com

i-Naturalist - http://www.inaturalist.org/projects/hong-kong-moths/

ALCG - https://www.facebook.com/Asian.Moths.and.Butterflies?ref=hl

Literature Cited

Dudgeon, D. & Corlett, R. (2011) *The Ecology and Biodiversity of Hong Kong* (revised edition). Lions Nature Education Foundation & Cosmos Books Ltd., Hong Kong. 344pp.

Kendrick, R.C. (2002) *Moths (Insecta: Lepidoptera) of Hong Kong*. Ph.D. thesis, The University of Hong Kong. xvi + 660 pp. [online at http://dx.doi.org/10.5353/th_b3027883].

Kendrick, R.C., (ed.) (2007) *Proceedings of the First South East Asian Lepidoptera Conservation Symposium, Hong Kong 2006*. Kadoorie Farm & Botanic Garden, Tai Po, Hong Kong. 160 pp. [online at http://www.kfbg.org/content/22/22/1/SEALCS_2006_Proceedings.pdf].

Lee, L.H.Y. & Winney, R. (1982) *Check List of Agricultural Insects of Hong Kong 1981*. Agriculture and Fisheries Department Bulletin No.2. 164 pp.

Li, H. H. (2002) *The Gelechiidae of China (I) (Lepidoptera: Gelechioidea)*. Nankai University Press, Tianjin. 504 pp., 32 plates.

Li, H.H., Zhen, H., Kendrick, R.C. & Sterling, M.J. (2010) Microlepidoptera of Hong Kong: Taxonomic study on the genus *Dichomeris* Hübner, 1818, with descriptions of three new species (Lepidoptera: Gelechiidae). *SHILAP Revista de lepidopterología,* **38** (149), 67-89. . [online at http://redalyc.uaemex.mx/src/inicio/ArtPdfRed.jsp?iCve=45514996004].

Li, H.H., Zhang, Z.W. & Sinev, S.Y. (2012) Review of the genus *Scaeosopha* Meyrick, 1914 (Lepidoptera, Cosmopterigidae, Scaeosophinae) in the world, with descriptions of sixteen new species. *Zootaxa,* **3322**, 1-34.

Li, H.H., Wang, S.X., Zhen, H., Zhang, J., Hu, B.B., Jing, Q., Sun, Y.H., You, P., Xiao, Y.L., Bai, H.Y., Zhu, Y.M., Zhang, Z.W., Yu., H.L., Li, W.C., Ren, Y.D., Zhang, D.D., Du, X.C., Hao, S.L., Lu, J.L., Han, H.X., Xue, D.Y., Wu, C.S., Zhang, X., Hua, B.Z., Wang, X.P. & Zhang, A.H. (2012) *Microlepidoptera of Qinling Mountains*. Science Press, Beijing. xviii + 1271 pp., 35 plates.

Mell, R. (1922) *Beiträge zur Fauna sinica (II). Biologie und Systematik der Süd-Chinesischen Sphingiden, vols. 1 & 2*. R. Friedländer & Sohn, Berlin. xxii + 177 pp. + 331 pp.

So, P.Y. (1967) A Preliminary List of the Insects of Agricultural Importance in Hong Kong. Agriculture & Fisheries Dept., *Hong Kong Agricultural Bulletin No. 1*.

Wang, S.X. & Kendrick, R.C. (2009) The genus *Stereodytis* Meyrick (Lepidoptera: Oecophoridae) from China, with descriptions of two new species. *Entomologica Fennica,* **20,** 186-190.

Wang, S.X., Kendrick, R.C. & Sterling, P. (2009) Microlepidoptera of Hong Kong: Oecophoridae I: the genus *Promalactis* Meyrick. *Zootaxa,* **2239**, 31-44.

Wang, S.X., Yuan G.X. & Kendrick, R.C. (2011) Microlepidoptera of Hong Kong: Oecophoridae II: description of three new species of the genus *Variacma* Wang. *Zootaxa,* **2762**, 31 –36.

Yuan, G.X. & Wang, S.X. (2009) A new species of *Ripeacma* from Hong Kong (Lepidoptera: Oecophoridae). *Entomological News,* **120** (4), 449.

New Digital Identification Tool of 'Microlepidoptera on Solanaceae' Available Online

James Hayden, Sangmi Lee, Steven Passoa, James Young, Jean-François Landry, Vazrick Nazari, Richard Mally, Louis Somma & Kurt Ahlmark

A new digital identification tool, "Microlepidoptera on Solanaceae" (http://idtools.org/id/leps/micro/), was officially released on Monday, September 30, 2013. This identification tool was developed through cooperation between USDA Animal and Plant Health Inspection Service's Identification Technology Program (ITP) and the Florida Department of Agriculture and Consumer Services, Division of Plant Industry (FDACS -DPI), with the specific goals of enhancing the ability of plant inspectors and diagnosticians in Florida to identify microlepidopteran pests of Solanaceae. The state of Florida is a leader in US vegetable production, especially in solanaceous crops, such as tomato, pepper, potato and tobacco, which are susceptible to certain complexes of pest species, to invasion by known non-native pests of regulatory and quarantine importance. Hence, diagnosticians need to be able to quickly distinguish genuine invasive species from already established pests and innocuous native species, so as to facilitate trade.

"Microlepidoptera on Solanaceae" are one of over 35 online identification tools for plant pests and diseases produced by ITP. The website includes an

Figure 1. Front page of the official website of Microlepidoptera on Solanaceae

‘Microlepidoptera on Solanaceae’ continues

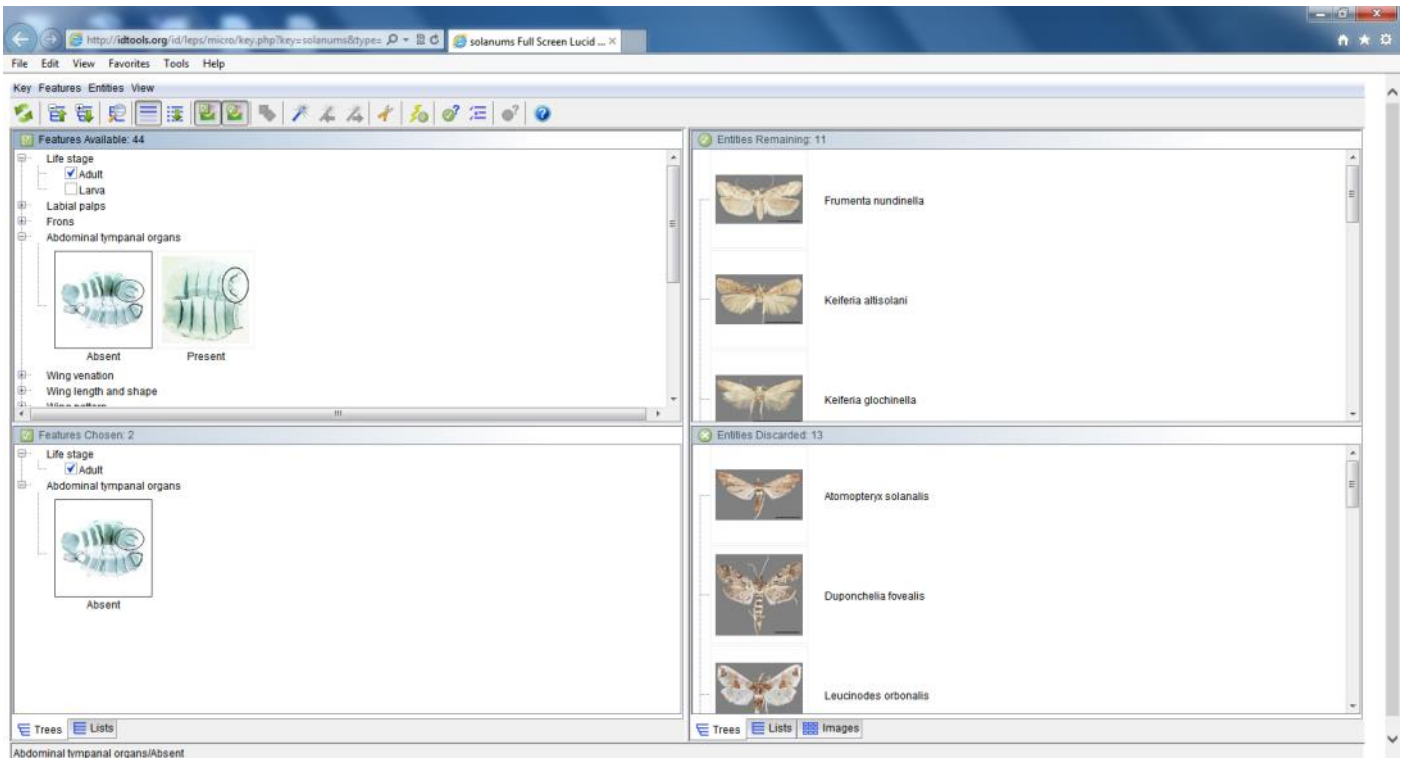

Figure 2. Full screen of Lucid Online Key of Microlepidoptera on Solanaceae

interactive identification key, fact sheets, descriptions, images of adults and genitalia, and an illustrated glossary of terms. The tool focuses on 24 species in two specific groups of microlepidoptera – Gelechioidea (11 species of Gnorimoschemini (Gelechiidae)) and Pyraloidea (13 species of the Leucinodes group of Spilomelinae (Crambidae)) – which represent the largest radiations of microlepidopterans feeding on Solanaceae, with a disproportionately large number of economically important or easily confusable native or exotic species. More specifically, this website serves to aid in identifying the detected sample specimens if they are a species of concern. The key in this tool is a matrix -based digital key developed using the Lucid software. Using the key with Lucid3 Player, the details are provided with the information on this website with the links.

***Figure 3. Images from the factsheet of* Keiferia lycopersicella**

Revising the North American Gnorimoschemini: Unlocking the Heritage of Dalibor F. Povolný

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Figure 1. Dalibor Povolný conversing with a young Ole Karsholt during the 9th European Congress of Lepidopterology in Lednice, Czech Republic, September 1994. Photo by Jean-Francois Landry

For a student of microlepidoptera in North America looking for a taxonomically challenging group to tackle, finding one among the Gelechiidae won't be too difficult. Many of the Nearctic gelechiid groups have been historically neglected and are in dire need of a thorough revision. In most cases these would be understudied groups with a slim literature record, so it may seem desirable to choose instead groups for which a large body of work already exists. The Gnorimoschemini are one such group.

Alongside Walsingham and Meyrick, the Czech entomologist Dalibor F. Povolný (1924-2004) was one of the most prolific gelechiid workers in history, and the dominant expert on the world Gnorimoschemini fauna for over 40 years. He is single-handedly responsible for describing the vast majority of Gnorimoschemini species of the world, including more than half of the known North American fauna. His immense contributions to the understanding of Gnorimoschemini cannot be underestimated, considering that he did not have many of the technological advances that we have today, including DNA and high tech photography capabilities.

Unfortunately, Povolný was also one of the world's most erratic microlepidopterists in modern times. Despite a huge publication record, Povolný's papers are very difficult to use due to the uneven quality of the descriptions, lack of identification keys, and lack of clear diagnoses. He wrote and described species in Czech, English, French, German or Spanish. His genitalia drawings - the key element essential for proper identification - are uniformly terrible. Although the superb technique of unrolling the male genitalia (Pitkin, 1986) to expose important structures (e.g. vinculum, valva and sacculus) was introduced when he was still very active, Povolný never adopted it, and until his death he continued to use crude line-drawings of intact male genitalia, often not in correct position, and with or without the aedeagus removed. He also never drew the whole female genitalia, rather only the subgenital plate and the signum. Subsequent workers following this method are also at fault since the full aspect of the female genitalia can be taxonomically very informative (e.g. size ratio of corpus bursae/ductus bursae, position of signum on corpus bursae, etc).

Povolný often did not dissect his designated holotypes. Instead, confident of his paratype selection, he would illustrate adults or genitalia of random paratypes. As it turns out, his type series were often a mixture of several species; i.e. cases where the holotype is a completely different species from the illustrated paratypes.

Unlocking the Heritage of Dalibor F. Povolný continues

Povolný described species in a hurry, often preparing tens of dissections in a row, quickly boiling the abdomens in KOH and slapping them on slides without even pulling them out of the abdomen or doing any cleaning. Consequently, beside the poor quality of his preps and damage to genitalia, he frequently mixed up things. Case in point: In describing *"Ephysteris"* (*Scrobipalpula*) *hodgesi* (Povolný, 1967), the illustrated genitalia of the female holotype belongs to the very well known *Symmetrischema tangolias*, while in the same paper under *tangolias* (=*plesiosoma*) he illustrated an incorrect female genitalia, one that looks suspiciously *Gnorimoschema*-like. Many of Povolný's papers also suffer from duplicated slide numbers or incorrect captions. The publication of his new species in obscure and unusual journals further complicates the matter. The most remarkable example of this is the description of 14 new species of *Gnorimoschema* from Canada and 5 new North American records of Palearctic species (Povolný 1998) in a special issue of the botanical journal Stapfia (dedicated to a deceased entomologist), published in Austria! To top it off, not a single specimen discussed in that paper are deposited in any of the North American Museums.

Povolný did not hesitate to describe new species based on single specimens. As a result, he often described the same species twice, once based on a specimen of each sex. In one case, he described two species, each based on one sex, both from the same rearing lot! In another case, he described the same species under three separate names from different localities, unaware that all of these refer to a species that already had been named by Busck many years earlier. But to give credit where its due, he realized the flaws with this kind of work, and in the introduction to one of his papers he actually says, "I cannot exclude that some of these new descriptions will later reveal to be superfluous" (Povolný 2003).

Povolný usually did not discuss observed variation within the species he described, and maintained peculiar ideas on the taxonomy of "polytypic species" (e.g. see 1998:337 on *Gnorimoschema nordlandicolella*). He was a harsh critic of his peers who questioned his methodology or conclusions (e.g. Povolný 1993, 2000).

Povolný was never in a hurry to return his borrowed material. He kept the primary types of what he described in his private collection, making them essentially unavailable to most researchers to study. Upon his death in 2004, it was revealed that Povolný had sold his collection simultaneously to two museums (Karlsruhe and the Moravian Museum in Brno), and these institutions had to sort out the issue between themselves. Eventually, his collection was transferred to the Moravian Museum, and only then was it possible for some of his borrowed material to be returned to their rightful owners (Huemer & Karsholt, 2010).

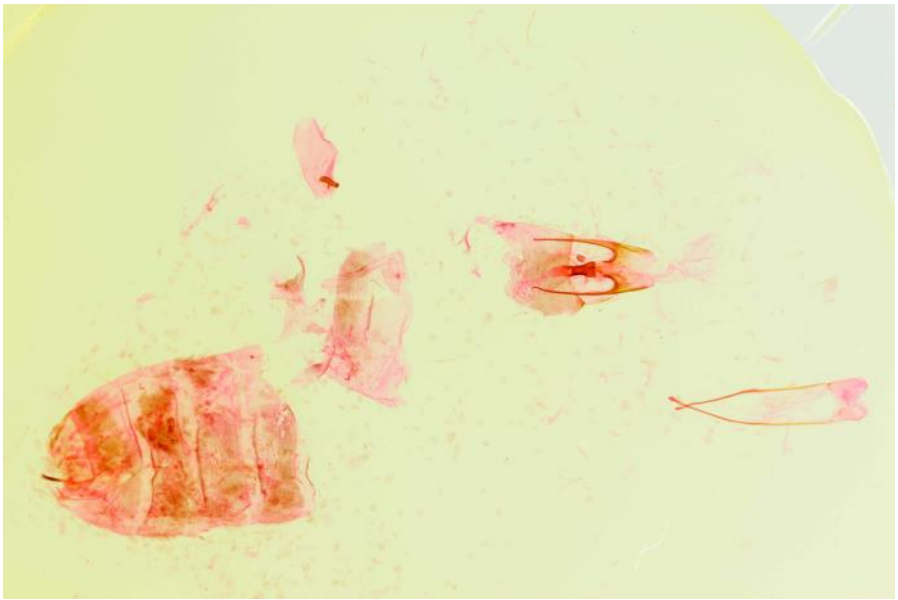

Figure 2. An example of Povolný's dissections: The female holotype of* Gnorimoschema wagneri*, dissection Wg.1184 (coll. Wagner).

Literature Cited

Huemer, P. & Karsholt, O. (2010) *Microlepidoptera of Europe, Vol. 6: Gelechiidae II (Gelechiinae: Gnorimoschemini)*. Apollo Books, Stenstrup. 586 pp., 21 colour plates.

Moreno, A.V. (2006) In Memoriam. Profesor Doctor Ingeniero Dalibor Povolny, 1924-2004. – *SHILAP Revista Lepidopterologia* 34, 429-438.

Pitkin, L. (1986) A technique for the preparation of complex male genitalia in Microlepidoptera. – *Entomologist's Gazette* 37, 173-179.

Povolný, D. (1967) Genitalia of some nearctic and neotropic members of the tribe Gnorimoschemnini (Lepidoptera, Gelechiidae). – *Acta Entomologica Musei Nationalis Pragae* 37, 51-127.

Povolný, D. (1993) Zur Taxonomie und Nomenklatur der amerikanischen gnorimoschemoiden Gattungen *Tuta* Strand, *Tecia* Strand, *Scrobipalpopsis* Povolny und *Keiferia* Busck (Insecta: Lepidoptera: Gelechiidae). – *Reichenbachia*, 30, 85-98.

Povolný, D. (1998) New Taxa and faunistic records of the tribe Gnorimoschemini from the Nearctic Region (Lepidoptera, Gelechiidae). *Stapfia* 55, 327-347.

Povolný, D. (2000) Towards the interpretation of the Palaearctic taxa of the *Scrobipalpula psilella* (Herrich-Schäffer, 1854) complex (Lepidoptera, Gelechiidae, Gnorimoschemini). – *Acta Univ. Agric. Silvic. Mendel. Brun. (Brno)*, 48, 71-89.

Povolný, D. (2003) Description of twenty-five new Nearctic species of the genus *Gnorimoschema* Busck, 1900 (Lepidoptera: Gelechiidae). – *SHILAP Revista Lepidopterologia* 31, 285-315.

Lepidoptera Course in Arizona for 2014

The annual Lepidoptera Course at the Southwest Research Station will be held August 14-23, 2014. The course is designed for students, amateur naturalists, conservation biologists, and other biologists who have an interest in learning more about butterfly and moth taxonomy. It will emphasize taxonomy, ecology, and field identification of Lepidoptera in southeastern Arizona. In addition to lectures, daily field trips and lab work will provide participants instruction on collecting, preparing, dissecting, and identifying specimens. Registration information for the 2014 course will be posted at the following website under the education tab in the near future: http://research.amnh.org/swrs/

John Brown pinning microlepidoptera at the 2010 Lepidoptera Course.

A Revised Classification for Gelechioidea

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As probably all the readers of this newsletter know, the family-level classification of Gelechioidea has been extremely confusing. Many of the published classifications have been in disagreement with each other as the number of families and the composition of these has varied.

Our recent publication, "Morphology reinforces proposed molecular phylogenetic affinities: a revised classification for Gelechioidea (Lepidoptera)" (*Cladistics*, e-pub ahead of print, DOI: http://dx.doi.org/10.1111/cla.12064), includes the largest taxon sampling, number of genes, and number of morphological characters ever used to study the phylogeny of Gelechioidea. Based on our results we have proposed a revised classification that divides the superfamily into 16 families. Our aim has been to provide a classification that follows our results as closely as possible while minimizing the number of alterations to the most recent classification in van Nieukerken et al. (2011). We also discuss morphological structures that are characteristic of the families. The main revisions include a redefined Depressariidae, a restricted Elachistidae and a restriction of Batracheridae to the core *Batrachedra* with the taxa previously included in it placed in an expanded Pterolonchidae. In addition, our results well support the inclusion of Chimabachidae as a subfamily of Lypusidae and the inclusion of *Deuterogonia* and Pleurotinae in Oecophoridae. Because some of the established family names are junior synonyms, we have, together with colleagues, begun to prepare a petition to the International Commission of Zoological Nomenclature to conserve the usage of these names.

Figure 1. **Hypertropha** ***sp. nr*** **desumptana** ***from Australia. Previous Elachistidae, now Depressariidae. Photo by Pekka Malinen***

Gelechioidea are really a mega-diverse group, the diversity of species in many areas of the world is still unexplored. We hope that future studies will include taxa from these other geographic areas as there are still many taxa that do not match any of the present families, and a wider taxon sampling could bring a solution to the situation. The evolutionary relationships between the families are also still uncertain. A wider taxon sampling combined with effective molecular techniques and morphological work will without doubt bring us more information on the relatedness of the families. Our study was not designed to explore subfamily classifications and therefore the results contradict subfamily classifications of several families. We encourage all gelechioid aficionados to do more focused studies on subfamilies to obtain more resolution to these groups!

Autostichidae Le Marchand, 1947 (650 spp.)

- Autostichinae Le Marchand, 1947
- Deocloninae Hodges, 1998
- Glyphidocerinae Hodges, 1998
- Holcopogoninae Gozmány, 1967
- Oegoconiinae Leraut, 1992
- Symmocinae Gozmány, 1957

Lecithoceridae Le Marchand, 1947 (1200 spp.)

- Ceuthomadarinae Gozmány, 1978
- Lecithocerinae Le Marchand, 1947
- Torodorinae Gozmány, 1978
- Crocanthes group of genera
- *Martyringa* group

Xyloryctidae Meyrick, 1890 (500 spp.)

Oecophoridae Bruand, 1850 (3400 spp.)

- Oecophorinae Bruand, 1850
  - Ashinagidae Matsumura, 1929
- Pleurotinae Toll, 1956

A Revised Classification for Gelechioidea continues

Depressariidae Meyrick, 1883 (2300 spp.)

Acriinae Kuznetsov and Stekolnikov, 1984

Aeolanthinae Kuznetsov and Stekolnikov, 1984

Cryptolechiinae Meyrick, 1883

[Orophiinae Lvovsky, 1974 nec Thomson, 1863, homonym]

Depressariinae Meyrick, 1883

Ethmiinae Busck, 1909

Hypercalliinae Leraut, 1993

Hypertrophinae Fletcher, 1929

Oditinae Lvovsky, 1996

Peleopodinae Hodges, 1974

Stenomatinae Meyrick, 1906

Carcina, *Gonionota*, *Machimia*, *Himmacia s. stricto*, *Psilocorsis*, and probably several genera hitherto placed in Oecophoridae; here not placed in any subfamilies

Cosmopterigidae Heinemann and Wocke, 1876 (1730 spp.)

Chrysopeleiinae Mosher, 1916

Antequerinae Hodges, 1978

Cosmopteriginae Heinemann and Wocke, 1876

Scaeosophinae Meyrick, 1922

Gelechiidae Stainton, 1854 (4700 spp.)

Physoptilinae Meyrick, 1914

Anacampsinae Bruand, 1850

Dichomeridinae Hampson, 1918

Anomologinae Meyrick, 1926

Thiotrichinae Karsholt et al., 2013

Gelechiinae Stainton, 1854

Elachistidae Bruand, 1850 (830 spp.)

Elachistinae Bruand, 1850

Agonoxeninae Meyrick, 1926

Parametriotinae Capuse, 1971

Coleophoridae Bruand, 1850 (1400 spp.)

Batrachedridae Heinemann and Wocke, 1876, in restricted concept (presently only 2 spp. verified)

Scythrididae Rebel, 1901 (650 spp.)

Blastobasidae Meyrick, 1894 (430 spp.)

Blastobasinae Meyrick, 1894

Holcocerinae Adamski, 1989

Stathmopodidae Meyrick, 1913 (100 spp.)

Momphidae Herrich-Schäffer, 1857, (60 spp.)

Pterolonchidae Meyrick, 1918 (revised concept 30 + spp.)

Pterolonchinae Meyrick, 1918

Coelopoetinae Hodges, 1978

Syringopainae Hodges, 1998

Houdinia group, *Homaledra* with position unresolved

Lypusidae Herrich-Schäffer, 1857 (estimated 150 spp., number of species of Periacmini uncertain)

Lypusinae Herrich-Sch€affer, 1857

Chimabachinae Heinemann, 1870 stat. n.

Taxa with uncertain position [current position in parentheses]

Crossotocerini Lvovsky, 2002 [Oecophoridae]
Lamprysticinae Lvovsky, 1996b [Agonoxenidae]
Oeciinae Hodges, 1998 [Holcopogoninae]
Schistonoeinae Hodges, 1998 [Schistonoeidae]
Fuchsiini Lvovsky, 1985 [Oecophoridae]
Epimarptiinae Meyrick, 1914 [Batrachedridae]

Literature Cited

van Nieukerken, E. J., Kaila, L., Kitching, I. J., Kristensen, N. P., Lees, D. C., Minet, J., Mitter, C., Mutanen, M., Regier, J. C., Simonsen, T. J., Wahlberg, N., Yen, S.-H., Zahiri, R., Adamski, D., Baixeras, J., Bartsch, D., Bengtsson, B. Å., Brown, J. W., Bucheli, S. R., Davis, D. R., De Prins, J., De Prins, W., Epstein, M. E., Gentili-Poole, P., Gielis, C., Hättenschwiler, P., Hausmann, A., Holloway, J. D., Kallies, A., Karsholt, O., Kawahara, A. Y., Koster, J. C., Kozlov, M. V., Lafontaine, J. D., Lamas, G., Landry, J.-F., Lee, S., Nuss, M., Park, K.-T., Penz, C., Rota, J., Schmidt, B. C., Schintlmeister, A., Sohn, J.-S., Solis, M. A., Tarmann, G. M., Warren, A. D., Weller, S., Yakovlev, R. V., Zolotuhin, V. V., Zwick, A. 2011. Order Lepidoptera. – *In*: Zhang, Z-Q (Ed.), Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa* 3148, 212–221.

New Gelechioidea Publication

Shared but overlooked: 30 species of Holarctic Microlepidoptera revealed by DNA barcodes and morphology

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In this study, the authors report 30 species of Lepidoptera previously known from either the Palearctic or the Nearctic that are newly recorded as Holarctic. For 28 of these species, their intercontinental distributions were initially detected through DNA barcode analysis and subsequently confirmed by morphological examination; two Palearctic species were first detected in North America through morphology and then barcoded. When possible, the origin and status of each species (introduced, overlooked Holarctic species, or unknowingly re-described) is discussed, and its morphology is diagnosed and illustrated.

The species involved include **Tineidae:** *Scardia amurensis* Zagulajev, *Triaxomera parasitella* (Hübner), *Nemapogon cloacella* (Haworth), *Elatobia montelliella* (Schantz), *Tinea svenssoni* Opheim; **Gracillariidae:** *Caloptilia suberinella* (Tengström), *Parornix betulae* (Stainton); *Phyllonorycter maestingella* (Müller); **Yponomeutidae:** *Paraswammerdamia albicapitella* (Scharfenberg), *P. conspersella* (Tengström); **Plutellidae:** *Plutella hyperboreella* Strand; **Lyonetiidae:** *Lyonetia pulverulentella* Zeller; **Autostichidae:** *Oegoconia deauratella* (Herrich-Schäffer), *O. novimundi* (Busck); **Blastobasidae:** *Blastobasis glandulella* (Riley), *B. maroccanella* (Amsel), *B. tarda* Meyrick; **Depressariidae:** *Agonopterix conterminella* (Zeller), *Depressaria depressana* (F.); **Coleophoridae:** *Coleophora atriplicis* Meyrick, *C. glitzella* Hofmann, *C. granulatella* Zeller, *C. texanella* Chambers, *C. vitisella* Gregson; **Scythrididae:** *Scythris sinensis* (Felder & Rogenhofer); **Gelechiidae:** *Altenia perspersella* (Wocke), *Gnorimoschema jalavai* Povolný, *Scrobipalpa acuminatella* (Sircom), *Sophronia gelidella* Nordman; **Choreutidae:** *Anthophila fabriciana* (L.); and **Tortricidae:** *Phiaris bipunctana* (F.). These cases of previously unrecognized faunal overlap have led to their redescription in several instances.

Five new synonyms are proposed: *Blastobasis glandulella* (Riley, 1871) = *B. huemeri* Sinev, 1993, syn. nov.; *B. tarda* Meyrick, 1902 = *Neoblastobasis ligurica* Nel & Varenne, 2004, syn. nov.; *Coleophora atriplicis* Meyrick, 1928 = *C. cervinella* McDunnough, 1946, syn. nov.; *C. texanella* Chambers, 1878 = *C. coxi* Baldizzone & van der Wolf, 2007, syn. nov., and = *C. vagans* Walsingham, 1907, syn. nov. Lectotypes are designated for *Blastobasis tarda* Meyrick and *Coleophora texanella* Chambers. The authors identify 12 previously overlooked cases of species introductions, highlighting the power of DNA barcoding as a tool for biosurveillance.

Figure 1. **Scrobipalpula acuminatella** ***from Les-Collines-de-l`Outaouais , Pontiac, Quebec, 14 July 1999, J.F. Landry leg. (CNCLEP00067700), a new record for North America and one of the 30 species discussed in this paper.***

Photo by Canadian National Collection

Jean-François Landry, Vazrick Nazari, Jeremy R. DeWaard, Marko Mutanen, Carlos Lopez-Vaamonde, Peter Huemer & Paul D.N. Hebert (2013) Shared but overlooked: 30 species of Holarctic Microlepidoptera revealed by DNA barcodes and morphology. - Zootaxa 3749 (1): 001–093 (16 Dec. 2013).

The full article can be downloaded from the Zootaxa website: http://www.mapress.com/zootaxa/list/2013/3749(1).html

Recent Publications on Gelechioidea

Compiled by Maria Heikkilä & Richard Brown

Articles dealing with pest or biocontrol issues and those on species new to a certain region are not included.

Please, see I.N.G.A. issues n. 1 and 2 for other articles published in 2012 and 2013: http://mississippientomologicalmuseum.org.msstate.edu/Researchtaxapages/Lepidoptera/Gelechioidea/INGA_newsletter.html

2012 additions

Beeche, M. (2012) Contribution to the knowledge of the species of *Lucyna* (Lepiodoptera: Oecophoridae: Oecophorinae). *Revista Chilena de Entomologia* 37: 23–36.

King, G.E. and Montesinos, J.L.V. (2012) *Chionodes meridiochilensis* sp. nov. from Chile: contribution to an understanding of its biology and description of its early stages (Insects: Lepidoptera: Gelechiidae). *Acta Zoological Cracoviensia* 55: 45-58.

2013

Adamski, D. (2013) Erratum: Review of the Blastobasinae of Costa Rica (Lepidoptera: Gelechioidea: Blastobasidae) (Zootaxa (2013) 3618 (001-223)). *Zootaxa* 3640(3): 500–500. DOI: http://dx.doi.org/10.11646/zootaxa.3640.3.13

Adamski, D., Makinson, J.R., Brown, B.T., Wright, S.A., Pratt, P.D. amd Brown, J.W. (2013) Description and evaluation of *Metharmostis multilineata* (Cosmopterigidae) and *Idiophantis soreuta* (Gelechiidae) (Lepidoptera: Gelechioidea) for biocontrol of downy rose myrtle, *Rhodomyrtus tomentosa* (Myrtaceae). *Journal of the Lepidopterists' Society* 67(2): 111-127.

Baldizzone, G. and Corley, M.F.V. (2013) "*Coleophora sattleri*" Baldizzone, 1995 in Portugal, with description of the female and the larval biology (Lepidoptera: Coleophoridae). *SHILAP Revista de lepidopterología* 41(163): 317–322.

Beavan, S.D. and Heckford, R.J. (2013) A reassessment of the identity of *Elachista densicomella* Hodgkinson, 1879 (Lepidoptera: Elachistidae). *Entomologist's Gazette* 64(2): 123–127.

Bidzilya, O. and Karsholt, O. (2013) Two little-known species of Gelechiidae in the European fauna. *Nota lepidopterologica* 36(1): 77–84.

Chen, F., Huang, D. and Wu, C. (2013) Camellia fruit borer, *Neoblastobasis camelliae*, a new species of Blastobasinae in China (Lepidoptera, Blastobasidae). *Zootaxa* 3682(4): 556–562. DOI: 10.11646/zootaxa.3682.4.6

Du, Z.H., Wang, S.W., and Li, H.H. (2013) A review of the genus *Promalactis* Meyrick, 1908 (Lepidoptera: Oecophoridae) from Taiwan, China. *Journal of Natural History* DOI:10.1080/00222933.2013.791940

Ernst, W.H.O., van Nieukerken, E.J. and Koster, S. (2013) Why do caterpillars of *Coleophora taeniipennella* (Lepidoptera: Coleophoridae) move from *Juncus articulatus* to *Schoenus nigricans*? *Entomologische Berichten (Amsterdam)* 73 (2): 42–47.

Harrison, T.L. and Berenbaum, M.R. (2013) A new, prairie-restricted species of *Filatima* Busck (Lepidoptera: Gelechiidae) from Illinois. *Zootaxa* 3734 (4): 469–476. DOI: http://dx.doi.org/10.11646/zootaxa.3734.4.4

Heckford, R. J. and Beavan, S.D. (2013) *Scythris fallacella* (Schläger, 1847) (Lep.: Scythrididae): an account of the early stages. *Entomologist's Record and Journal of Variation* 125 (1):1–3.

Heikkilä, M., Mutanen, M., Kekkonen, M. and Kaila, L. (2013) Morphology reinforces proposed molecular phylogenetic affinities: a revised classification for Gelechioidea (Lepidoptera). *Cladistics* e-pub ahead of print. DOI: http://dx.doi.org/10.1111/cla.12064

Kameda, M. (2013) Oecophoridae of Hokkaido VII. *Yugato* 211:27–31.

Karsholt, O., Nel, J.,Fournier, F., Varenne, T. and Huemer, P. (2013) *Monochroa bronzella* sp. n. from the southwestern Alps (Lepidoptera: Gelechiidae). *Nota lepidopterologica* 36 (1): 13–18.

Kawahara, A. and Rubinoff, D. (2013). Convergent evolution of morphology and habitat use in the explosive Hawaiian fancy case caterpillar radiation. *Journal of Evolutionary Biology* 26(8): 1763–1773. DOI: http://dx.doi.org/10.1111/jeb.12176

Landry, J.-F., Nazari, V., deWaard, J.R., Mutanen, M., Lopez -Vaamonde, C., Huemer, P. and Hebert, P.D.N. (2013) Shared but overlooked: 30 species of Holarctic Microlepidoptera revealed by DNA barcodes and morphology. *Zootaxa* 3749 (1): 001–093 (16 Dec. 2013).

Liu, S. and Wang, S. (2013) Three new species of the genus *Issikiopteryx* Moriuti, 1973 (Lepidoptera: Lecithoceridae: Lecithocerinae) from China. *Zootaxa* 3669 (1): 037–042. DOI: http://dx.doi.org/10.11646/zootaxa.3669.1.4

Lvovsky, A.L. (2013) On the distribution of broad-winged moths (Lepidoptera, Oecophoridae) of the Palaearctic fauna. *Entomological Review* 93 (4): 422-431. DOI: http://dx.doi.org/10.1134/S0013873813040039

Lvovsky, A.L. (2013) New and little known species of the genus *Casmara* Walker, 1863 (Lepidoptera: Oecophoridae) from Southeast Asia. *Zoosystematica Rossica* 22(1): 107-110.

Mutanen, M. Kaila, L. and Tabell, J. (2013) Wide-ranging barcoding aids discovery of one-third increase of species richness in presumably well-investigated moths. *Scientific Reports* 3(2901):1–7. DOI: http://dx.doi.org/10.1038/

srep02901

Park, K.-T., Bae, Y.-S. and Kim, S. (2013) Three new species of "*Thubana*" Walker, 1864 from Cambodia and Malaysian Borneo (Lepidoptera: Lecithoceridae). *SHILAP Revista de lepidopterología* 41(163): 311–316.

Park, K.-T., Bae, Y.-S., Kim, S. and Heppner, J.B. (2013) Genus *Torodora* Meyrick in Cambodia (Lepidoptera: Lecithoceridae: Torodorinae), with descriptions of three new species.Journal of Natural History 47(35-36): 2289-2304. DOI: http://dx.doi.org/10.1080/00222933.2012.759285

Park, K.-T. and Kim, M. (2014) Three new species of *Neopectinimura* Park (Lepidoptera: Lecithoceridae) from Papua New Guinea, Indonesia. *Journal of Asia-Pacific Entomology* 17(1): 53–58. DOI: http://dx.doi.org/10.1016/j.aspen.2013.10.006

Park, K.-T. and Lee, S. (2013) A new genus of Lecithoceridae (Lepidoptera, Gelechioidea), from New Guinea, with a description of two new species. *Florida Entomologist* 96(1):219-224. DOI: http://dx.doi.org/10.1653/024.096.0129

Parkinson, D. (2013) An unusual creation of a third larval case by *Coleophora serratella* (Linnaeus, 1761) (Lepidoptera: Coleophoridae). *Entomologist's Gazette* 64 (3):166–167.

Passerin D'Entrèves, P. and Roggero, A. (2013) Taxonomy of Palaearctic scythridids: description of *Falkovitshella hindukushi* sp. nov. and *Scythris wadiqeltella* sp. nov. (Lepidoptera: Gelechioidea: Scythrididae). *Journal of Natural History* 47(29–30): 1983–1991. DOI: http://dx.doi.org/10.1080/00222933.2012.763106

Passerin D'Entrèves, P. and Roggero, A. (2013) The first case of gynandromorphism in *Enolmis* (Lepidoptera: Gelechioidea: Scythrididae). *Acta Entomologica Musei Nationalis Pragae* 53(1): 369–380.

Shamsudeen, R.S.M. (2013) Systematic studies on subfamily Gelechiinae (Lepidoptera: Gelechiidae)with new record to Western Ghats. *Academic Journal of Entomology* 6 (2): 74-78. DOI: http://dx.doi.org/10.5829/idosi.aje.2013.6.2.74184

Sonderegger, P. (2013) *Agonopterix flurii* sp. nov. aus dem Wallis, Schweiz (Lepidoptera, Depressariidae). *Contributions to Natural History* 21: 1–14.

Sterling, P. H., Wall, M. J. and Langmaid, J. R. (2013) The discovery of *Brachmia inornatella* (Douglas, 1850) (Lep.: Gelechiidae) in North Hampshire, with notes on its life history and a larval description. *Entomologist's Record and Journal of Variation* 125(1): 14–17.

Šumpich, J. (2013) *Depressaria pyrenaella* sp. n. - a confused species from south-western Europe (Lep. : Depressariidae). *Entomologist's Record and Journal of Variation* 125(3): 114–118.

Terada, T. (2013) A review of the *Stathmopoda aprica* species-group (Lepidoptera: Stathmopodidae) from Japan. *Lepidoptera Science* 64 (1): 18-26.

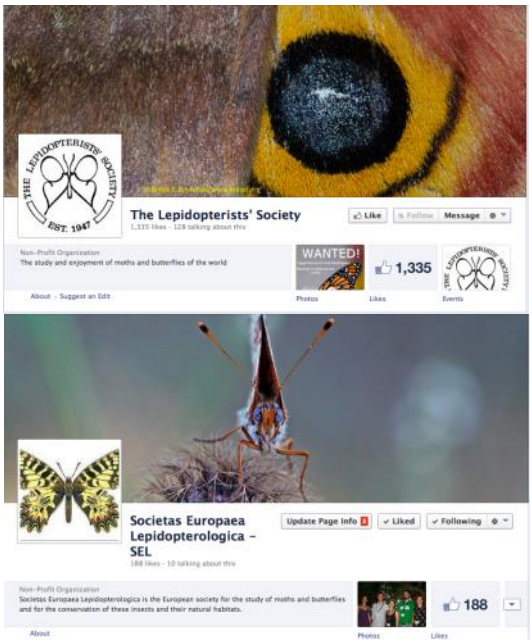
Terada, T. (2013) A taxonomic note on *Atkinsonia leechi* (Walsingham, 1889) (Lepidoptera: Stathmopodidae). *Japan Heterocerists' Journal* 267: 438–439.

Twidle, A.M., Clare, G.K. and Stanbury, M.E. (2013) Sex attractant for *Izatha peroneanella* (Walker) (Lepidoptera: Oecophoridae *sensu lato*), a lichen tuft moth. *New Zealand Entomologist* Published online: 03 Sep 2013 DOI: http://dx.doi.org/10.1080/00779962.2013.823677

Urra, F. 2013. Contribution to the knowledge of Oecophoridae (Lepidoptera: Gelechioidea) of central Chile. *Acta Entomologica Chilena* 33(1–2): 31-46.

Wang, S., Du, Z. and Li. H. (2013) Taxonomic study of the genus *Promalactis* Meyrick, 1908 from Southeast Asia (Lepidoptera: Oecophoridae). *Zootaxa* 3669 (4): 401–455. DOI: http://dx.doi.org/10.11646/zootaxa.3669.4.1

Yin, A. and Wang, S. (2013) Three new species of the genus *Ripeacma* (Lepidoptera: Oecophoridae) from China. *Zootaxa* 3718 (6): 591–595. DOI: http://dx.doi.org/10.11646/zootaxa.3718.6.7



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Future Meetings

The 2014 Annual Meeting of the Lepidopterists' Society

The 63rd Annual Meeting of the Lepidopterists' Society will be co-hosted by the Utah Lepidopterists' Society and Utah Butterfly Field Trips at the Yarrow Resort Hotel Resort and Conference Center in Park City, Utah during July 16-19, 2014. In addition to the program of presentations, eleven field trips have been organized. Hotel reservations should be made early because of a concurrent event that will result in a shortage of hotel rooms. Registration and other information can be accessed at http://www.lepsoc.org/2014_meeting.php

I.N.G.A. Newsletter

I.N.G.A. is a biannually distributed electronic newsletter with its main focus on different aspects of the superfamily Gelechioidea. Subscription and all contributions are free of charge. All opinions presented here are authors' own and do not represent an official opinion of the newsletter. Guidelines for submission and previous issues of I.N.G.A. can be found from the newsletter's website:

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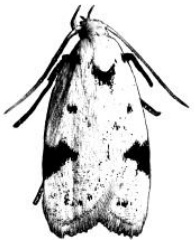

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