CHARACTER VARIABILITY AND A NEW SYNONYM OF *ACERPENNA PYGMAEA* (EPHEMEROPTERA: BAETIDAE)[1]

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ABSTRACT: An adult of *Acerpenna harti* was reared from a larva and compared with larvae of *A. macdunnoughi,* and *A. pygmaea. Acerpenna harti* can not be consistently distinguished as larvae or adults from *A. pygmaea* based on observed variabilities in adult and larval characters. *Acerpenna harti* is reported as a junior subjective synonym of *Acerpenna pygmaea,* new synonymy.

Acerpenna harti (McDunnough) has only rarely been reported by mayfly workers since its description over seventy years ago. The only published keys to incorporate this species in the adult stage are those of Traver (1935, as *Baetis*) and Burks (1953, as *Baetis*). McDunnough (1924) first described *A. harti* (as *Baetis*) based on specimens collected July 11, 1898, from Urbana, Illinois, and housed in the Canadian National Collection, Ottawa. Burks (1953) revised the male description and included additional Illinois records. Waltz and McCafferty (1987) first characterized *Acerpenna* as a genus distinct from *Baetis* Leach but they did not transfer the species *B. harti* McD. or *B. akataleptos* McD. until 1990 (McCafferty and Waltz, 1990). As of this writing, only the larva of *A. akataleptos* remains unknown among the Nearctic *Acerpenna* species. We strongly suspect, but do not have any data to conclude at this time, that *A. akataleptos* is also a synonym of *A. pygmaea.*

McCafferty et al. (1993), although not able to assign a species name to larvae of *Acerpenna* collected in Colorado, alluded to the possible occurrence of *A. akataleptos* in Colorado due to the discovery of *Acerpenna* larvae with gills similar in form to *A. pygmaea* (Hagen) but differing in having both the anterior and posterior margins of gill 7 serrate. This condition is distinctly different from the generally accepted concept of *A. pygmaea* larvae characterized by Ide (1937) and Morihara and McCafferty (1979), in which the gills are asymmetric and only the posterior margins are serrate.

MATERIAL EXAMINED

One of us (DEB) reared one larva from which the adult was identified as *Acerpenna harti.* Collection data for the reared specimen is as follows: OKLA-

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HOMA: Pushmataha Co., Pine Ck @ unnamed rd (old main highway) in Wadena, 16-VII-1993, DE Baumgardner, (DB 93-137), [1 reared male larval exuviae (slide mounted: euparal: abs. alc.) and its adult].

Paratypes: *Acerpenna harti* McDunnough (2 Male adults): IL: Urbana, July 11, 1898, INHS tag No. 24491, CNC Paratype No. 708, housed in Canadian National Collection, Ottawa. 4 specimens labeled Ontario: Ottawa, 7-V-1921, 8-5-1921, 10-V-1920, 17-V-1921, all collected by J. H. McDunnough.
AL: Choctaw Co., Tucklebaum Cr. @ Hwy 17, 12 May 1989, S. Harris, (20 males).
CO: Moffat Co., Green River, Echo Park, Dinosaur NM, 19 August 1993, B. Kondratieff and R. Durfee, (1 larva). CO: Moffat Co., Yampa River, Echo Park, Dinosaur NM, 3 September 1994, B. Kondratieff and R. Durfee, (1 larva). CO: Routt Co., Yampa River, near Steamboat Springs off Rt. 131, 28 July 1991, Kondratieff, Durfee, and Painter, (1 larva). CO: Yuma Co., Chief Creek Co. Road CC North, 25 April, 1993, B. Kondratieff, R. Durfee, (1 reared male and 2 reared females and associated larval exuviae, 1 larva).
MI: Emmet Co., Lake Michigan, Trail's End Bay, VI-6-1994, P. Hudson (1 larval exuviae).
OK: Le Flore Co.; Rock Ck. @ Railroad Road ca. 0.5 mi N of Talihina, 17-III-1993, D.E. Baumgardner, (DB 93-46), (5 larvae). OK: LeFlore Co.; Birney Ck. @ Hwy 63, ca. 5 mi SE of Talihina, 16-V-1993, D.E. Baumgardner, (DB 93-90), (3 larvae). OK: Pushmataha Co.; Beaver Ck. @ Coffee Ck. Rd., ca. 1.5 mi S of Hwy 3 jct, ca. 4 mi W of Antlers, 17-IV-1993, D.E. Baumgardner, (DB 93-49), (1 larva). Same as preceding but, 14-III-1993, (DB 93-27), (2 larvae). OK: Pushmataha Co.; Cedar Ck. @ Snow Ck. Rd. in Snow, 17-III-1993, D. E. Baumgardner, (DB 93-47), (2 larvae). OK: Pushmataha Co.; Kiamichi R @ unnamed rd., 3 mi E of Albion, 18-IV-1993, (DB 93-27), (2 larvae). OK: LeFlore Co.; Unnamed 2nd order trib. of Buzzard Ck. @ unnamed rd., ca. 2 mi. E. of Talihina, 17-III-1993, DE Baumgardner (DB 93-45.5) (6 larvae); OK: Pushmataha Co., Marble Fobb Ck. (?) at main rd. in Kiamichi Wilderness Area, 17-IV-1993, DE Baumgardner, (DB 93-53) (2 larvae); OK: Pushmataha Co., Cole Ck. @ unnamed rd., 3.7 mi. S. of Miller, 14-III-1993, DE Baumgardner, (DB 93-25) (6 larvae). OK: Pushmataha Co., Dry Ck. @ low water crossing @ unnamed rd., ca. 1.5 mi. E. of Tuskahoma, 17-VII-1993, DE Baumgardner, (DB 93-142), 2 larvae). OK: Pushmataha Co., Panther Ck. @Hwy. 2, 3.1 mi. N. of Hwy. 2-3 jct., 11-IX-1992, DE Baumgardner, (DB 92-101), (1 larva). OK: Pushmataha Co., Tenmile Ck. @ Hwy. 2 N. of Antlers, 5-VIII-1994, DE Baumgardner, (DB 94-005), (1 larva).

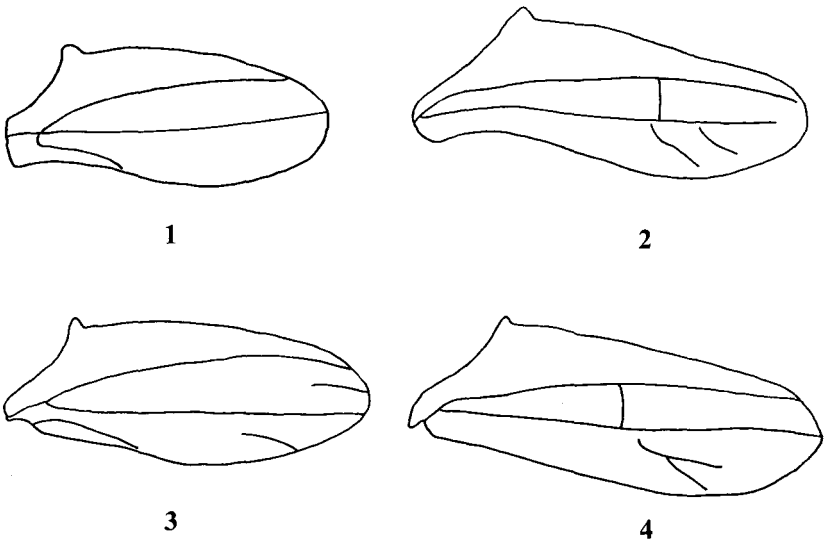
Slide mounted voucher material (Euparal: abs. alc.) and alcohol preserved material is deposited at Purdue University, Entomological Research Collection, West Lafayette, Indiana, and at University of North Texas, Denton, Texas.

DISCUSSION

A male larva from Oklahoma, for which the reared adult was readily identified as *A. harti,* possessed setulae on the anterior margin of the gill, thereby giving the gill a distinctly serrated appearance so that one might conclude that serration existed on both margins of gill 7. In all other respects this larva was found to be morphologically identical to *A. pygmaea*. Our examination of additional collections [above] of non-reared and reared larvae identified as *A. pygmaea* from Colorado, Oklahoma, Alabama, and Michigan indicated that development of the setulae on the anterior margin of gill 7 was extremely variable within populations, ranging from well developed to absent.

In adult specimens, we found hindwing characters to be highly variable. Previously published keys have used characters such as hindwing venation

(Burks 1953) and development of the costal process (Traver 1935) to separate adults of *A. pygmaea* from *A. harti.* Adult specimens examined from Alabama and Colorado showed variation in both of these characters. The costal process varied from acute and well developed to blunt and poorly developed (Figs. 1-4). Traver (1935) considered the presence of an acute well-developed costal process to be typical of *A. harti* while *A. pygmaea* possessed a small, blunt costal process. Burks (1953) separated *A. pygmaea* from *A. harti* by the presence or absence of marginal intercalary veins in the hindwing. The hindwing of *Acerpenna pygmaea* was considered to possess 1-2 marginal intercalary veins, whereas *A. harti* completely lacked intercalary veins in the hindwing. Series of adult specimens from Alabama and Colorado varied from 0-2 marginal intercalaries in the hindwing, with the location of the intercalaries being highly variable (Figs. 2-4). Additionally, some adults possessed hindwings with a weakly developed third longitudinal vein (Figs.1, 3), while other adults possessed a cross vein between the two longitudinal veins (Figs. 2, 4), or possessed intercalaries along the outer margin (Fig. 2-4), or intercalaries in both the outer margin and between the longitudinal veins (Fig. 3); at least one specimen demonstrated intersected intercalaries (Fig. 4).



Figs. 1-4. Hindwing (hw) variations in *A. pygmaea.* 1) hw with blunt costal process and third vein (Alabama specimen), 2) hw with two free marginal intercalaries (Colorado specimen), 3) hw with basal, third vein and intercalaries (Alabama specimen), 4) hw with intersected intercalaries (Colorado specimen).

Similar to our findings of venational variations in the hindwings of this species, Durfee and Kondratieff (1993) reported nearly identical venational variations of hindwings in their study of *Baetis magnus* McCafferty and Waltz and *B. tricaudatus* Dodds. Based on these studies, workers should use caution in separating at least some species of baetids traditionally discriminated on hindwing characters alone,including species discriminations based on minor differences in wing venation and color (e.g., Waltz 1995).

Based on the above data, including our examination of the reared male compared with the adult paratypes of *Acerpenna harti*, we conclude that *Acerpenna harti* is a junior subjective synonym of *Acerpenna pygmaea*, new synonymy.

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LITERATURE CITED

Burks, B.D. 1953. The Mayflies, or Ephemeroptera, of Illinois. Ill. Nat. Hist. Surv. Bull. 26, 216 pp.

Durfee, R. and B. C. Kondratieff. 1993. Description of the adults of *Baetis magnus* (Ephemeroptera: Baetidae). Entomol. News 104: 227-232.

Ide, F.P. 1937. Descriptions of Eastern North American species of baetine mayflies with particular reference to the nymphal stages. Can. Entomol. 69: 219-231, 235-243.

McCafferty, W.P., R.S. Durfee, and B.C. Kondratieff. 1993. Colorado mayflies (Ephemeroptera): An annotated inventory. Southwest. Nat. 38: 252-274.

McCafferty, W.P. and R.D. Waltz. 1990. Revisionary synopsis of the Baetidae (Ephemeroptera) of North and Middle America. Trans. Am. Entomol. Soc. 116: 769-799.

McDunnough, J. 1924. New Ephemeridae from Illinois. Can. Entomol. 56: 7-9.

Morihara, D.K. and W.P. McCafferty. 1979. The *Baetis* larvae of North America (Ephemeroptera: Baetidae). Trans. Am. Entomol. Soc. 105: 139-221.

Traver, J.R. 1935. Part II. Systematic. pp. 237-739 in Needham, J.G., J.R. Traver and Y.C. Hsu (eds.), The biology of mayflies with a systematic account of North American species. Comstock Publ. Co., Ithaca, NY. 759 pp.

Waltz, R.D. 1995. *Baetis ochris*, a new synonym of *Baetis flavistriga* (Ephemeroptera: Baetidae). Entomol. News 106: 75-76.

Waltz, R.D. and W.P. McCafferty. 1987. New genera of Baetidae for some Nearctic species previously included in *Baetis* Leach (Ephemeroptera). Ann. Entomol. Soc. Am. 80: 667-670.