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REVISED IDENTITIES AND NEW SPECIES OF *AETHES* FROM MIDWESTERN NORTH AMERICA (TORTRICIDAE)

MICHAEL SABOURIN
23476 Johnson Rd., Grantsburg, Wisconsin 54840, USA, mothvet@grantsburgtelcom.net

WILLIAM E. MILLER
Department of Entomology, University of Minnesota, 1980 Folwell Ave., St. Paul, Minnesota 55108, USA, mille014@tc.umn.edu

ERIC H. METZLER
1241 Kildale Square North, Columbus, Ohio 43229, USA, spruance@infinet.com

AND

JAMES T. VARGO
13890 Ireland Road, Mishawaka, Indiana 46544, USA, Jvargo51@aol.com

ABSTRACT. Ongoing systematic study of Nearctic Tortricidae revealed several historical misidentifications and new species of *Aethes* in the Midwest. We redefine *A. promptana* (Robinson), *A. angulatana* (Robinson), *A. argentilimitana* (Robinson), and *A. atomosana* (Busck); resurrect *A. interruptofasciata* (Robinson); and synonymize *A. labeculana* (Robinson) with the prior *A. argentilimitana*, and *A. sublepidana* (Kearfott) with the prior *A. interruptofasciata*. We describe as new species ***A. sexdentata*** Sabourin & Miller, ***A. razowskii*** Sabourin & Miller, ***A. westratei*** Sabourin & Miller, ***A. matheri*** Sabourin & Miller, ***A. terriae*** Sabourin & Miller, ***A. baloghi*** Sabourin & Metzler, and ***A. matthewcruzi*** Sabourin & Vargo. The status of six species previously considered *incertae sedis* is resolved, and the number of recognized Nearctic *Aethes* species is increased from 27 to 34. Conclusions are based on type study as well as on more than 500 pinned specimens and more than 300 genitalia preparations in 29 museums and private collections. A comprehensive definition of *Aethes* also is presented.

Additional key words: Tortricinae, Cochylini, taxonomy.

The genus *Aethes* is holarctic, with 27 species previously recognized in North America (Metzler 1999, Pogue 1986, Powell 1983, Razowski 1986, 1994, 1997). The higher category to which *Aethes* belongs has been ranked variously from tribe to family, but a concensus is emerging that the appropriate rank is tribe, namely Cochylini of Tortricinae.

Cochylini are difficult to discriminate and identify because of sibling or cryptic species, variability in maculation and size, and geographic variation. Lack of detailed systematic work, including unstudied types and mixed type series, adds to the confusion surrounding the taxonomy of *Aethes* and its relatives.

In the early 1900's, Busck (1907) and Kearfott (1907a, 1907b) described a number of Cochylini species. Forbes (1923) provided a synopsis of species recorded from New York and neighboring areas. With additional collecting and increased interest in biodiversity, Cochylini have attracted new attention. In a dissertation, Pogue (1986) proposed a new generic classification of Nearctic Cochylini, including *Aethes*, and we draw liberally upon his work, all of which has not been published. He recognized 102 described species in 23 genera, with 8 species *incertae sedis*. Razowski (1997) recently reviewed Canadian species, but did not examine all types. Metzler (1999) described two species in connection with work on Midwestern prairie insects.

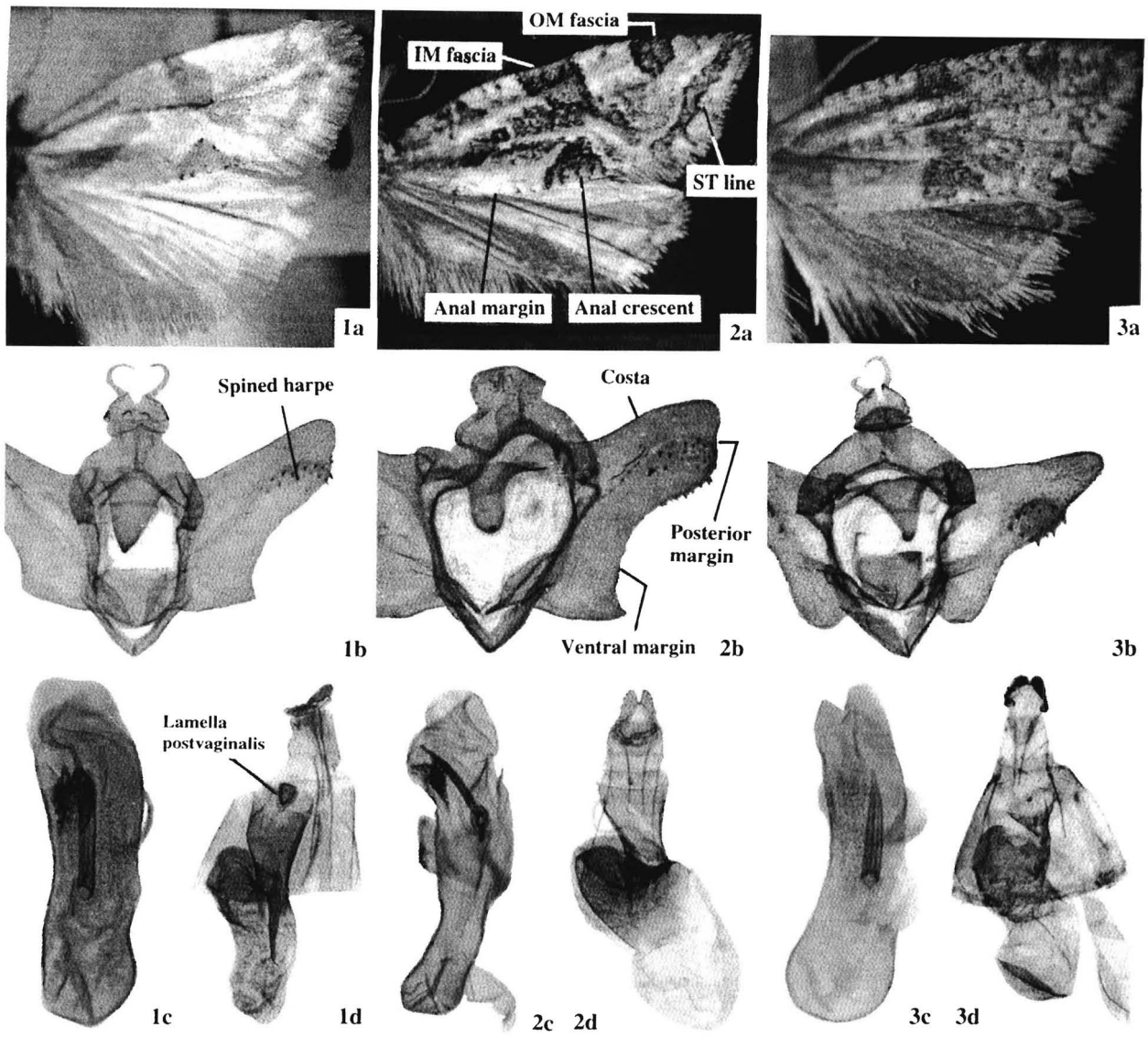
Structurally, *Aethes* has one notable synapomorphy: the paired sicklelike structures of the male socii. Otherwise, *Aethes* includes markedly diverse genital structure. A number of structural characters useful for species discrimination are found on or in the aedeagus and associated parts.

This paper redefines and illustrates five *Aethes* species whose identities have been confused historically. In addition, seven new species are added to the Nearctic fauna. The seven new species raise the number of *Aethes* recognized in North America from 27 to 34.

MATERIALS AND METHODS

This study is based on more than 500 pinned adults assembled from 29 sources listed at the end of this section. Genitalia of more than 300 specimens were prepared. For the five previously known species treated here, "Specimens examined" sections are shortened to States and Provinces of specimen origin, months of capture, and depositories. Detailed lists of such specimens are available from the authors.

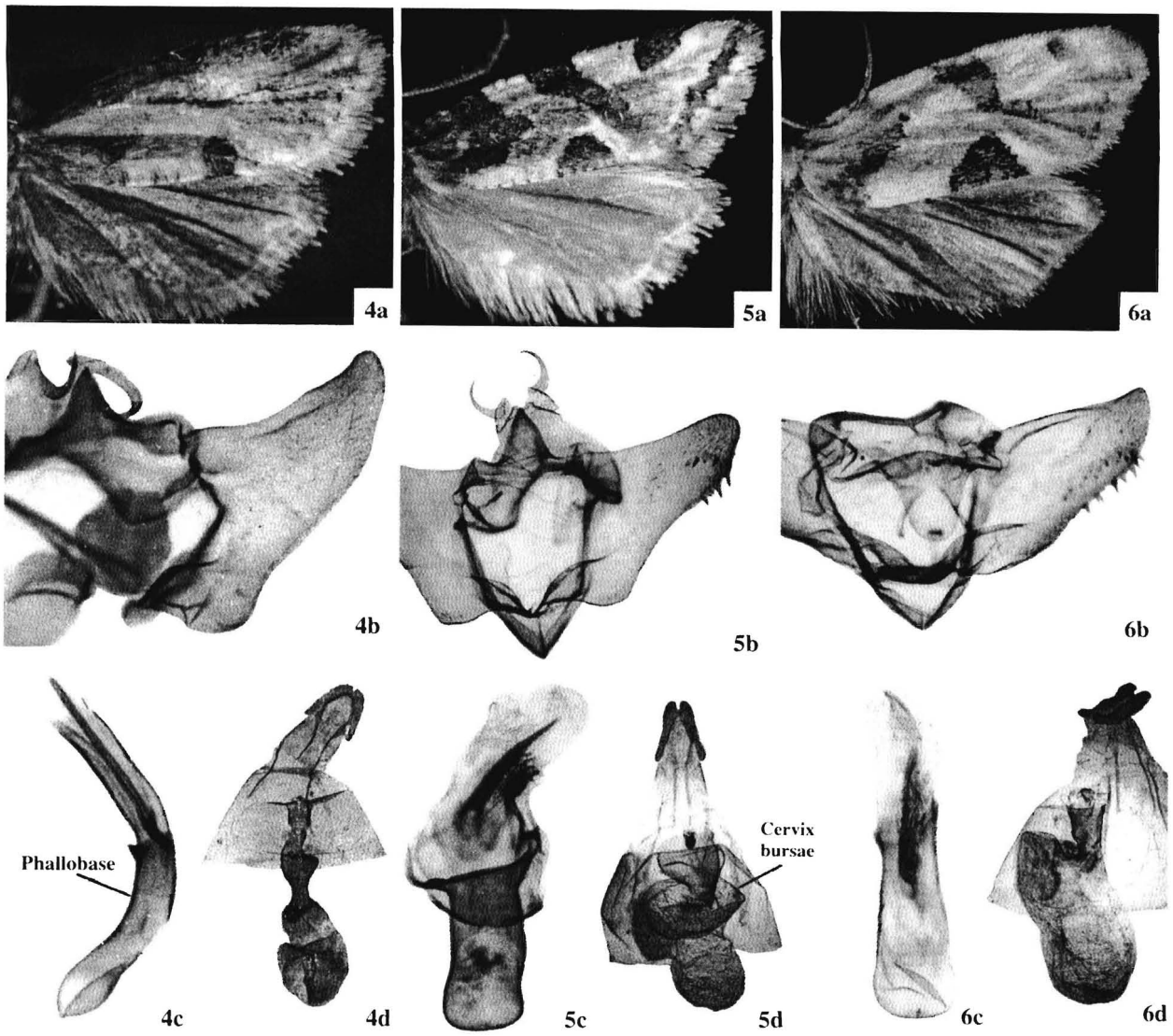
Wing lengths were measured by caliper under magnification to the nearest 0.2 mm. Colors were determined under incandescent light by comparison with the swatches of Smithe (1975).



FIGS. 1a–3d. *Aethes* species. 1a. Wings of *A. promptana* lectotype ♂. 1b, Genitalia of *A. promptana* lectotype ♂ (prep. MGP936). 1c, Aedeagus of *A. promptana* lectotype ♂ (prep. MGP936). 1d, Genitalia of *A. promptana* ♀ from Grantsburg, Wisconsin (prep. MS99182). 2a. Wings of *A. angulatana* ♂ from St. Joseph Co., Indiana. 2b, Genitalia of *A. angulatana* ♂ from St. Joseph Co., Indiana (prep. MS00253). 2c, Aedeagus of *A. angulatana* ♂ from St. Joseph Co., Indiana (prep. MS00253). 2d, Genitalia of *A. angulatana* lectotype ♀ (prep. MGP932). 3a. Wings of *A. argentilimitana* ♂ (*A. labeculana* lectotype ♂). 3b, Genitalia of *A. argentilimitana* ♂ (*A. labeculana* lectotype ♂) (prep. MGP934). 3c, Aedeagus of *A. argentilimitana* lectotype ♂ (prep. MGP931). 3d, Genitalia of *A. argentilimitana* ♀ from Grand Isle, Vermont (prep. MS01052).

Genitalia were prepared by placing abdomens in cold 10% KOH for 24–48 hours. After removal from KOH, they were cleaned in distilled water, soaked in 70% isopropyl alcohol, then stained in aqueous Chlorazole Black E (3 minutes for males and 1–2 minutes for females). Following Chlorazole staining, pelts were double-stained with lignin pink and acid fuchsin (males for 3 minutes, females for 1 minute). Pelts were then returned to 70% isopropyl alcohol, and the genitalia removed. The male aedeagus was separated with the juxta remaining attached to it. Genitalia then were placed in 99% isopropyl alcohol for 15 minutes. Finally, they were stored in glycerine in glass pin vials, or mounted on slides in Canada balsam or Euparal thinned with Cellosolve, and dried at 19°C for five weeks. Vinyl cover-slip props were used on female slides to reduce distortion.

Whole specimens were photographed under tungsten lights with a 35-mm camera attached to a dissecting microscope, except for Fig. 11a which was produced with a Polaroid microscope camera with a fiber optic light source. Genitalia were photographed with a 35-mm Olympus photomicrographic apparatus. All photo images were scanned, after which they were en-



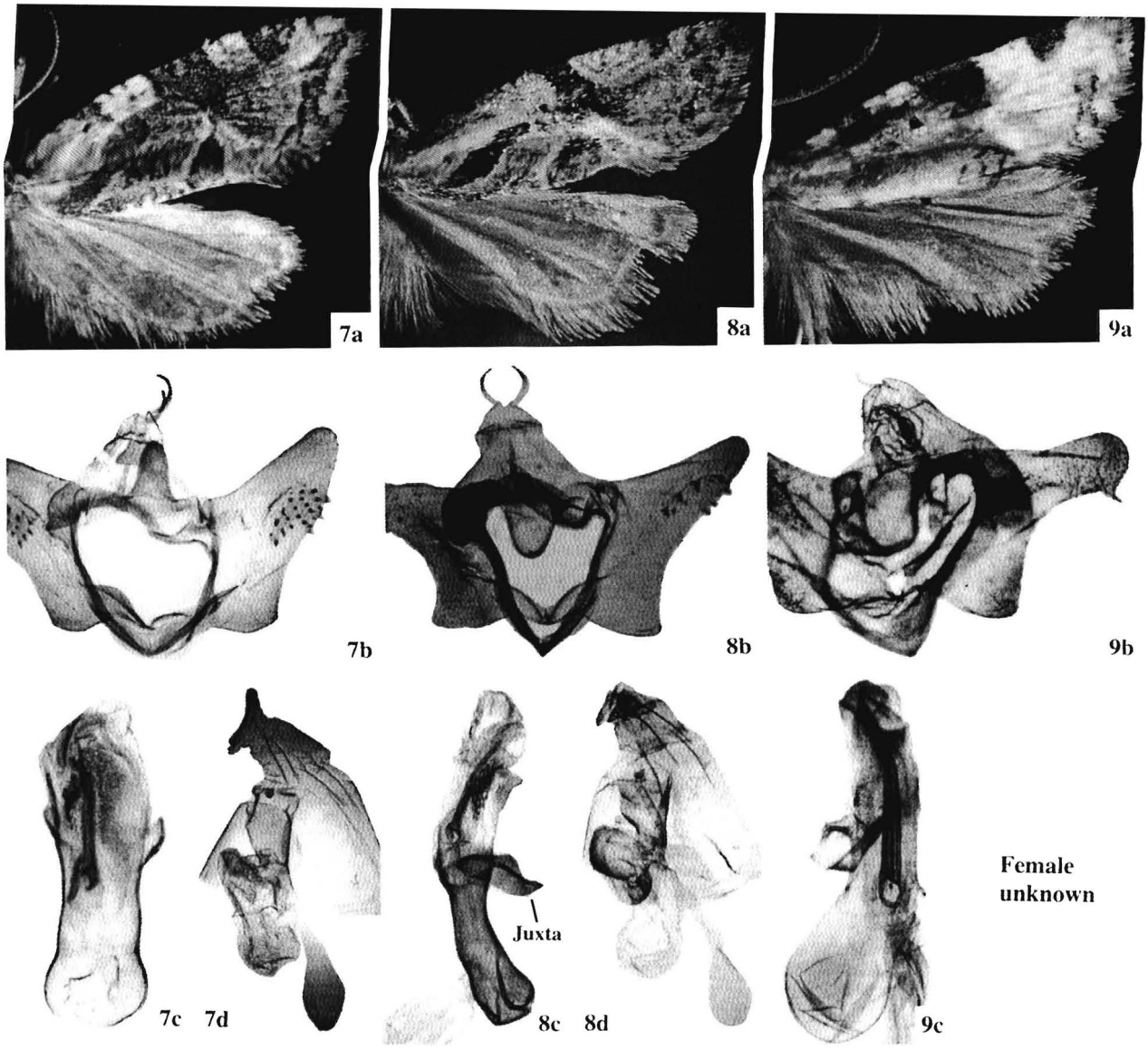
FIGS. 4a–6d. *Aethes* species. 4a. Wings of *A. interruptofasciata* ♂ from Burnett Co., Wisconsin. 4b, Genitalia of *A. interruptofasciata* ♂ from Lk. Katherine, Wisconsin (prep. MS01040). 4c, Aedeagus of *A. interruptofasciata* ♂ from Allegheny Co., Pennsylvania (prep. MS01056). 4d, Genitalia of *A. interruptofasciata* ♀ from Kanawha Co., West Virginia (prep. MS99068). 5a, Wings of *A. sexdentata* paratype ♂ from S. Burlington, Vermont. 5b, Genitalia of *A. sexdentata* holotype ♂ from Grand Isle, Vermont (prep. MS10046). 5c, Aedeagus of *A. sexdentata* holotype ♂ from Grand Isle, Vermont (prep. MS10046). 5d, Genitalia of *A. sexdentata* paratype ♀ from Clark Co., Illinois (prep. MS98427). 6a, Wings of *A. razowskii* paratype ♂ from Allegan Co., Michigan. 6b, Genitalia of *A. razowskii* holotype ♂ from Schoolcraft Co., Michigan (prep. MS01050). 6c, Aedeagus of *A. razowskii* paratype ♂ from Winston Co., Alabama (prep. MS99196). 6d, Genitalia of *A. razowskii* paratype ♀ from Winston Co., Alabama (prep. MS99197).

hanced and cropped with Apple Photoflash software, then laser printed.

Abbreviations used are as follows: AL, at light; BL, black light; BLT, black-light trap; FW, forewing; gen. prep., genitalia preparation; HW, hindwing; IG, in glycerine; IM fascia, inner median fascia (antemedian, antemedial, and median of authors); LT, light trap; OM fascia, outer median fascia (postmedian or preapical of authors); n, number of specimens on which a statement is based; ND, no date; ST line, subterminal line; UV, UVL, ultraviolet light. Collection dates are in month/day/year format.

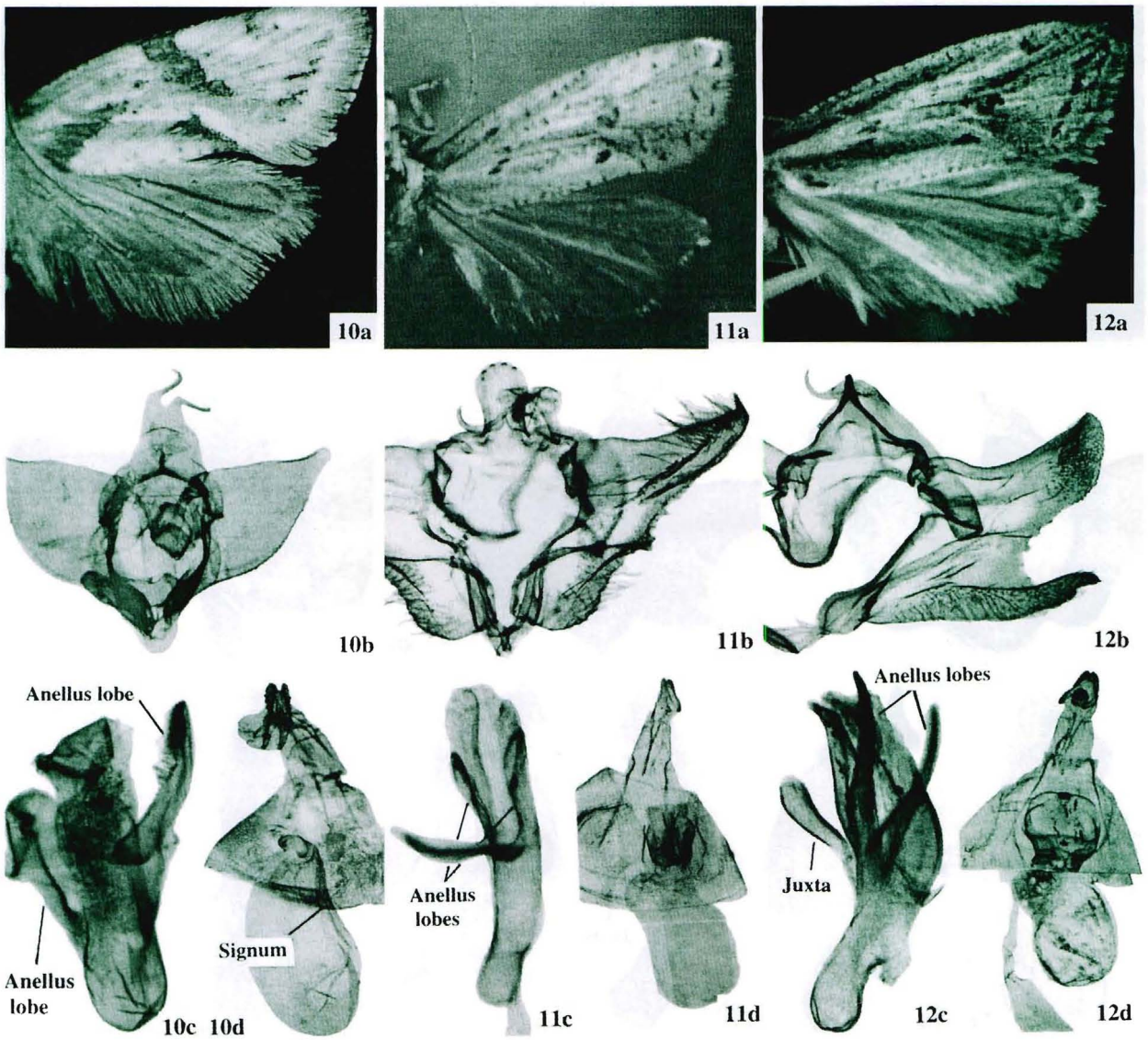
Certain anatomical terms are defined or illustrated or both as follows. Anal margin: the straight portion of the forewing trailing edge (Fig. 2a); anal crescent: mark on anal margin of the forewing (Fig. 2a); harpe: slightly raised spined area on the interior distal half of the valva (Fig. 1b); costa of the valva: dorsal margin of the valva (Fig. 2b); posterior and ventral margins of the valva (Fig. 2b); phallobase: sheath surrounding the base of the aedeagus (Fig. 4c). Illustrations of some other terms are noted on first use in the text.

Collection abbreviations used are: AMNH, American Museum of Natural History, New York, New York;



FIGS. 7a–9c. *Aethes* species. 7a, Wings of *A. westratei* paratype ♀ from Cass Co., Michigan. 7b, Genitalia of *A. westratei* paratype ♂ from Cass. Co., Michigan (prep. MS01048). 7c, Aedeagus of *A. westratei* paratype ♂ from Cass. Co., Michigan (prep. MS01039). 7d, Genitalia of *A. westratei* paratype ♀ from Cass Co., Michigan. (prep. MS98146). 8a, Wings of *A. matheri* holotype ♂ from Long Beach, Mississippi. 8b, Genitalia of *A. matheri* paratype ♂ from Hinds Co., Mississippi (prep. MS01082). 8c, Aedeagus of *A. matheri* paratype ♂ from Hinds Co., Mississippi (prep. MS01082). 8d, Genitalia of *A. matheri* paratype ♀ from Harrison Co., Mississippi (prep. MS01132). 9a, Wings of *A. terriae* holotype ♂ from Kalamazoo Co., Michigan. 9b, Genitalia of *A. terriae* paratype ♂ from Cass Co., Michigan (prep. MS01088). 9c, Aedeagus of *A. terriae* paratype ♂ from Cass Co., Michigan (prep. MS01088)

ANSP, Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania; BGS, B. G. Scholtens collection, Charleston, South Carolina; BM, The Natural History Museum, London, England; BMMS, B. Mather collection, Mississippi Entomological Museum, Mississippi State, Mississippi; CMNH, Carnegie Museum of Natural History, Pittsburgh, Pennsylvania; CNC, Canadian National Collection of Insects, Ottawa, Ontario; EME, Essig Museum of Entomology, University of California, Berkeley; FMNH, Field Museum of Natural History, Chicago, Illinois; GJB, G. J. Balogh collection, Portage, Michigan; FMPS, Frost Entomological Museum, Pennsylvania State University, University Park; INHS, Illinois Natural History Survey, Champaign; JDG, J. D. Glaser collection, Baltimore, Maryland; JHW, J. H. Wilterding III collection, East Lansing, Michigan; JRH, J. R. Heitzman collection, Independence, Missouri; JV, J. Vargo collection, Mishawaka, Indiana; MAR, M. A. Roberts collection, Steuben, Maine; MS, M. Sabourin collection,



FIGS. 10a–12d. 10a, Wings of *A. baloghi* holotype ♀ from Yonkers, New York. 10b, Genitalia of *A. baloghi* paratype ♂ from Allegan Co., Michigan (prep. MS01083). 10c, Aedeagus of *A. baloghi* paratype ♂ from Newaygo Co., Michigan (prep. MS01098). 10d, Genitalia of *A. baloghi* paratype ♀ from Whitesbog, New Jersey (prep. MS01077). 11a, Wings of *A. atomosana* ♂ from Kings Co., Nova Scotia. 11b, Genitalia of *A. atomosana* ♂ from Lunenburg Co., Nova Scotia (prep. MS01047). 11c, Aedeagus of *A. atomosana* ♂ from Lunenburg Co., Nova Scotia (prep. MS01047). 11d, Genitalia of *A. atomosana* ♀ from Burnett Co., Wisconsin (prep. MS00653). 12a, Wings of *A. matthewcruzi* holotype ♂ from Roseau Co., Minnesota. 12b, Genitalia of *A. matthewcruzi* holotype ♂ from Roseau Co., Minnesota (prep. MS00167). 12c, Aedeagus of *A. matthewcruzi* holotype ♂ from Roseau Co., Minnesota (prep. MS00167). 12d, Genitalia of *A. matthewcruzi* paratype ♀ from Burnett Co., Wisconsin (prep. MS00342).

Grantsburg Wisconsin; MSG, M. S. Griggs collection, Grand Isle, Vermont; MSUC, Michigan State University, East Lansing; NSPM, Nova Scotia Museum, Halifax; RL, R. Letsinger collection, Sarcoxie, Missouri; UMMZ, University of Michigan, Ann Arbor; UMRM, University of Missouri, Columbia; UMSP, University of Minnesota Entomology Museum, St. Paul; USNM, National Museum of Natural History, Washington, D. C.; UWEM, University of Wisconsin, Madison; WPW, W. P. Westrate collection, Cassopolis, Michigan; YPM, Yale University Peabody Museum of Natural History, New Haven, Connecticut; ZMUH, Zoological Museum, University of Helsinki, Finland.

Genus *Aethes* Billberg, 1820

Type species: *Pyralis smeathmanniana* Fabricius, 1781, designated by Fernald (1908).

The characterization that follows is based mainly on North American species.

No significant external sexual dimorphism. Speci-

mens cannot reliably be sexed by number of frenular bristles; males have one bristle, females one or two.

Head. Proboscis conspicuous; ocelli present; scales of labial palpus expanded ventrally beyond third segment, inner side usually of FW ground color, outer side of FW marking colors. **Thorax.** Short dorsal tuft usually present; lateral tufts of metanotum consisting of flattened hairs or elongate scales. **FW** longer than wide, lacking costal fold, costa slightly curved, termen slanted toward body, apex acute or obtuse. All veins usually free, R_1 and Cu_2 originating, respectively, from middle and distal ⅓ of discal cell; origins of R_2, R_3, R_4, M_2, and M_3 usually closer to veins following them than to veins preceding them, R_5 extending to costa before apex, origins of R_5 and M_1 usually closer to veins preceding them than to those following them, M_3 and Cu_1 adjacent or connate, CuP absent, the last probably constituting a cochyline synapomorphy (Pogue 1986); a vestigial chorda present in some species. Variably developed subcostal and cubital retinacula retain female frenular bristles. Ground color usually pale with markings darker; basal fascia usually thin, sometimes broad, or absent; median fascia reduced, represented by inner and outer parts, the inner one sometimes complete from costa to anal margin (Fig. 2a), sometimes divided into costal and anal parts, the anal part forming a crescent along the anal margin; outer fascia complete in some species, in others represented by a small spot along costa; discal spot usually present, consisting of scales at the distal end of the discal cell beyond the inner median fascia; ST line (Fig. 2a) occasionally present. **HW** costal fold usually lacking, veins Rs and M_1 stalked; origins of M_3 and Cu_1 well separated. **Abdomen.** Proximal apodeme of sternum 2 a short stub or cone. Anterolateral process longer than proximal apodeme. Venulae of sternum 2 long, contrasting. **Male genitalia:** Aedeagus variable in length and width, vesica may have one large cornutus accompanied by a small bundle of cornuti, or cornuti may be absent altogether. Anellus lobes (Figs. 10c, 11c, 12c) sometimes present. Juxta (Figs. 8c, 12c) typically a simple subquadrate or subrectangular plate attached to apex of phallobase, caulis absent. Valva broad, posterior margin (Fig 2b) variable, some species with dentiform spines on the harpe (Fig. 1b) in a pattern that makes the distal portion of the valva resemble a shark snout. Sacculus varying in length and shape. Uncus usually indiscernible, socii with dual apical sicklelike structures. Apex of vinculum arms variable in size, free, or fused by a thin membrane. **Female genitalia:** Papillae anales elongate, narrow, lightly sclerotized. Anterior and posterior apophyses slender, as long as or longer than papillae anales. Sterigma variable, sometimes reduced; without bilateral sclerotized bands connecting sterigma to anterior apophyses; lamella postvaginalis (Fig. 1d) usually present as a medial process or plate. Antrum robust to reduced. Ductus bursae highly variable, ranging from absent to present to coalesced with corpus bursae such as to be almost unrecognizable. Cervix bursae (Fig. 5d) sometimes present. Supplementary bursa (accessory bursa of authors) present, usually originating dorsally at base of antrum. Ductus seminalis originating from ductus-, cervix-, or corpus bursae, usually not from supplementary bursa. Signum (Fig. 10d) usually absent, but if present represented by sclerotized vestiges of ductus bursae or broad sclerotized plates.

Yasuda (1972) mentions peculiar bristles on tarsal segments 1–4 of the hind leg as being of taxonomic importance. These are short, dark spines occurring on the ventral surface of tarsomeres, usually singly or in rows at joints. In *Aethes* species treated here, the bristle groups on apical edges of eutarsal and distitarsal segments occur in a 3:3:3:3 pattern.

Aethes promptana (Robinson) (Fig. 1a–d)

Conchylis promptana Robinson (1869:286, pl. 8, fig. 80) (Lectotype ♂ designated here, type # 7440, #77, no data, FW 6.0 mm long, gen. prep. MGP936 [Fig. 1b, c], in ANSP). Fernald (1882:25), Handfield et al. (1997:44).

Phalonia promptana; Dyar et al. (1903:487), Forbes (1923:508, in part), McDunnough (1939:60), Brower (1983:50, in part).

Phtheochroa promptana; Poole & Gentili (1996:876).

Aethes promptana; Razowski (1997:124, figs. 150–152, in part).

Male and female exterior. Frons cream colored, vertex, notum, and tegulum buff-yellow; labial palpus 3× longer than horizontal eye diameter. Thoracic tuft inconspicuous. Hind leg buff except for the shorter tibial spurs which are darker. **FW** (Fig. 1a) 5.7–7.9 mm long (n = 21). Ground color cream, markings buff-yellow with scattered brown scales; fasciae not bordered by darker scales; costa and anal margin outlined with short striae; basal fascia extending to costa, also slightly into discal cell at midpoint; IM fascia (Fig. 2a) extending into cell, coalescing with discal spot; anal crescent and OM fascia (Fig. 2a) present; ST line (Fig. 2a) extending to apex; fringe of ground color. **HW** drab gray.

Male genitalia (Fig. 1b, c) (n = 7). Costa of valva straight, posterior margin broad, rounded, numerous dentiform spines on harpe; sacculus short, ventral

margin straight. Median process of transtilla broad, triangulate, with a toothlike point. Aedeagus thick, vesica bearing one large, thick cornutus, a bundle of smaller cornuti, and a distal crescent-shaped sclerite. Anellus lobes absent.

Female genitalia (Fig. 1d) (n = 9). Lamella postvaginalis a large triangular medial process; anterior apophyses longer than posterior; antrum robust, elongate, tapering on anterior half. Cervix bursae sinistrocaudad of corpus bursae when viewed as in Fig. 1d.

Diagnosis. Superficially resembling *A. patricia* Metzler, but the FW markings of *A. promptana* are buff rather than red. Also, the posterior margin of the valva, the sacculus, median process of transtilla, and aedeagus (Fig. 1b, c) are all broader than in *A. patricia* (Metzler 2000: fig. 2a, b); the valval posterior margin is simple rather than edged with dense setae as in *A. patricia*, and the female sternum 7 (Fig. 1d) is not heavily sclerotized as in *A. patricia* (Metzler 2000: fig. 2c).

Discussion. Razowski's (1997) concept of *A. promptana* apparently is based on a misidentified specimen. He did not report examining the specimen designated here as lectotype, which is undoubtedly the Pennsylvania male referred to by Robinson (1869), and thus a syntype. Although Klots (1942) never designated a lectotype, he mentions selecting Robinson's "best specimens" for the purpose. We designate a lectotype to prevent confusion in the future about the identity of this taxon. Razowski's *A. promptana* is described later on here as *A. razowskii*, new species.

Biology. Larval foodplants unknown. April–July adult captures suggest a univoltine or bivoltine life cycle.

Specimens examined (n = 21, including lectotype ♂). Counties and months of capture by State and Province: Canada. NOVA SCOTIA: Cumberland, July; Queens, June (CNC, NSRM, UMSP). USA. ILLINOIS: Putnam, May (INHS). MAINE: Washington, July (MAR). MISSISSIPPI: Oktibbeha, April; Tishomingo, May; Warren, April (UMSP, BMMS). MISSOURI: Boone, May (UMRM). NEW JERSEY: Arlington, August (ANSP). OHIO: Montgomery, May (UMSP). PENNSYLVANIA: Allegheny, June (CMNH). WISCONSIN: Burnett, June (MS).

Aethes angulatana (Robinson)
(Fig. 2a–d)

Conchylis angulatana Robinson (1869:286, pl. 8, fig. 81) (Lectotype ♀ designated by Klots [1942], type #7442, "Penn.," ND, FW 5.0 mm long, gen. prep. MGP932 [Fig. 2d], in ANSP). Fernald (1882:25), Klots (1942:416), Handfield et al. (1997:44).

Phalonia angulatana; Dyar et al. (1903:487), Forbes (1923:508), McDunnough (1939:60), Brower (1983:50).

Aethes angulatana (not Robinson 1869); Razowski (1986:394, 1995:139, 1997:123).

Aethes angulatana; Grehan et al. (1995:25), Covell (1999:62).

Phtheochroa angulatana; Poole and Gentili (1996:876), Nielsen (1998:10).

Male and female exterior. Head cream colored, often suffused with darker scales; labial palpus 3× longer than horizontal eye diameter. Notum and tegulum cream and mixed buff, brown, or black; hind leg cream, tibial spurs not contrasting. **FW** (Fig. 2a) 4.8–7.6 mm long (n = 53). Ground color cream, often suffused with darker scales; markings a mixture of buff, brown, and black scales, fasciae outlined intermittently with darker scales; basal one-fourth of costa dark, costa and anal margin outlined with short striae; basal fascia extending to costa, protruding slightly into discal cell at midpoint; IM fascia extending into discal cell, often coalescing with discal spot, scattered scales angling from discal spot toward termen and tornus; anal crescent and OM fascia present; ST line extending from tornus to apex; fringe of ground color, often bicolored, with darker basal band the color of FW markings. **HW** dark drab, fringe paler with darker basal band.

Male genitalia (Fig. 2b, c) (n = 25). Valva broad, costa subsinuate, posterior margin broad, curved, a horseshoe-shaped row of dentiform spines on harpe; sacculus pointed. Median process of transtilla thumb-shaped, apex rounded, with a small terminal process. Aedeagus moderately thick, vesica bearing one long cornutus and a small irregularly shaped bundle of smaller cornuti. Anellus lobes absent.

Female genitalia (Fig. 2d) (n = 23). Lamella postvaginalis a small medial round process; bases of apophyses broad, posterior apophyses as long as anterior; antrum robust, long, funnel shaped, tapering anteriorly; ductus bursae sclerotized, coalesced with corpus bursae, corpus bursae slanted to right when viewed as in Fig. 2d. Cervix bursae to the left and dorsad of antrum when similarly viewed.

Biology. Larval foodplants unknown. Adults collected mid-June to mid-September. Life cycle probably univoltine.

Diagnosis. *A. angulatana* is highly variable in size and markings, with some phenotypes resembling other species; it can be diagnosed best by genitalia. Its large lamella postvaginalis, and lack of a distal aedeagal sclerite differentiate it from *A. promptana* (Figs. 2d, 1d, 2c, 1c); its narrower phallobase apex, and lack of

ventral cervix bursae differentiate it from from *A. sexdentata* (Figs. 2d, 5d, 2c, 5c); its smaller lamella postvaginalis, and absence of a blade-shaped aedeagal carina differentiate it from *A razowskii* (Figs. 2d, 6d, 2c, 6c); its slightly narrower IM fascia, and lack of a distal aedeagal sclerite also differentiate it from *A razowskii* (Figs. 2c, 7c, 2a,7a); and its broader harpe and less pronounced cervix bursae differentiate it from *A. matheri* (Figs. 2d, 8d, 2b, 8b). Melanics also occur.

Discussion. This species was misidentified by Razowski (1986, 1995, 1997) who based his identification on misidentified specimens. He did not report examining the lectotype. Razowski's *A. angulatana* is described later here as ***A. sexdentata*, new species.**

Specimens examined (n = 53, including type). Counties and months of capture by State or Province: Canada. QUEBEC: Gatineau, July (UMSP). USA. ILLINOIS: Putnam, September (USNM). INDIANA: St. Joseph, July–September (UMSP). MAINE: Franklin, June; Washington, August (MAR). MICHIGAN: Allegan, August; Cass, July, September; Cheboygan, July; Clinton, July, September; Kalamazoo, September; Otsego, August; St. Clair, September; St. Joseph, September (BGS, GJB, JHW, MSUC, UMSP, WPW). MINNESOTA: Wilkin, July (UMSP). NEW JERSEY: Burlington, June, September, October (ANSP). PENNSYLVANIA: Allegheny, August, September; Beaver, August, September (CMNH, USNM). VERMONT: Bennington, August; Chittenden, August; Grand Isle, September (FMPS, MS). WISCONSIN: Burnett, August (MS).

Aethes argentilimitana (Robinson)
(Fig. 3a–d)

Conchylis argentilimitana Robinson (1869:287, pl. 8, fig. 82) (Lectotype ♂ designated by Klots [1942], type #7441, "Penn.," ND, gen. prep. MGP931 [Fig. 3c], FWs missing, in ANSP), Fernald (1882:25), Klots (1942:417), Handfield et al. (1997:44), Covell (1999:62).

Conchylis labeculana Robinson (1869:287, pl. 8, fig. 83) (Lectotype ♂ designated by Klots [1942], type #7443, "Penn.," ND, gen. prep. MGP934 [Fig. 3b], FW 5.5 mm long [Fig. 3a], in ANSP), Fernald (1882:25), Klots (1942:417), **new synonym.**

Phalonia argentilimitana; Dyar et al. (1903:487), McDunnough (1939:60), Brower (1983:50).

Phalonia labeculana; Dyar et al. (1903:487), McDunnough (1939:60).

Aethes argentilimitana; Grehan et al. (1995:25), Razowski (1997:123, figs. 51–53, 149).

Phtheochroa argentlimitana; Poole and Gentili (1996:876).

Phtheochroa labeculana; Poole and Gentili (1996:876).

Aethes labeculana (not Robinson 1869); Razowski (1997:122).

Male and Female exterior. Head, notum, and tegulum white; labial palpus 2× longer than horizontal eye diameter. Thoracic tuft inconspicuous, middle and hind legs predominantly buff, tibial spurs not contrasting. **FW** (Fig. 3a) 3.9–6.4 mm long (n = 81). Ground color white; markings buff to raw umber; buff and umber striae on costa and anal margin; basal fascia extending to costa; often suffused basally with buff scales; IM fascia extending into discal cell, scattered scales reaching anal crescent; discal spot minute; OM fascia short, narrow, sometimes coalesced with ST line; ST line irregular, consisting of scattered scales reaching apex; fringe of ground color. **HW** drab; fringe pale, basal line present.

Male genitalia (Fig. 3b, c) (n = 16). Costa of valva straight, posterior margin narrowly rounded, apex oblique, harpe spined; sacculus lobed. Aedeagus thick, vesica bearing one stout cornutus and a scobinate patch, lacking small cornuti. Anellus lobes absent.

Female genitalia (Fig. 3d) (n = 11). Anterior and posterior apophyses subequal in length. Antrum funnel-shaped, apical half broad, shorter than in *A. angulatana*, often twisted forward almost entire length of ductus bursae; ductus bursae scerlotized, coalesced with the elongate corpus bursae. Cervix bursae located at posterior end of corpus bursae, subequal in size to it.

Diagnosis. *A. argentilimitana* is readily recognized by the golden buff FW markings. As noted by Razowski (1997), FW marginal striae are absent in some specimens, which makes their FW ground color solid white.

Discussion. Although the type of *A. argentilimitana* lacks forewings, its genitalia are intact, and genitalia of the type of *A. labeculana* do not differ from them. Razowski (1997) misidentifed *A. labeculana*, basing his identification on a misidentified specimen. He did not report examining the type.

Biology. Larval foodplants unknown. May–October adult capture dates suggest the life cycle is multivoltine. Sabourin has captured adults in dry, open areas of meadows and fields.

Specimens examined (n = 81, including types of *A. argentilimitana* and *A. labeculana).* Counties and months of capture by State or Province: Canada. ONTARIO: Muskoka, July (ANSP). USA. ILLINOIS: Putnam, May, June; Union, July (INHS). INDIANA: Elkhart, May; LaGrange, August; Perry, June; St. Joseph, August (JV, UMSP). KENTUCKY: Barren, September; Meade, May; Rockcastle, May (ANSP). MAINE: Kennebec, July (MAR). MASSACHUSETTS: Dukes, July, August (ANSP). MICHIGAN:

Allegan, May; Barry, August; Cass, June; Clinton, June; Washtenaw, July (JHW, UMSP, WPW). MINNESOTA: Anoka, May; Beltrami, June, July; Clearwater, June–August; Marshall, August (UMSP). MISSISSIPPI: Lee, May; Oktibbeha, April, May; Tishomingo, June, July (BMMS, UMSP). NEW JERSEY: Burlington, June–August (ANSP). OHIO: Adams, July; Clermont, May; Hamilton, May–July, September, October (ANSP). PENNSYLVANIA: Allegheny, June, August; Bucks, July (AMNH, CMNH). VERMONT: Chittenden, May, July; Grand Isle, August (MS, FMPS). WISCONSIN: Burnett, May, June, August (UMSP).

Aethes interruptofasciata (Robinson),
revised status
(Fig. 4a–d)

Conchylis interruptofasciata Robinson (1869:287, pl. 8, fig. 85) (Lectotype ♂ designated here, type #7444, "Penn.," ND, gen. prep. MGP933, FW 5.0 mm long, in ANSP), Fernald (1882:25).

Phalonia interruptofasciata; Dyar et al. (1903:487) Forbes (1923:506).

Phalonia aureana Busck (1907:25) (Holotype ♀: Pennsylvania, Oak Station, F. Marloff, gen. prep. USNM #24375, in USNM), Forbes (1923:507), McDunnough (1939:60), Procter (1946:308), Covell (1999: 62), Brown and Lewis (2000:1021).

Phalonia sublepidana Kearfott (1907:82) (Lectotype ♂ designated by Klots [1942], N. J., Caldwell [Essex Co.], W. D. Kearfott, 8 July 1900, gen. prep. MGP810, in AMNH), Forbes (1923:507), McDunnough (1939:60), Procter (1946:308), Brower (1983:50), **new synonym.**

Phalonia interruptofasciana; McDunnough (1939:60), Brower (1983:50). Misspelling.

Phtheochroa aureana; Poole and Gentili (1996:876).

Phtheochroa interruptofasciana; Poole and Gentili (1996:876). Misspelling.

Phtheochroa sublepidana; Poole and Gentili (1996:876).

Aethes labeculana (not Robinson 1869); Razowski (1997:122, figs. 49, 50, 147, 148).

Male and female exterior. Head, tegulum, and thoracic tuft mixed cream and buff, remainder of notum predominantly fuscous; labial palpus 2.5× longer than horizontal eye diameter. Fore- and midlegs fuscous anteriorly, buff posteriorly, mixed fuscous and buff at articulations, hindleg predominantly buff, some fuscous scales posteriorly. **FW** (Fig. 4a) 4.7–7.0 mm (n = 32). Ground color cream, suffused with cinnamon and fuscous scales; markings varying from cinnamon to burnt umber; basal fascia cinnamon; fuscous striae on costa and anal margin; IM fascia cinnamon, short, extending barely into discal cell; anal crescent narrow, umber, darker than IM fascia, or absent; fuscous scales along veins from discal cell to termen; terminal half of FW suffused with fuscous scales in *sublepidana* phenotype; discal spot not prominent, some cinnamon scaling between IM and OM fasciae; OM fascia extending to tornus, often paler below costa; ST line absent; fringe cream; apex obtuse. **HW** dark drab; fringe a mixture of drab and paler scales.

Male genitalia (Fig. 4b, c) (n = 10). Costa of valva subsinuate, posterior margin narrowly rounded, oblique, harpe unspined; sacculus lobed. Sicklelike apical structures of socii long. Aedeagus long, thin, curved, vesica with one long cornutus. Anellus lobes absent. Juxta small, rotund, a V-shaped incision at its junction with aedeagus.

Female genitalia (Fig. 4d) (n = 5). Anterior and posterior apophyses subequal in length to papillae anales. Sterigma small, crescent shaped; lamella postvaginalis a medial spot; antrum short, cylindrical, 1/6 length of ductus bursae; ductus bursae long, posterior 1/2 sclerotized. Cervix bursae a small fingerlike process on basal left margin of ductus bursae when viewed as in Fig. 4d.

Diagnosis. Pale specimens of *A. interruptofasciata* can be differentiated from *A. argentilimitana* by their broader basal fascia, and the OM fascia extending to the tornus (Figs. 4a, 3a). The two taxa also differ markedly in genitalia; males of *A. argentilimitana* possess a spined harpe and those of *A. interruptofasciata* lack it (Figs. 4b, 3b). Material labeled as *A. sublepidana* suggests an undersized *A. interruptofasciata*; no consistent genitalic differences were found between them.

Discussion. *A. interruptofasciata* is resurrected from the synonymy of *A. labeculana*. Razowski (1997) synonymized *A. interruptofasciata* under *A. labeculana* based on a misidentified specimen of *A. labeculana* which actually is *A. argentilimitana*. Variability in size and maculation of *A. interruptofasciata* has led to descriptions of some of its phenotypes as separate species. We designate a lectotype to prevent future confusion about the identity of this taxon.

Biology. Larval foodplants unknown. Adults captured May 20–August 4. Life cycle probably multivoltine. Sabourin has captured adults in deciduous forest openings and blueberry thickets.

Specimens examined (n = 32, including types of *A. interruptofasciata, sublepidana,* and *aureana*). Counties and months of capture by State or Province: Canada. MANITOBA (no county system): Aweme, June (CNC). NOVA SCOTIA: Queens, July (NSPM). USA. ILLINOIS: Putnam, July (USNM). MAINE: Washington, July (MAR), MICHIGAN: Cheboygan,

July (BGS). MISSOURI: Wayne, June (JRH). NEW JERSEY: Essex, July (AMNH). PENNSLYVANIA: Allegheny, June–August (AMNH, CMNH). WEST VIRGINIA: Kanawha, May (UMSP). WISCONSIN: Burnett, June, July; Douglas, July; Oneida, July; Vilas, June (EME, GJB, MS, UMSP).

A. sexdentata Sabourin and Miller, new species
(Fig. 5a–d)

Aethes sp. nr. *angulatana*; Grehan et al. (1995:25).
Aethes angulatana (not Robinson, 1869); Razowski (1997:123, figs. 54, 55, in part).

Male and female exterior. Head and notum white, dusted with buff; labial palpus 3× longer than horizontal eye diameter. Tegulum mixed raw umber, clay, and buff; midleg fuscous anteriorly, with buff scales at junctions of tarsomeres, buff posteriorly; hindleg predominately buff, some fuscous scales on femur, tibial spurs fuscous anteriorly, the shorter of the pairs usually darker. **FW** (Fig. 5a) 5.7–8.2 mm long (n = 83). Ground color white, dusted with buff scales except along costa; costa and anal margin outlined with short striae; markings raw umber, clay, and buff; fasciae black bordered; basal fascia broad, extending to costa; IM fascia extending into discal cell, coalesceing with discal spot; scattered scales from discal spot angled toward tornus and beyond apex of anal crescent; OM fascia a broad spot; ST line extending from tornus to apex; fringe buff with less mixture of variously colored scales than in *A. angulatana*; terminal line darker than fringe. **HW** dark drab; fringe cream with darker basal band.

Male genitalia (Fig. 5b, c) (n = 37). Costa of valva slightly curved, posterior margin broad, rounded, 4–12 spines on harpe, but usually 6; sacculus rounded. Median process of transtilla subtriangular. Aedeagus thick, vesica bearing one large cornutus and a bundle of smaller cornuti. Phallobase broadening at apex. Anellus lobes absent.

Female genitalia (Fig. 5d) (n = 19). Anterior and posterior apophyses subequal in length, longer than papillae anales. Lamella postvaginalis a small medial plate; terminal half of antrum broadening sinistrad when viewed as in Fig. 5d; cervix bursae circular, produced ventrad to base of antrum; tergum 7 lightly sclerotized.

Types. **Holotype:** VERMONT, Grand Isle Co., Grand Isle, Lovers Lane, ♂, 07/27/1995 (M. S. Griggs), FW 7.0 mm long, gen. prep. MS01046 (Fig. 5b, c) (UMSP). **Paratypes** (n = 78): Canada. NOVA SCOTIA: Colchester Co., Debert, ♂, 07/20/1961 (D. C. Ferguson), gen. prep. MS00308 (NSPM). ONTARIO: Grand Bend [Huron Co.], ♀, 07/06/1939 (T. N. Freeman), gen. prep. MS97249. Pt. Colborne [Welland Co.], ♂, 07/13/1932, gen. prep. Ph23; ♂, 05/07/1933 (J. J. deGryse), gen. prep. MS97308 (CNC). Trenton [Northumberland Co.], ♀, 07/12/1912 (Evans) (CNC). QUEBEC: Montreal [Laval Co.], ♂, 07/01/1985 (B. Landry) (MS). USA. CONNECTICUT: Washington [Litchfield Co.], AL, ♂, 06/21/1960, gen. prep. MS00407, coll. #63404; ♂, 06/22/1960, coll. #63404; ♂, 06/20/1961, gen. prep. MS97292, coll. #63406; ♂, 07/17/1960, gen. prep. MS01063, coll. #63399; ♂, 07/21/1960, gen. prep. MS00407, coll. # 63400; ♂, 06/25/1962 (S. A. Hessel), gen. prep. MS97260, coll. # 63421(YPM). Windham Co., Putnam, ♂, 07/1–4/1959 (Klots), gen. prep. MS01028 (AMNH). ILLINOIS: Algonquin [McHenry Co.], ♂, 07/07/1909, gen. prep. 00738IG. Clark Co., Rocky Branch Preserve, UVL, ♀, 07/03/1995 (T. Harrison), gen. prep. MS98427 (INHS). INDIANA: Elk[hart] Co., LT, ♂, 06/21/1997, gen. prep. MS98413. St Joseph Co., LT, ♂, 07/31/1996 (J. Vargo), gen. prep. MS97290 (UMSP). MAINE: Steuben [Washington Co.], ♂, 06/11/1999, gen. prep. 01072IG; ♀, 07/17/1999, gen. prep. MS01073; ♂, 06/26/2000 (M. A. Roberts), gen. prep. MS01066 (MAR). MASSACHUSETTS: Lancaster [Worcester Co.], ♂, 07/15/1993 (E. Peters) (MS). MICHIGAN: Cass Co., Westrate farm, LT, ♂, 07/16/1999 (J. Vargo), gen. prep. MS99438 (UMSP); T5S R14W Sec. 31, ♂, 06/11/1987 (W. P. Westrate), gen. prep. MS01051 (WPW). Ingham Co., T4N R2W Sec. 35, 3 ♂, 07/20/1968 (J. P. Donahue), gen. prep. 01105IG. Lenawee Co., T8S R2E Sec. 31, 3 ♂, 07/08/1969. Livingston Co., George Reserve, ♀, 07/19/1934 (W. C. Stinson), gen. prep. MS00502. Midland Co., ♀, 08/09/1958 gen. prep. MS01093; ♂, 08/11/1958 (R. R. Dreisbach), gen. prep. MS00727 (MSUC). Muskegon Co., Muskegon S[tate] P[ark] dunes, ♀, 08/11/1989 (G. Balogh), gen. prep. 97293 (GJB). Oakland Co., ♀, 06/26/1933 (W. C. Stinson), gen. prep. 01094IG (MSUC). MINNESOTA: Itasca Pk., LaSalle Valley [Clearwater Co.], AL, ♀, 07/09/1940 (C. E. Mickel), gen. prep. MS01053. Ramsey Co., North Oaks, ♂, 06/28/1965 gen. prep. JAB122; ♂, 08/02/1965 (W. E. Miller), gen. prep. JAB121. Wilkin Co., ♂, 07/11/1937 (D. G. Denning), gen. prep. 01103IG. MISSISSIPPI: Claiborne Co., Rocky Springs, ♂, 05/10/1970, gen. prep. MS00058, coll. #35670. Hinds Co., Clinton, ♂, 11/13/1958, gen. prep. MS99495, coll. #287; ♂, 05/07/1971 (B. Mather), gen. prep. MS99172, coll. #35561 (UMSP). NEBRASKA: Cherry Co., Valentine N[atl.] W[ildlife] R[efuge], Hackberry Lk., LT, ♂, 06/21/1983; ♂, 06/28/1983; ♂, 06/29/1983, gen, prep. MS01223; ♀, 06/30/1983 (R. W. Hodges) (USNM). NEW JERSEY: New Lisbon [Burlington Co.], ♂, 06/17/1933; ♂, 06/18/1933 (E. P. Darlington), gen. prep. MS00243.

PENNSYLVANIA: Philadelphia [Philadelphia Co.], ♂, 07/05/1914 (ANSP). VERMONT: Chittenden Co., Colchester, 07/04/1993, ♀, 3 ♂, gen. prep. MS01037; ♀, 2 ♂, 07/11/1993, gen. preps. MS01150, MS01148; Colchester, railway by bog, 2 ♂, 08/05/1992, gen. prep. MS95013; Shelburne, ♂, 07/04/1993; S. Burlington, ♀, 07/29/1993, gen. prep. MS01146 (MS); ♀, 07/12/1992, gen. prep. MS97250; ♂, 07/28/1992; ♂ (Fig. 5a), 07/07/1993 (M. Sabourin), gen. prep. MS97207. Grand Isle Co., Grand Isle, Lovers Lane, ♀, 07/27/1995 (M. S. Griggs), gen. prep. MS00056 (UMSP). WASHINGTON: Pullman [Whitman Co.], ♂, 05/1935, reared ex *Solidago* stalks, gen. prep. MS00060 (EME); 3 ♂, 2 ♀, 05/1935 (J. F. G. Clarke), reared ex *Solidago* stalks, gen. preps. USNM23877, 23878, 23880, 23980, wing slides MS23877, USNM23878. Walla Walla [Walla Walla Co.], ♂, ♀, 06/06/1931(D. R. Brannon), gen. preps. USNM23879, 23981(USNM). WEST VIRGINIA: ♀, no data, gen. prep. MS00013, pseudotype *argentilimitana* (Klots 1942), Grote and Robinson type #23031(AMNH). WISCONSIN: Burnett Co., Grantsburg, AL, ♂, 06/07/2000; ♂, 06/26/2000; ♀, 06/23/2001, gen prep. MS01482; ♀, 07/01/2000, gen. prep. MS00602; ♀, 07/09/2000, gen. prep. MS00621, wing slide MS00621W; ♂, 08/09/2000; T40N R18W Sec. 23, LT, ♂, 06/30/2001, gen. prep. MS01494; ♂, 07/14/2001 (M. Sabourin), gen. prep. MS00601 (MS, ZMUH). Dane Co., Nevin Marsh, ♂, 06/26/1974 (D. T. Bach) (UWEM).

Diagnosis. *A. sexdentata* most resembles *A. fernaldana* (Walsingham 1879), the wings of which were illustrated by Walsingham (1879), and the male genitalia by Razowski (1964). We examined the *A. fernaldana* syntypes enumerated below.

A. sexdentata differs in its white FW ground color, and markings predominantly of raw umber and buff with black borders, versus the yellow ground with ochreous markings in *A. fernaldana*. In addition, the OM fascia and ST line in *A. sexdentata* are conspicuous and concolorous with the IM fascia, whereas in *A. fernaldana* the OM fascia and ST line are paler than the IM fascia and hardly differentiated from the ground color.

In male genitalia, *A. sexdentata* differs in its more sinuate ventral margin of the valva, and more rounded ventral margin of the sacculus. Further, although FW length of *A. fernaldana* ranges within that given above for *A. sexdentata*, the single large cornutus of *A. sexdentata* is twice as thick and nearly twice as long as that of *A. fernaldana*, and the small cornuti of *A. sexdantata* are larger and twice as numerous as those of *A. fernaldana*. The genitalia preparation of the one female syntype of *A. fernaldana* was in too poor condition for comparison. The cervix bursae of *A. sexdentata* is ventrad to the antrum, which otherwise separates females of the new species from all known *Aethes*.

***A. fernaldana* specimens examined** (n = 3). FW length 7.0–8.5 mm. Type H. T., Hatchet Creek, Shasta Co., California, 07/14–17/1871, *Cochylis fernaldana* Wlsm., type ♂ figd. & descr. . . ., B. M. ♂ genitalia slide No. 4777. Same data except *Cochylis fernaldana* paratype, B. M. ♂ genitalia slide No. 12950. Same data except B. M. ♀ genitalia slide No. 18564 (BM). So far as we know, no types have been formally designated, so these specimens are considered syntypes here.

Discussion. This is Razowski's *A. angulatana,* the identity of which was based on a misidentified specimen. Females were associated by FW color pattern and simultaneous capture. One melanic specimen was found. One of the most widely distributed Nearctic *Aethes*, *A. sexdentata* ranges from Nova Scotia west to Washington State, and south to Mississippi and Nebraska.

Etymology. The name *sexdentata* refers to the spines on the harpe.

Biology. *Solidago* sp. (Asteraceae) is a larval foodplant (Razowski 1997, and data on pinned specimens). Adults were captured May 7–August 11, suggesting a univoltine life cycle.

Aethes razowskii Sabourin and Miller, new species

(Fig. 6a–d)

Phalonia promptana (not Robinson, 1869); Forbes (1923:508, in part), Brower (1983:50, in part).

Aethes promptana (not Robinson, 1869); Grehan et al. (1995:25), Razowski (1997:124, figs. 56–60, 150–152).

Male and female exterior. Head, notum, and tegulum cream colored; labial palpus 3× longer than horizontal eye diameter. Fore- and midlegs darker anteriorly than posteriorly, hindleg with some brownish scales on femur, the smaller tibial spurs darker than the larger ones. **FW** (Fig. 6a) 4.7–8.6 mm long (n = 34). Ground cream colored; markings buff, orange yellow, dark brown, and fuscous; all fasciae bordered by darker scales; basal fascia narrow, extending to costa; striae on costa and anal margin not conspicuous; IM fascia narrow, extending into cell, coalescing with discal spot; discal spot paler than IM fascia, often barely contrasting with ground color; anal crescent present; OM fascia short; ST line extending to vein R_5, hardly differentiated from ground, orange yellow with a few umber specks to more contrasting and brown in some females; fringe of ground color. **HW** dark drab; fringe paler with narrow basal band.

Male genitalia (Fig. 6b, c) (n = 23). Costa of valva subsinuate, posterior margin broad, dorsally oblique, U-shaped row of spines on harpe, spines on exterior

margin longer than those on interior; sacculus broadly rounded. Aedeagus moderately thick, vesica bearing a blade-shaped beak or carina, an elongate scobinate patch, and one large, thick cornutus. Anellus lobes absent.

Female genitalia (Fig. 6d) (n = 4). Anterior and posterior apophyses subequal in length to papillae anales. Lamella postvaginalis a subquadrate medial plate; antrum cylindrical; ductus bursae sclerotized entire length. Cervix bursae subquadrate, not notably separated from corpus bursae.

Types. **Holotype:** MICHIGAN, Schoolcraft Co., T42N R16W Secs. 11, 13, ♂, 07/04/1987 (G. Balogh), FW 6.5 mm long, gen. prep. MS01050 (Fig. 6b) (AMNH). **Paratypes** (n = 19): Canada. NOVA SCOTIA: Round Hill [Annapolis Co.], ♂, 06/24/1961 (H. Stultz) (NSPM). QUEBEC: Knowlton [Brome Co.], 2 ♂, 06/09/1936 (G. S. Walley), gen. prep. Ph13 (CNC). USA. ALABAMA: Winston Co., ♂, 04/11/1999, gen. prep. MS99196; ♀, gen. prep. MS99197 (MS). CONNECTICUT: Windham Co., Putnam, ♀, 08/13–16/1961 (A. B. Klots), gen. prep. MS00202 (AMNH). IDAHO: Wallace [Shoshone Co.], ♂, 3000 ft., Sweadner collection, 06/22–30, gen. prep. MS00245 (CMNH). INDIANA: St. Joseph Co., LT, ♂, 06/20/1999 (J. Vargo), gen. prep. IG (JV). MAINE: Rangeley [Franklin Co.], ♂, 07/10/1938; ♀, 06/23/1938 (V. H. dos Passos), gen. preps. 00062IG, MS00016 (AMNH). MARYLAND: Baltimore Co., Prettyboy Reservoir, ♂, 08/24/2001, coll. #4, gen. prep. MS02029; Soldiers Delight, ♂, 04/25/1998; ♂, 05/25/1997, gen. prep. MS02205; ♂, 05/15/2000, gen. prep. MS0220; ♂, 06/14/1997; 2 ♂, 07/05/1997; ♂, 08/07/1997; ♂, 09/06/1998; ♀, 09/30/1998, gen. prep. MS02206; ♂, 09/19/1998, gen. prep. MS02182; ♂, 05/15/1998, gen. prep. IG02184 (J. Glaser) (JDG). MICHIGAN: Allegan Co., T2N R14W Sec. 26, ♂ (Fig. 6a), 5/30/1986 (G. Balogh), gen. prep. MS97310 (GJB). Cass Co., T5S R14W Sec. 31, ♂, 07/25/1996 (W. P. Westrate), gen. prep. IG (WPW); LT, 2 ♂, 09/03/1999, gen. prep. IG; ♂, 09/25/1999 (J. Vargo), gen. prep. MS99529 (UMSP). Gladwin Co., ♂, 06/25/1959 (R. R. Dreisbach), gen. prep. 01108IG (MSUC). Livingston Co., George Reserve, AL, ♂, 07/22/1938 (S. Moore), gen. prep. MS01101 (UMMZ). Schoolcraft Co., T42N R16W Secs. 11, 13, ♂, 07/04/1987 (G. Balogh), gen. prep. MS01050 (GJB). St. Joseph Co., Three Rivers, LT, ♂, 05/29/1999 (J. Vargo), gen. prep. MS99439, wing slide MS99439W (UMSP). Washtenaw Co., T3S R3E Sec. 29, ♂, 05/30/1992 (B. G. Scholtens), gen. prep. 00027IG (BGS); T2S R3E Sec. 6, ♀, 07/19/1993 (J. H. Wilterding), gen. prep. MS00499 (JHW). NEW HAMPSHIRE: Coos Co., Whitefield, BLT, ♀, 07/11/1992 (W. Kiel), gen. prep. MS01496 (MS). VERMONT: Ferdinand [Essex Co.], ♂, 06/23/1993 (M. Sabourin), gen. prep. 00247IG (UMSP).

Diagnosis. *A. razowskii most resembles A. promptana*. FW markings in *A. razowskii* are usually more contrasting with ground color and outlined by darker scales (Figs. 6a, 1a). In male genitalia, *A. razowskii* differs from *A. promptana* in its oblique posterior margin of the valva and well rounded ventral margin of the sacculus, compared with the curved posterior margin of the valva and straight margin of the sacculus in *A. promptana* (Figs. 6b, 1b). Also, the aedeagus of *A. razowskii* has a blade-shaped carina, which is absent in *A. promptana* (Figs. 6c, 1c). In female genitalia, the antrum of *A. razowskii* is more cylindrical and the lamella postvaginalis smaller than in *A. promptana* (Figs. 6d, 1d). *A. razowskii* is superficially similar to some individuals of *A. angulatana,* but in *A. razowskii* the IM fascia is narrower, the ST line paler, and the genitalia are different (Figs. 6a–d, 2a–d).

Discussion. Razowski (1997) and earlier authors misidentified this species as *A. promptana*. Females were associated by FW color pattern and simultaneous capture.

Etymology. This species is named in honor of Dr. Josef Razowski in recognition of his continuing efforts to illuminate the world tortricid fauna.

Biology. Larval foodplants are unknown. May–September adult capture dates suggest a multivoltine life cycle.

Aethes westratei Sabourin and Miller, new species

(Fig. 7a–d)

Male and female exterior. Head and notum usually unicolorous cream to tawny, antennal scape darker than head; labial palpus white apically, 3× longer than horizontal eye diameter. Thoracic tuft conspicuous, tegulum brown, darker than notum; fore- and midlegs fuscous anteriorly with buff scales at articulations, hindleg predominately buff except for fuscous scales anteriorly on shorter tibial spurs. **FW** (Fig. 7a) 6.9 mm long (n = 9). Ground color cream, suffused with brownish scales, basal area suffused with tawny scales, posterior 3/4 often suffused with grayish scales; markings brown; fasciae with darker brown or black borders; basal fascia extending slightly into discal cell at midpoint, also to costa; costa and anal margins with short striae; IM fascia broad, coalescing with discal spot; anal crescent and OM fascia present; ST line irregular, but extending to apex; fringe cream with some brown scales; terminal line darker than fringe. **HW** olive-brown; fringe paler, with basal band.

Male genitalia (Fig. 7b, c) (n = 4). Costa of valva

straight, posterior margin rounded, sinuate, harpe spined; sacculus subtriangular, ventrally rounded. Median process of transtilla subtriangular. Aedeagus thick, vesica bearing one large cornutus, a bundle of small cornuti, and a distal crescent-shaped sclerite. Anellus lobes absent.

Female genitalia (Fig. 7d) (n = 1). Anterior and posterior apophyses equal in length; antrum funnel shaped, almost as long as ductus bursae, right margin straight, left margin bowed at 1/3 its length when viewed as in Fig. 7d. Cervix bursae sinistrocaudad of corpus bursae when similarly viewed, and small. Corpus bursae elongate, slightly slanted.

Types. **Holotype:** MICHIGAN, Cass Co., T5S R14W Sec. 31, UV, ♂, 09/02/1995 (M. C. Nielsen), FW 6.5 mm long, gen. prep. MS97289 (AMNH). **Paratypes** (n = 8): MICHIGAN: Barry Co., Shaw Lk., T3N R10W Sec 3, 2 ♂, 09/09/1986 (G. Balogh) (GJB). Cass Co., LT, ♂, 09/06/1997, gen. prep. MS97325; ♀ (Fig. 7a), same data (J. Vargo), gen. prep. MS98146 (UMSP); T5S R14W Sec. 31, UV, ♂, 09/02/1995 (M. C. Nielsen), gen. prep. MS01039 (MSUC); same locality, ♂, 09/02/1988; ♂, 09/09/1988 (W. P. Westrate), gen. prep. MS01048, wing slide MS01048W (WPW); Dr. Lawless C[ounty] P[ark], T6S R13W Sec. 32, UV, ♂, 09/01/1995 (M. C. Nielsen) (MSUC).

Diagnosis. *A. westratei* most resembles *A. angulatana* superficially and genitalically. The broad IM fascia is a distinguishing feature, being broader in *A. westratei* than in *A. angulatana* (Figs. 7a, 2a). In male genitalia, the harpe of *A. westratei* is more heavily spined than in *A. angulatana*, the posterior margin of the valva less sinuous, and the sacculus less acute (Figs. 7b, 2b). In female genitalia, the anterior and posterior apophyses are shorter and the corpus bursae less slanted than in *A. angulatana* (Figs. 7d, 2d).

Discussion. Females were associated by FW color pattern and simultaneous capture.

Etymology. This species is named in honor of William P. Westrate in recognition of his activities to illuminate southern Michigan's flora and fauna.

Biology. Larval foodplants unknown. September adult capture dates suggest a univoltine life cycle.

Aethes matheri Sabourin & Miller, new species

(Fig. 8a–d)

Phalonia angulatana (not Robinson, 1869); Kimball (1965:270).

Male and female exterior. Head, notum, and tegulum usually cream or buff; labial palpus 2.5× longer than horizontal eye diameter. Hindleg without markings. **FW** (Fig. 8a) 4.4–6.6 mm long (n = 57). Ground color variable, usually cream or buff; markings buff and brown or cinnamon, fasciae outlined with fuscous scales; basal 1/4 of costal margin fuscous; short striae on costal and anal margins; basal fascia variably projecting slightly into discal cell at midpoint and extending to costa or costal half, diffuse, or absent; IM fascia extending into cell, bordered by or joining discal spot; anal crescent and OM fascia present; ST line present, not reaching apex, variable in color, often not differentiated; terminal line darker than fringe; fringe a mix of cream, cinnamon, buff, and brown scales, paler at tornus. **HW** pale drab; fringe paler with thin basal band.

Male genitalia (Fig. 8b, c) (n = 34). Costa of valva straight, posterior margin narrowly rounded, harpe spined; sacculus pointed. Median process of transtilla triangular, rounded apically. Aedeagus laterally triangular at apex, vesica bearing one stout cornutus and a bundle of smaller cornuti. Anellus lobes absent.

Female genitalia (Fig. 8d) (n = 17). Posterior apophyses longer than anterior; left margin of antrum irregular when veiwed as in Fig. 8d; ductus bursae coalescing with corpus bursae; cervix bursae sinistrocaudad of corpus bursae when viewed as in Fig. 8d, subquadrate; corpus bursae elongate; tergum 7 lightly sclerotized.

Types. Holotype (Fig. 8a)**:** MISSISSIPPI, Long Beach [Harrison Co.], ♂, 03/30/1997 (R. Kergosien), gen. prep. MS99483, FW 5.0 mm long, coll. #180525 (AMNH). **Paratypes** (n = 56): FLORIDA: Dade Co., Florida City, ♀, 04/02/1947; ♂, gen. prep. MS01137; ♂, 05/02/1947, gen. prep. MS01134; ♀, 05/04/1947, gen. prep. MS01109; ♂, 05/06/1947 (O. Buchholz), gen. prep. MS01101; R. Palm Pk., AL, 3 ♀, 03/14/1938 (E. P. Darlington), gen. preps. 01136, MS01089 (ANSP). ILLINOIS: Coles Co., T12N R6E Sec. 11, UVL, ♀, 06/05/1997 (T. Harrison), gen. prep. MS98437. Putnam Co., ♂, 07/06/1967 (M. O. Glenn), gen. prep. MS97297 (INHS). INDIANA: Elk[hart] Co., LT, 3 ♂, 05/29/1999, gen. prep. MS01080. St. Joseph Co., LT, ♂, 06/20/1999, gen. prep. MS00611; ♂, 06/23/1999, gen. prep. MS99508; ♂, 08/07/1999 (J. Vargo), gen. prep. 00254IG (UMSP). MAINE: Bangor [Penobscot Co.], overgrown field across from Roadway Inn, *Cornus, Alder, Spiraea*, common, 08:50–09:50 h, 2 ♂, 06/20/1997 (M. Sabourin), gen. prep. 00707IG (MS); ♂, same data, gen. prep. MS97350 (UMSP). Steuben [Washington Co.], ♂, 06/10/1991, gen. prep. G1797; ♂, 07/07/1993 (M. A. Roberts), gen. prep. G1791 (MAR). MARYLAND: Baltimore Co.,Towson, ♂, 06/05/1999 (J. Glaser), gen, prep. 02204IG (JDG). MICHIGAN: Barry Co., Shaw Lk., T3N R10W Sec. 3, ♂, 06/30/1989 (G. Balogh), gen. prep. MS99189 (GJB). Shiawassee

Co., Moon Lk., T5N R1E Sec. 21, ♂, 06/25/1969 (J. P. Donahue), gen. prep. MS01100 (MSUC). St. Joseph Co., Three Rivers, LT, 2 ♂, 05/9/1999, gen. preps. MS99226, 99447; ♀, same date (J. Vargo), gen. prep. MS99227 (UMSP). MISSISSIPPI: Hancock Co., Bay St. Louis, ♀, 03/24/1972 (R. Kergosien), gen. prep. MS99170, coll. #106143. Harrison Co., Handsboro, ♀, 04/14/1966 (R. T. Taylor), gen. prep. IG, coll. #21264; Long Beach, ♀, 04/14/1978, gen. prep. MS01132, coll. #126347; ♂, 03/31/1997, gen. prep. IG, coll. #180569; ♂, 04/09/1997, gen. prep. IG, coll. #180549; ♂, ♀, 06/29/1997 (R. Kergosien), coll. #180550, #180570, gen. prep. IG (UMSP). Hinds Co., Clinton, ♂, 09/02/1962 (B. Mather), coll. #11986 (BMMS); ♂, 03/06/1995 (M. & E. Roshore), coll. #180543; Jackson, ♂, 04/07/1963, gen. prep. MS01082, coll. #13179; ♀, 10/07/1961, gen. prep. IG, coll. #8303; ♂, 04/30/1966, gen. prep. MS01131, coll. #21278; ♀, 10/08/1966 (B. Mather), gen. prep. MS99436, coll. #22976. Jackson Co., Shepard S[tate] P[ark], ♂, 08/28/1965, gen. prep. MS99040, coll. #20421; ♂, 08/15–22/1995, gen. prep. 99524, coll. #175647; ♀, 09/6–11/1995, gen. prep. MS99275, wing slide MS99275W, coll. #164312. Rankin Co., Pearl, ♀, 03/31/1963 (B. Mather), gen. prep. IG, coll. #13177 (UMSP). Tishomingo Co., J. P. Coleman S[tate] P[ark], ♂, 06/10–24/1995, gen. prep. MS99282, coll. #164313 (BMMS); ♂, 07/10–21/1995 (R. Kergosien), gen. prep. 99485, coll. #180567 (UMSP). MISSOURI: Columbia [Boone Co.], ♀, 07/22/1985 (W. S. Craig), gen. prep. MS99253 (UMRM). NORTH CAROLINA: Raleigh [Wake Co.], ♂, 08/10/1938 (M. W. Wing), gen. prep. MS01135 (ANSP). PENNSYLVANIA: Allegheny Co., 4 km N of Tarentum, ♂, 06/22/1989 (W. Zanol), gen. prep. MS01107; Pittsburgh, ♀, 06/21/1905 (H. Engel), gen. prep. 01095; ♀, 06/27/1907 (H. Kahl), gen. prep. MS00501 (CMNH). TENNESSEE: Oak Ridge [Roane Co.], ♂, 04/27/1966 (B. Mather), gen. prep. MS99441, coll. #21217 (UMSP). TEXAS: Beaumont [Jefferson Co.], ♀, 08/02/1991 (C. Bordelon), gen. prep. MS01149 (MS).

Diagnosis. *A. matheri* most resembles *A. angulatana*. Superficially, *A. matheri* differs in its smaller size, more obscure basal fascia, narrower IM fascia, and ST line not reaching apex (Figs. 8a, 2a). In male genitalia of *A. matheri*, the valva is narrower distally, the base of the transtilla median process broader, and the apex of the aedeagus more acute (Figs. 8b, c, 2b, c). In *A. matheri* female genitalia, the left side of the antrum is more irregular, cervix bursae more conspicuous, and corpus bursae straighter than in *A. angulatana* when viewed as in Figs. 8d and 2d. *A. matheri* differs from *A. sexdentata* in male genitalia, the former, for example, having an acute sacculus, and the latter an obtuse one (Figs. 8b, 5b).

Discussion. The triangular process of the aedeagus can be seen by brushing away scales at the tip of the abdomen. Northern specimens of *A. matheri* are larger and have a less acute termination of the aedeagus. Females were associated by FW color pattern and simultaneous capture.

Etymology. This species is named for Bryant Mather in recognition of his long dedication to collecting Lepidoptera.

Biology. Larval foodplants are unknown. March–November adult capture dates in the southern part of range suggest a bivoltine life cycle there; May and June capture dates in the northern part of range suggest univoltinism there. In the north, this species flies earlier than *A. angulatana*.

Aethes terriae Sabourin & Miller, new species

(Fig. 9a–c)

Male exterior. Head, tegulum, and notum white, labial palpus 2× longer than horizontal eye diameter, second segment white apically. Fore- and midlegs black anteriorly with buff scales at junctions of tarsi, the longer tibial spur of middle leg buff; hindleg predominately buff, a few dark scales on the shorter tibial spur. **FW** (Fig. 9a) 5.3 mm long (n = 3). Ground color white; markings black or buff with scattered buff scales; minute striae on costal and anal margins; costa black to basal fascia; basal fascia extending to costa, or obscure just below costa; IM fascia short, not extending into discal cell, a few buff scales on apical margin; anal crescent narrow, buff with black borders; discal spot obscure; OM fascia present; ST line buff with black border, extending only to vein M_2; fringe white with scattered buff and brown scales. **HW** pale drab; fringe paler; basal band present.

Male genitalia (Fig. 9b, c) (n = 3). Costa of valva sinuate, posterior margin rounded, bearing a hooklike process ventrally; sacculus rounded. Median process of transtilla short, triangular. Sicklelike apical structures of socii short. Aedeagus apically falcate, vesica bearing one long cornutus. Anellus lobes absent. Juxta a small subrectangular plate.

Types. Holotype (Fig. 9a): MICHIGAN, Kalamazoo Co., wet deciduous forest east side Sugarloaf Lake, ♂, 07/03/1993 (G. J. Balogh), FW 5.0 mm long, gen. prep. MS 99200 (AMNH). **Paratypes** (n = 2): MICHIGAN**:** Cass Co., Westrate farm, LT, ♂, 07/16/1999 (J. Vargo), gen. prep. MS01088 (Fig. 9b, c), wing slide MS01088W (UMSP); ♂, same data as holotype, gen. prep. MS01069 (GJB).

Diagnosis. Superficially, *A. terriae* resembles a small *A. sexdentata*. It differs from *A. sexdentata* superficially in its IM fascia not extending beyond discal cell, narrower anal crescent, and ST line not reaching apex (Figs. 9a, 5a). In male genitalia, *A. terriae* differs from *A. sexdentata* in that the posterior margin of its valva is evenly rounded, with a hooklike spine on the ventral margin, transtilla with a short median process, an apically falcate aedeagus, and a single cornutus (Fig. 9b, c); in contrast, the valva of *A. sexdentata* has a more narrowly rounded posterior margin with a few spines near the outer margin of the harpe, a larger median process of transtilla, a small bundle of cornuti in addition to one large cornutus, and the aedeagus lacks a falcate apex (Fig. 5b, c).

Discussion. The female of *A. terriae* is unknown.

Etymology. This species is named in honor of Terri Balogh for her hospitality to lepidopterists.

Biology. Larval foodplants are unknown. July 3–16 adult capture dates suggest a univoltine life cycle.

Aethes baloghi Sabourin & Metzler, new species
(Fig. 10a–d)

Male and female exterior. Head and notum mixed cream and buff; labial palpus 2× longer than horizontal eye diameter, apex cream colored. **FW** (Fig. 10a) 4.0–6.8 mm long (n = 155). Ground cream suffused with buff; markings orange brown; fasciae dark bordered except for basal fascia; basal fascia oblique, costal half indiscernible; basal 1/4 of costa same color as markings; costal and anal margins with minute striae; IM fascia extending through cell, joined with discal spot, angled toward tornus; OM fascia reduced to a few scales near costa; ST line not conspicuous, consisting of a few scattered dark scales not reaching apex; fringe of ground color, but orange-brown on tornus adjacent to anal crescent. **HW** dark drab; fringe cream with a darker basal line.

Male genitalia (Fig. 10b, c) (n = 15). Costa of valva fairly straight, posterior margin digitiform; sacculus rounded. Median process of transtilla long, broad, tapering terminally to a twisted apex. Aedeagus apically falcate, vesica bearing a scobinate patch, but no cornuti. Anellus lobes lateral and asymmetrical, inner margin spinose terminally. Juxta broad, crescent shaped.

Female genitalia (Fig. 10d) (n = 14). Anterior and posterior apophyses subequal in length to papillae anales. Sterigma, antrum, and ductus bursae reduced; sterigma a C-shaped sclerotized ridge; corpus bursae large, bulbous. Signum a sclerotized area on caudal right half of corpus bursae when viewed as in Fig. 10d. Surface of sternum 7 with heavily sculpted, irregular ridges. Cervix bursae indiscernible.

Types. Holotype (Fig. 10a)**:** NEW YORK, Yonkers [Westchester Co.], ♀, 06/19/1936 (A. B. Klots), FW 6.5 mm long, gen. prep. MS00061 (AMNH). **Paratypes** (n = 154): ILLINOIS: Waukegan [Lake Co.], ♀, 08/17/1941 (A. K. Wyatt), 309 (FMNH). Putnam Co., ♂, 09/20/1959; ♂, 09/17/1964 (M. O. Glenn) (USNM). INDIANA: Lagrange Co., LT, ♂, 07/26/1996. St. Joseph Co., LT, ♀, 08/07/1999, gen. prep. 00424IG, wing slide MS00424W (UMSP); 3 ♂, 07/28/1999; 3 ♂, 08/26/1999; ♂, 08/26/1999, gen. prep. EHM253; 3 ♂, 08/28/1999 (J. Vargo) (JV). Hessville [Lake Co.], ♀, 06/30/1905 (A. Kwiat), gen. prep. IG (USNM). MASSACHUSETTS: Martha's Vineyard [Dukes Co.], ♂, 08/11/1944 (F. M. Jones), gen. prep. IG (USNM). MICHIGAN: Allegan Co., T2N R14W Sec. 7, 2 ♂, 05/22–24/1970 (J. P. Donahue), gen. prep. MS97345IG (MSUC); T2N R15W Sec. 25, ♂, A[llegan] S[tate] G[ame] A[rea], 07/21/1984; T3N R15W Sec. 36, ♀, 05/03/1991, gen. prep. IG; T2N R14W Sec. 26, ♀, 09/09/1989; 4 ♂, 2 ♀, 07/25/1987; ♂, ♀, 09/19/1989, gen. prep. EHM251; sand prairie, savanna, 56 ♂, 15 ♀, 08/22/1986, gen. preps. IG, MS97350, EHM250, 252; 2 ♂, 09/19/1987, gen. prep. MS97347; T3N R14W Sec. 31, ♂, 05/11/1991; sand prairie/savanna, ♀, 2 ♂, 07/25/1992, gen. prep. EHM254 (G. Balogh) (GJB); A[llegan] C[ounty] G[ame] P[reserve], LT, 2 ♂, 07/17/1999, gen. prep. MS99322; A[llegan] S[tate] G[ame] A[rea], 8 ♂, 05/26/2000 (J. Vargo), gen. preps. 00423IG, MS01083 (Fig. 10b) (UMSP). Cheboygan Co., Grass Bay, T38N R5W Sec. 25, ♂, 08/04/1995, gen. prep. IG (BGS); T37N R3W Sec. 33, ♀, 06/25/1990 (B. G. Scholtens), gen. prep. MS99154 (UMSP). Emmet Co., Wilderness S[tate] P[ark], base of Waugoshance Point, ♂, 05/27/1990, gen. prep. IG (G. Balogh) (GJB). Lk. Lansing [Ingham Co.], 3 ♀, 09/20/1936, gen. prep. MS01097; 3 ♂, same data (W. C. Stinson), gen. preps. IG (MSUC). Mackinaw Co., T41N R5W Sec. 23, ♀, 08/15/1998, dunes (G. Balogh) (GJB). Montcalm Co., T12N R10W Sec. 18, ♂, 05/09/1987 (G. Balogh), gen. prep. IG. Muskegon Co., T12N R17W Sec. 26, sand pr[airie]/savanna, 3 ♂, 06/11/1993, gen. prep. IG; Muskegon S[tate] P[ark] dunes, ♂, 07/13/1991; ♂, 08/12/1989; ♂, 07/15/1991 (G. Balogh) (GJB). Newaygo Co., T12N R12W Sec. 1, ♂, 07/14/1967 (J. P. Donahue), gen. prep. MS01098 (Fig. 10c). Wayne Co., ♀, 09/14/1943 (J. H. Newman), gen. prep. IG (MSUC). MISSISSIPPI: Harrison Co., Long Beach, ♀, 03/07/1991, gen. prep. IG, coll. #180535; ♂, 03/20/1998, gen. prep. IG, coll. #180537 (BMMS); ♂, 03/13/1991, gen. prep. IG, coll. #180534; ♀, 04/23/1991, gen. prep. IG, coll. #180553; ♂, 04/30/1997, gen. prep. IG, coll. #180548 (R. Kergosien) (UMSP). MISSOURI: Barry

Co., Roaring River S[tate] P[ark], Ozark plateau flora, BL, ♀, 09/03/1994, gen. prep. MS99178 (RL); ♀, same data, gen. prep. MS99180 (UMSP). Columbia [Boone Co.], ♀, 09/17/1983 (W. S. Craig), gen. prep. MS98164 (UM). NEW JERSEY: Franklinville [Gloucester Co.], ♀, 08/18/1939 (W. Sachse). Lakehurst [Ocean Co.], ♀, 09/04/1937, gen. prep. MS01054; AL, ♂, 08/08/1939. New Lisbon [Burlington Co.], AL, ♂, 09/23/1935; ♀, 07/06/1942, gen. prep. MS00240; Whitesbog, AL, ♀, 07/31/1938 (E. P. Darlington), gen. prep. MS01077 (Fig. 10d)(ANSP). NEW YORK: Yonkers [Westchester Co.], ♂, 06/06/1936; ♀, 09/14/1936 (Klots) (AMNH). NORTH CAROLINA: So[uthern] Pines [Moore Co.], ♀, 04/1–7, gen. prep. IG. VIRGINIA: Glencarlyn [Arlington Co.], ♀, AL, 05/26/1959 (J. Armstrong), gen. prep. IG (USNM).

Diagnosis. *A. baloghi* most resembles *A. patricia* Metzler, but differs in having orange-brown FW markings compared to the buff markings of *A. patricia*. In male genitalia of *A. baloghi* the posterior margin of the valva is digitiform, not outlined with dense setae, the sacculus is undemarcated, and anellus lobes are present (Fig. 10b, c); in contrast, *A. patricia* has the posterior margin of the valva concave, outlined with dense setae, tipped with a short tooth, the sacculus as a separate lobe, and anellus lobes are absent (Metzler 2000: fig. 2a, b). In female genitalia, *A. baloghi* has a conspicuous signum and sculptured seventh sternum (Fig. 10d), whereas *A. patricia* lacks a signum, and sternum 7 has two heavily sclerotized areas laterad to the ostium bursae (Metzler 2000: fig. 2c).

Discussion. Males were associated by FW color pattern and simultaneous capture.

Etymology. This species is named for George J. Balogh in recognition of his dedication to lepidopterology.

Biology. Larval foodplants unknown. Associated with prairie habitat in parts of range. March–September adult capture dates suggest a multivoltine life cycle.

Aethes atomosana (Busck)
(Fig. 11a–d)

Phalonia atomosana Busck (1907:22) (Holotype ♀ [incorrectly given as ♂ by Brown & Lewis 2000], type #10223, Pa., Pittsburgh [Allegheny Co.], H. Engel, 08/17/1905, forewing 8.0 mm long, gen. prep. USNM23825, in USNM), Forbes (1923:509), McDunnough (1939:59), Procter (1946:308), Brower (1983:49, in part), Handfield (1997:44), Brown and Lewis (2000:1020).

Aethes atomosana; Grehan et al. (1995:25), Razowski (1997:127, figs. 82–84, 163–165).

Phtheochroa atomosana; Poole and Gentili (1996:876), Nielsen (1998:10).

Male and female exterior. Head, notum, and tegulum chamois colored; labial palpus 3.0–3.5× longer than horizontal eye diameter. Thoracic tuft conspicuous. **FW** (Fig. 11a) 6.6–9.8 mm long (n = 34). Ground color chamois; markings reduced, represented by black and buff scales; some specimens completely irrorated with fuscous scales, others less maculate with no markings above vein Sc; fuscous striae along anal margin and distally on costa beyond vein Sc; basal fascia vestigial, serial black spots along vein Sc; IM and OM fasciae absent; discal spot present; anal crescent reduced to a submarginal spot; ST line represented by paired spots reaching apex; fringe of ground color; heavy fuscous scaling on underside excluding margins. **HW** cream to fawn colored.

Male genitalia (Fig. 11b, c) (n = 10). Costa of valva slightly curved, posterior margin subsinuate, oblique, serrated, with apical spine; sacculus rounded, forming a subharpal plate. Median process of transtilla large, thumb shaped, apex broadly rounded, with 4 or more short apical processess. Aedeagus bearing a medial process, vesica bearing one long, thin cornutus. Anellus lobes bilateral and appressed. Juxta large, subovate.

Female genitalia (Fig. 11d) (n = 4). Lamella postvaginalis a long elliptical plate; anterior apophyses longer than posterior; sternum 7 heavily sclerotized, a pair of raised ridges creating a medial furrow ventrad of antrum; antrum cylindrical, ½ as long as ductus bursae. Cervix bursae indiscernible.

Diagnosis. *A. atomosana* most resembles *A. matthewcruzi*, which is described and differentiated in the next section.

Biology. Larval foodplants unknown. Early August to mid-September adult captures suggest a univoltine life cycle.

Specimens examined (n = 34, including type). Counties and months of capture by State or Province: Canada. NOVA SCOTIA: Kings, August; Lunenburg, August (MS, NSPM, UMSP). ONTARIO: Carleton, August (CNC). USA. ILLINOIS: Algonquin, August (INHS). INDIANA: Lagrange, August (JV). MARYLAND: Garrett, September (JDG). MICHIGAN: Barry, September; Cass, September; Cheboygan, August; Clinton, September; Kalamazoo, August; Livingston, September; Midland, August (BGS, GJB, MSUC, UMSP, WPW). PENNSYLVANIA: Allegheny, August (USNM). VERMONT: Addison, August; Chittenden, August, September; Franklin, August; Grand Isle, September (FMPS, MS, MSG). WISCONSIN: Burnett, August (MS).

Aethes matthewcruzi Sabourin & Vargo, new species
(Fig. 12a–d)

Male and female exterior. Head cream with brown suffusion; labial palpus 2.5–3.0× longer than horizontal eye diameter. Notum and tegulum cream with brown suffusion or mixed black, buff, and brown; hindleg anterior spurs and shorter tibial spurs with some darker scales. **FW** (Fig. 12a) 6.9–9.2 mm long (n = 12). Ground color cream with brown suffusion especially between veins; markings reduced to small, black, buff, and brown spots; basal ¼ of costa gray, costa and anal margin with fuscous striae; IM and OM fasciae and anal crescent reduced to submarginal black spots; discal spot the most conspicuous marking, a mixture of black and buff scales; gray patch between discal spot and anal crescent extending to tornus; ST line represented by black and buff spots, not extending to apex; fringe cream colored with basal line the color of FW markings; heavy fuscous scaling on entire underside. **HW** drab-gray.

Male genitalia (Fig. 12b, c) (n = 5). Valva broad, costa slightly curved, posteriorly deeply emarginate, serrated; sacculus long, slightly curved, tapering distally. Median process of transtilla triangular, apical half narrowing to a point. Phallobase narrow and curving to a 45° angle to aedeagus. Aedeagus thick, vesica bearing one long, thin cornutus and an elongate scobinate patch. Anellus lobes (Fig. 12c) long and narrow.

Female genitalia (Fig. 12d) (n = 4). Sterigma subquadrate; lamella postvaginalis a medial proccess; apophyses long, anterior longer than posterior; antrum a robust collar, ½ as long as ductus bursae; ductus bursae sclerotized entire length.

Types. Holotype (Fig. 12a): MINNESOTA, Roseau Co., Lost River S[tate] F[orest], AL, ♂, 08/22/1999 (Vargo & Sabourin), forewing length 8.0 mm, gen. prep. MS00167 (Fig. 12b, c) (UMSP). **Paratypes** (n = 11): MAINE: Steuben [Washington Co.], ♂, 08/02/1990 (M. A. Roberts), gen. prep. G1786 (MAR). MICHIGAN: Allegan Co., Saugatuck S[tate] P[ark], ♀, 08/08/1992, gen. prep. MS97269. Barry Co., fen on Shaw Lk., T3N R14W Sec. 3, ♂, 06/26/1991 (G. Balogh), gen. prep. MS01055 (GJB). Cass Co., T5S R14W Sec. 31, ♀, 08/22/1996 (W. P. Westrate), gen. prep. MS01030 (WPW). Washtenaw Co., T2S R3E Sec. 6, ♂, 07/26/1993 (J. H. Wilterding), gen. prep. MS00298, wing slide MS00298W (JHW). MINNESOTA: Same data as holotype, 4 ♂, gen. prep. MS99543 (MS). NEW HAMPSHIRE: Whitefield [Coos Co.], ♀, 08/07/1985 (W. J. Kiel), gen. prep. MS97209 (UMSP). WISCONSIN: Burnett Co., Grantsburg, AL, ♀, 07/28/1999, gen. prep. MS00342 (Fig. 12d), wing slide MS00342W; T40N R18W Sec. 23, LT, ♂, 07/14/2001 (M. Sabourin) (MS).

Diagnosis. *A. matthewcruzi* is most similiar to *A. atomosana*, from which it differs subtly in FW markings, and more markedly in genitalia. *A. matthewcruzi* has fuscous striae on the basal ¼ of the FW costal margin which are absent in *A. atomosana*, and the OM and IM fasciae, which are reduced to submarginal spots in *A. matthewcruzi*, are lacking completely in *A. atomosana* (Figs. 12a, 11a). In male genitalia of *A. matthewcruzi*, the posterior margin of the valva is deeply emarginate, the sacculus long and slightly curved, and the median process of transtilla triangular, whereas in *A. atomosana* the posterior margin of the valva is acute, the sacculus short and rounded, and the median process of transtilla thumb shaped (Figs. 12b, 11b). In female genitalia, *A. matthewcruzi* has a small, round lamella postvaginalis and sternum 7 is not heavily sclerotized, whereas in *A. atomosana* the lamella postvaginalis is elliptical, and sternum 7 is heavily sclerotized (Figs. 12d, 11d). Sexual dimorphism in size may occur, as male FW length ranged 6.8–8.2 mm (n = 8), and female, 8.6–9.2 mm (n = 4). However, this might prove to be an artifact of small sample size.

Discussion. Females were associated by FW color pattern.

Biology. Larval foodplants unknown. June–August adult capture dates suggest a univoltine life cycle. Adults appear about one month earlier than those of *A. atomosana*. Although broadly sympatric with *A. atomosana*, *A. matthewcruzi* seems to occur in a wider variety of habitats.

Etymology. This species is named in memory of Matthew Edward Cruz, a talented young artist who lost his life in a tragic accident.

In conclusion, using male structural characters, we readily constructed a key to the 12 species treated, but it is omitted here because numerous untreated species of *Aethes* also occur in the region.

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