

First Report of *Ecpyrrorrhoe puralis* (South) (Pyraloidea: Crambidae: Pyraustinae) in North America: A Naturalized Exotic Pyraustine from Asia Feeding on *Paulownia Siebold & Zucc.*

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Source: The Journal of the Lepidopterists' Society, 64(1) : 33-35

Published By: The Lepidopterists' Society

URL: <https://doi.org/10.18473/lepi.v64i1.a5>

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FIRST REPORT OF *ECPYRRHORRHOE PURALIS* (SOUTH) (PYRALOIDEA: CRAMBIDAE: PYRAUSTINAE) IN NORTH AMERICA: A NATURALIZED EXOTIC PYRAUSTINE FROM ASIA FEEDING ON *PAULOWNIA* SIEBOLD & ZUCC.

Additional key words: Crambidae, Pyraloidea, *Paulownia*, invasive, China, *Yezobotys*.

In 2001, while sampling for the Great Smoky Mountains All Taxa Biodiversity Inventory at the Cosby Ranger Station, BGS collected a single specimen of a large, yellow pyraustine (Figs. 1, 2). Subsequent searches at other institutions and contacts with other lepidopterists documented other specimen records (see below). In addition, Doug Tallamy at the University of Delaware submitted two adults to MAS for identification that were reared on *Paulownia tomentosa* (Thunb.) Steud. (Scrophulariaceae) by DHF in West Grove, Chester Co., Pennsylvania (voucher specimens deposited at the National Museum of Natural History, USNM, Washington, D.C.).

In the U.S. this species most resembles members of the genus *Hahncappsia* Munroe, but it is significantly larger (female forewing length 12.8mm (n=14); male forewing length 12.5mm (n=10)), and the male genitalia are very different. Briefly, the uncus of *Hahncappsia* is broad at its tip while in the new moth the tip is thin (Fig. 4). The valvae of *Hahncappsia* have a complex sella and no fibula, but the new moth has a prominent non-scaled fibula (Fig. 4). The penis of *Hahncappsia* is not armed, and, in the new moth, is prominently armed (Fig. 5).

In 2008 MAS, with Michael Shaffer, identified the moth as *Pionea puralis* South (1901), originally described from central China, based on comparison to the male type specimen at The Natural History Museum (BMNH) in London. The male genitalia of the type specimen lacked the uncus, but the valvae were quite distinctive (Fig. 4). Mutuura (1954) placed *P. puralis* in *Pyrausta*, but it was evident that it did not belong in this genus. In addition, we discovered that it was similar to *Yezobotys ainualis* Munroe & Mutuura (1969) from Japan. The female genitalia (BMNH genitalia slide #19693) are similar, but the antrum is clearly different in *P. puralis* (Fig. 3). The BMNH card catalog also indicated that *Pyrausta dissimilis* Yamanaka (1958) was similar to *Y. ainualis* and *P. puralis*, and indeed Inoue *et al.* (1982) had synonymized *dissimilis* with *ainualis*. Zhang *et al.* (2004) revised *Ecpyrrhorrhoe* in China, described three new species, and transferred *Pionea puralis* South and *E. rubiginalis* (Hübner), known to feed on Labiatae, into this genus.

Zhang and colleagues proposed the following classification for Chinese species, and we also include the finding by Maes (1994) that *Harpadispar* Agenjo is a synonym of *Ecpyrrhorrhoe* Hübner and its type species, *Botys diffusalis* Guenée:

- Ecpyrrhorrhoe* Hübner, [1825], 1816
Harpadispar Agenjo, 1952
Pyraustegia Marion, 1963
Yezobotys Munroe & Mutuura, 1969, **new synonym**
- E. biaculeiformis* Zhang, Li, & Wang, 2004
 - E. diffusalis* Guenée, 1854 (synonyms not listed here)
 - E. digitaliformis* Zhang, Li, & Wang, 2004
 - E. dissimilis* Yamanaka, 1958, **new combination**
 - E. ainualis* Munroe & Mutuura, 1969
 - E. ruidispinalis* Zhang, Li, & Wang, 2004
 - E. puralis* South, 1901
 - E. rubiginalis* Hübner, 1796

Based on collection and observation records, *E. puralis* was introduced into the eastern United States probably in the 1990s, and spread quickly over much of the range of its introduced host, *P. tomentosa*. This species is commonly known as the Princess or Empress tree, among other names. It was introduced to the eastern U. S. around 1840, probably by using its seeds as packing material for porcelain from China. More recently, it has been planted as an ornamental and now occurs from New York and Massachusetts south through Florida and west to Texas, Missouri and Illinois, and in Oregon in the northwest (Williams 1993). The species is invasive primarily in the Appalachians from Pennsylvania to Georgia (Langdon & Johnson 1994), but the National Park Service notes that it is now found in over 25 states (<http://www.nps.gov/plants/alien/fact/pato1.htm>). Although *Paulownia* is invasive in the Appalachian Region, it is highly prized for its wood, which is exported, and the species is used in reforestation efforts in various other parts of the world. For example, the American *Paulownia* Association (www.paulowniatrees.org) is dedicated to its culture and encourages its marketing, and the "Peace Portal" touts it as "the fastest growing Hardwood Tree on the planet"



FIGS. 1–5. 1. Dorsal view of pinned adult, photo by B. Scholtens. 2. Dorsal view of live adult, photo by Rich Healy, Hart. Co. Kentucky, 9 Aug 2006. 3. Ventral view female genitalia, photo by M. Metz. 4. Ventral view male genitalia, photo by M. Metz. 5. Penis, photo by M. Metz.

(<http://peaceportal.mobi/home/>).

Ecpyrrhorrhoe puralis records reflect the invasive range of the tree; the moth is known from Mississippi and Georgia to Maryland and Pennsylvania. The following are known records of *E. puralis* from eastern North America. ALABAMA: Jackson Co./Hollytree/Bingham Mtn. area/9 May 2008, 20 Jun 2008, 18 Jul 2008, 19 Sep 2008/ Howard Grisham (4 specimens)/ Howard Grisham collection; GEORGIA: Gordon Co./Calhoun (346 Sunset Dr. SE)/at lights/18 Jul 2000, 23 Jul 2000, 10 Sep 2001, 26 Apr 2002, 29 Jun 2002, 12 May 2003, 6 Sep 2003, 8 Sep 2003, 14 Aug 2005, 8 Sep 2005, 11 Sep 2005, 24 Apr 2006, 2 Aug 2007, 5 Aug 2007/James K. Adams (16 specimens) /James Adams collection; Whitfield Co./Carbondale, exit 326 off I-75/at lights/14 Sep 2005/James K. Adams/James Adams collection; Whitfield Co./Rocky Face ridgeline, Co. Rd. 202 (Hurricane Rd)/crest of Doug Gap Battle Rd./SW of Dalton/19 Aug 2003/James K. Adams/James Adams collection; KENTUCKY: Hart Co./ 9 Aug 2006/ Rich Healy/photo record; MARYLAND: Anne Arundel Co./Smithsonian Env. Res. Ctr., Edgewater/8 Sep 2000/D.C. Ferguson, J.D. Glaser/USNM collection; Prince George's Co./ Bowie/22 Jun 2004, 18 Jun 2005/ Bob Patterson/photo records on Moth Photographers Group (MPG); MISSISSIPPI: Tishomingo Co./J.P. Coleman St. Pk./20 Jul 2004/Ricky Patterson/Mississippi State collection; PENNSYLVANIA: Chester Co./Goat Hill Nat. Conser./Nottingham/20 Aug 2005/Samuel R. Smith; Chester Co./Wert Grove/captured Sep 2005/ Dave Funk /lab reared on *Paulownia*, eclosed 10 Apr 2006 and 22 May 2006/ USNM collection; Dauphin Co./Middletown/7 Sep 2003/Samuel R. Smith; LancasterCo./Mountville/31 Aug 2005/Matthew Roth/ photo record on MPG; SOUTH CAROLINA: Greenville Co./17 Aug 2004/John A Snyder/Furman Univ. collection; TENNESSEE: Cocke Co./Cosby Ranger Station/16 May 2001/Brian Scholtens/College of Charleston collection; WEST VIRGINIA: Boone Co./Fork Creek WMA/2.5 miles NW, Nellis/29 Aug–1 Sep 2003/Steve Johnson (2 specimens)/ Jim Vargo collection. The species appears to be at least double brooded in the south, with adult records from April through September in Georgia. In the north, all records are from August and September. We expect the moth will spread throughout the range of *Paulownia* in the United States.

ACKNOWLEDGEMENTS

We thank the late Michael Shaffer (The Natural History Museum, London, England), Doug Tallamy (University of

Delaware, U.S.A.) and Hou-Hun Li (Nankai University, China) for their generous collaborations. We thank Rich Healy and Mark Metz for photographs. We thank S. Scheffer and T. Henry (Systematic Entomology Laboratory, USDA) and D. Tallamy for reviewing the manuscript.

LITERATURE CITED

- AGENJO, R. 1952. Faunula Lepidopterologica Almeriense. Madrid: 370 pp.
- GUENÉE, A. 1854. Species général des Lépidoptères. Tome huitième. Deltoides et Pyralites. Paris: Librairie Encyclopédique Roret: 448 pp.
- HÜBNER, J. 1796. Sammlung europäischer Schmetterlinge. Augsburg: 7 v., 785 pl.
- _____. 1816–1826. Verzeichniss bekannter Schmetterlinge. Augsburg: 431 pp.
- INOUE, H., S. SUGI, H. KUROKO, S. MORIUTI, & A. KAWABE. 1982. Moths of Japan. Tokyo: Kyodo Printing Co, Ltd.: Vol. I: 966 pp. and Vol. II: 552 pp., plates.
- LANGDON, K. R. & K. D. JOHNSON. 1994. Additional notes on invasiveness of *Paulownia tomentosa* in natural areas. Nat. Areas J. 14: 139–140.
- MAES, K. V. N. 1994. Some notes on the taxonomic status of the Pyraustinae (sensu Minet 1981 [1982]) and a check list of the Palearctic Pyraustinae (Lepidoptera, Pyraloidea, Crambidae). Bull. Anns Soc. r. belge Ent. 130: 159–168.
- MARION, H. 1963. Revision des Pyraustidae de France. Alexanor 2: 297–304.
- MUNROE, E. G. & A. MUTUURA. 1969. Contributions to a study of the Pyraustinae (Lepidoptera: Pyralidae) of temperate East Asia. VIII. Can. Entomol. 101: 1239–1248.
- MUTUURA, A. 1954. Classification of Japanese *Pyrausta* group based on the structure of the male and female genitalia (Pyr. Lep.) Bull. Naniwa Univ. 4: 7–33.
- SOUTH, R. 1901. Lepidoptera Heterocera from China, Japan, and Corea by the late John Henry Leech, B.A., F.L.S., F.Z.S., etc. Part V. Trans. Entomol. Soc. London 1901: 385–514.
- WILLIAMS, C. E. 1993. The exotic empress tree, *Paulownia tomentosa* – an invasive pest of forests. Nat. Areas J. 13: 221–222.
- YAMANAKA, H. 1958. One new species and one unrecorded species of the Japanese Pyraustinae (Lepidoptera: Pyralididae). Tinea 4: 265–266.
- ZHANG, D.-D., H.-H. LI, & S.-X. WANG. 2004. A review of *Ecpyrrhorrhoe* Hübner (Lepidoptera: Crambidae: Pyraustinae) from China, with descriptions of new species. Oriental Insects 38: 315–325.

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Received for publication by Michael E. Toliver, editor for this note. Submitted on 10 March 2009, revised and accepted: 5 December 2009.