

# *Perlesta placida* (Hagen), an eastern nearctic species complex (Plecoptera: Perlidae)

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*Perlesta placida* (Hagen), long regarded as a widespread variable species, is a complex of at least 12 species which differ in pigmentation, egg morphology and male and female genital structures. Species removed from the synonymy of *P. placida* (= *Chloroperla virginica* Banks, 1898; = *P. virginica immaculata* Klapálek, 1921) include *P. cinctipes* (Banks, 1905), *P. decipiens* (Walsh, 1862) (= *Perla brunnipennis* Walsh, 1862, syn. n.; = *Isoperla texana* Banks, 1914, syn. n.; = *P. costalis* Klapálek, 1921, syn. n.) and *P. nitida* Banks, 1948. New species described include *P. adena*, *P. baumanni*, *P. bolukta*, *P. browni*, *P. lagoi*, *P. nelsoni* and *P. shubuta*. Lectotypes are designated for most older species, including *P. frisoni* Banks, 1948, which is also valid, and all are redescribed from types.

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*Perlesta* was proposed by Banks (1906) for *Perla placida* Hagen, 1861 and defined by Needham & Claassen (1925) to include small, brown, perlid stoneflies with three ocelli and a yellow costal margin. Females have a moderately produced, medially notched subgenital plate, and males are unique among nearctic Acroneuriinae in lacking a hammer. The genus may be an eastern nearctic endemic, but Wu (1938, 1948) described two Chinese species in the genus; these species are provisionally retained in *Perlesta* pending further study.

The synonymy given for *Perlesta placida* (Hagen) in Illies (1966) includes eight names, and reflects opinions of Needham & Claassen (1925) and Frison (1942) that this is a widespread, highly variable species. Many recent faunal, ecological, and behavioral studies have followed this opinion (e.g. Hitchcock 1974; Snellen & Stewart 1979; Lake 1980; Mingo 1983; Stewart & Huggins 1977) but others (e.g. Stark & Gaufin 1976; Stark & Harris 1986; Kondratieff & Kirchner 1987; Feminella & Stewart 1986) have suggested *P. placida* is a species complex in need of revision.

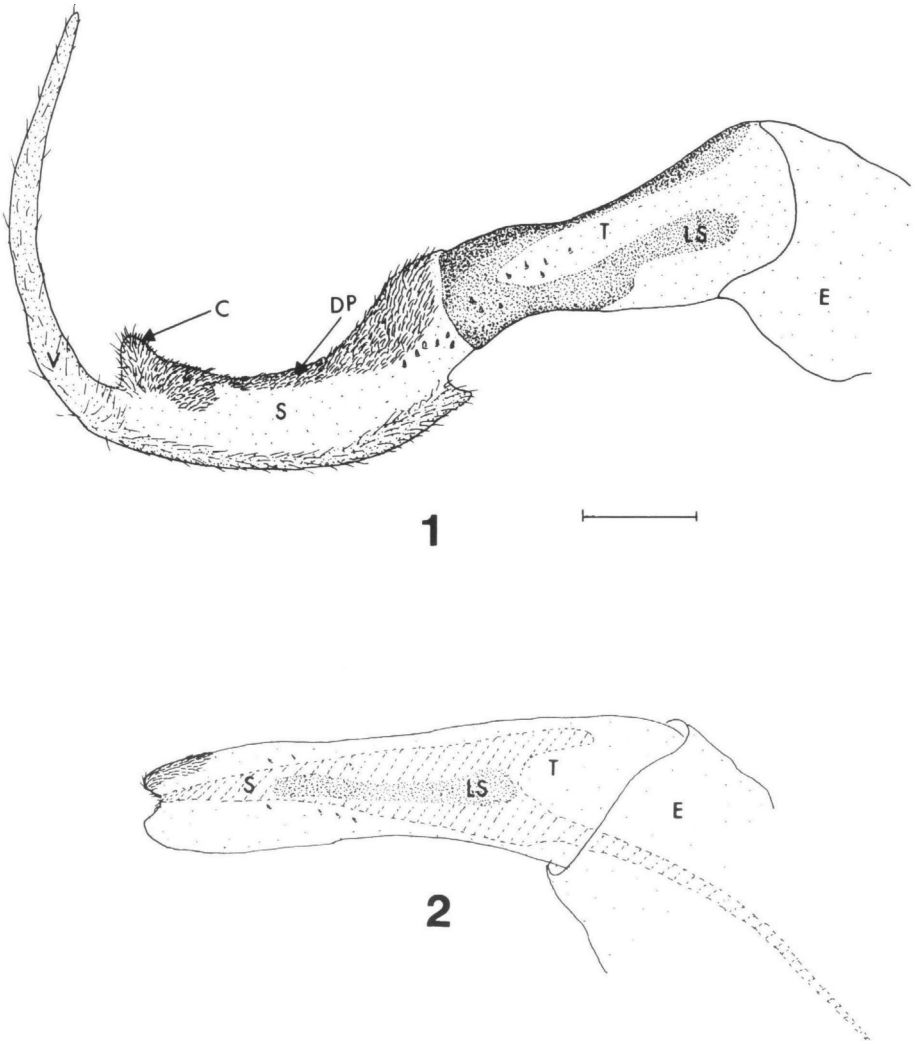
Since 1980, I have studied types, collected mating pairs from many localities, and accumulated males with completely extruded genitalia in order to evaluate this putative complex. Because a comprehensive study of all available specimens will require

perhaps another decade, I am presenting preliminary results based on examination of all types and selected samples of suitably prepared and associated material. These results indicate a minimum of 12 species make up this complex, but several more are expected from regions which are poorly represented in this study.

## Materials and methods

Males collected at light traps, or reared from nymphs, were squeezed with forceps to fully extrude the penis sac. In order to minimize retraction of this structure, males were submerged in various solutions including hot water, 80% ethanol, Carnoy's fixative, and KAAD, and held with forceps for 1-3 minutes to maintain pressure on the genitalia until death occurred. Mating pairs were collected and preserved together; only pairs with genitalia engaged were included, pairs where males were riding loosely on a female were excluded. Some associations are based on similar color patterns, co-occurrences, or rearings from similar nymphs.

Male and female genitalia were examined after clearing with hot 10% KOH. Eggs and the few paraprocts studied with SEM were prepared following methods of Stark & Szczytko (1981). SEM study of penial armature required critical point drying of



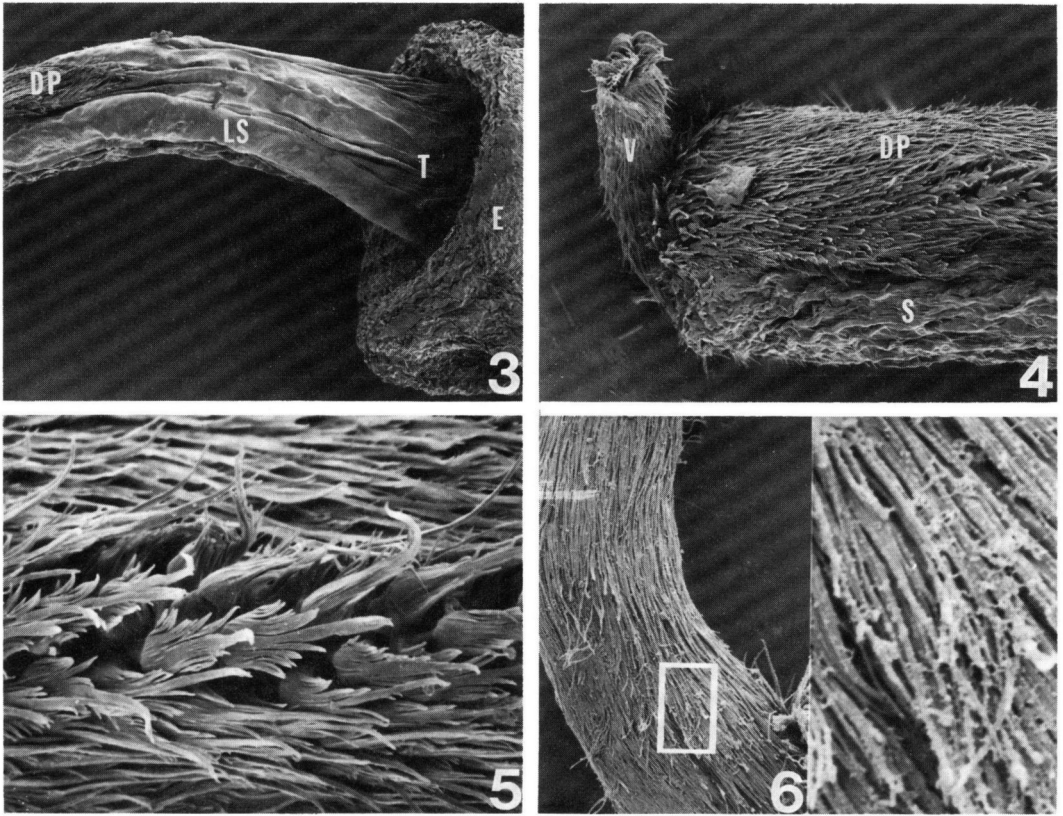
Figs. 1-2. *Perlesta* penis structure. 1. Fully extruded sac (S) of an undetermined Arkansas species showing caecum (C), ventral extension (V), and dorsal patch (DP). The lateral sclerites (LS) of the tube (T) are united dorsally, and the envelope (E) is membranous. 2. Partially extruded sac and tube of *P. decipiens* (from *P. costalis* holotype). The unextruded sac is denoted by diagonals. Scale = 0.15 mm.

uncleared, extruded genitalia prior to gold coating for best results.

Specimens used in this study are deposited in collections of the following individuals and museums, or in the collection of the author (BPS). Holotypes of all new species are deposited in the United States National Museum, Washington (USNM).

Illinois Natural History Survey, Urbana, Illinois (INHS).

Monte L. Bean Museum, Brigham Young University (BYU).  
 Museum of Comparative Zoology, Harvard University (MCZ).  
 National Museum of Natural History, Prague (NMP).  
 Clemson University, Clemson, South Carolina (CU).  
 University of Alabama, Tuscaloosa, Alabama (UA).  
 University of Mississippi, Oxford, Mississippi (UM).  
 University of North Texas, Denton, Texas (UNT).  
 C. H. Nelson, Chattanooga, Tennessee (CHN).  
 B. C. Kondratieff, Fort Collins, Colorado (BCK).  
 R. F. Surdick, Front Royal, Virginia (RFS).



Figs. 3-6. *Perlesta* penis armature. 3. *P. placida*, base of tube, 205 ×. 4. *P. browni*, apex of sac, 405 ×. 5. *P. browni*, dorsal patch, 1550 ×. 6. *P. placida*, ventral sac extension, left 560 ×, right 2790 ×. Abbreviations as in Fig. 1.

**Taxonomic characters**

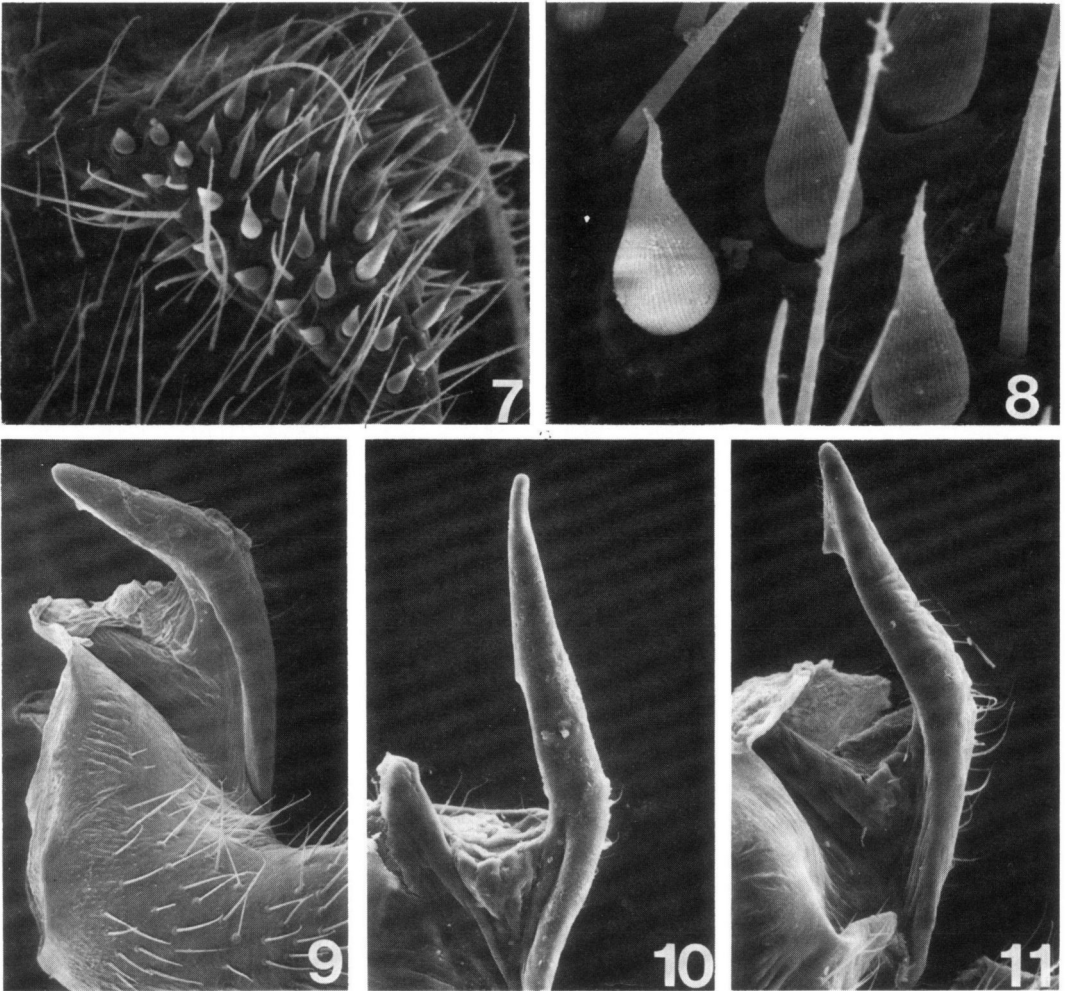
*Internal male genitalia.* – The penis of *Perlesta* species consists of three telescoping sections (Figs. 1-2) which are armed with fine seta-like, sometimes multibranch spines (Figs. 4-5). The short mesal tube section bears a pair of lateral sclerites (Figs. 1,3) which sometimes unite dorsally, and scattered dorso-lateral sensilla (Figs. 3-4) which extend onto the apical sac section. In most species the dorsomesal area of the sac protrudes over the ventroapical sac extension to form a caecum; the dorsal surface of the sac bears a prominent patch of seta-like spines. The ventroapical sac extension is long and densely coated with very fine seta-like spines (Fig. 6). The basal envelop section (Fig. 3) is membranous, but sometimes it is armed with small spinule-like structures.

*External male genitalia.* – Paraprocts are usually thin, moderately to strongly sclerotized, and armed

with a small spine on the anteroapical margin (Figs. 9-11). Tergum 10 (T10) has a more heavily sclerotized mesal region which is usually covered with small to prominent patches of sensilla basiconica (Figs. 7-8).

*Female genitalia.* – The subgenital plate is a moderately produced, slightly cleft or bilobed structure. Frequently the posterior margins of the plate bear prominent setae.

*Egg.* – Most *Perlesta* have eggs with short stalked collars and relatively smooth or slightly granular chorionic surfaces (Figs. 12-15), but conical or button-like collars (Figs. 19-20) and sessile collars (Figs. 16-18) occur. The most common chorionic modifications include irregular, shallow, pitting (Figs. 17, 19-20) and eclosion lines (Figs. 15, 17). Micropyles have sessile, slanted orifices and form an irregular circumlinear row near the posterior



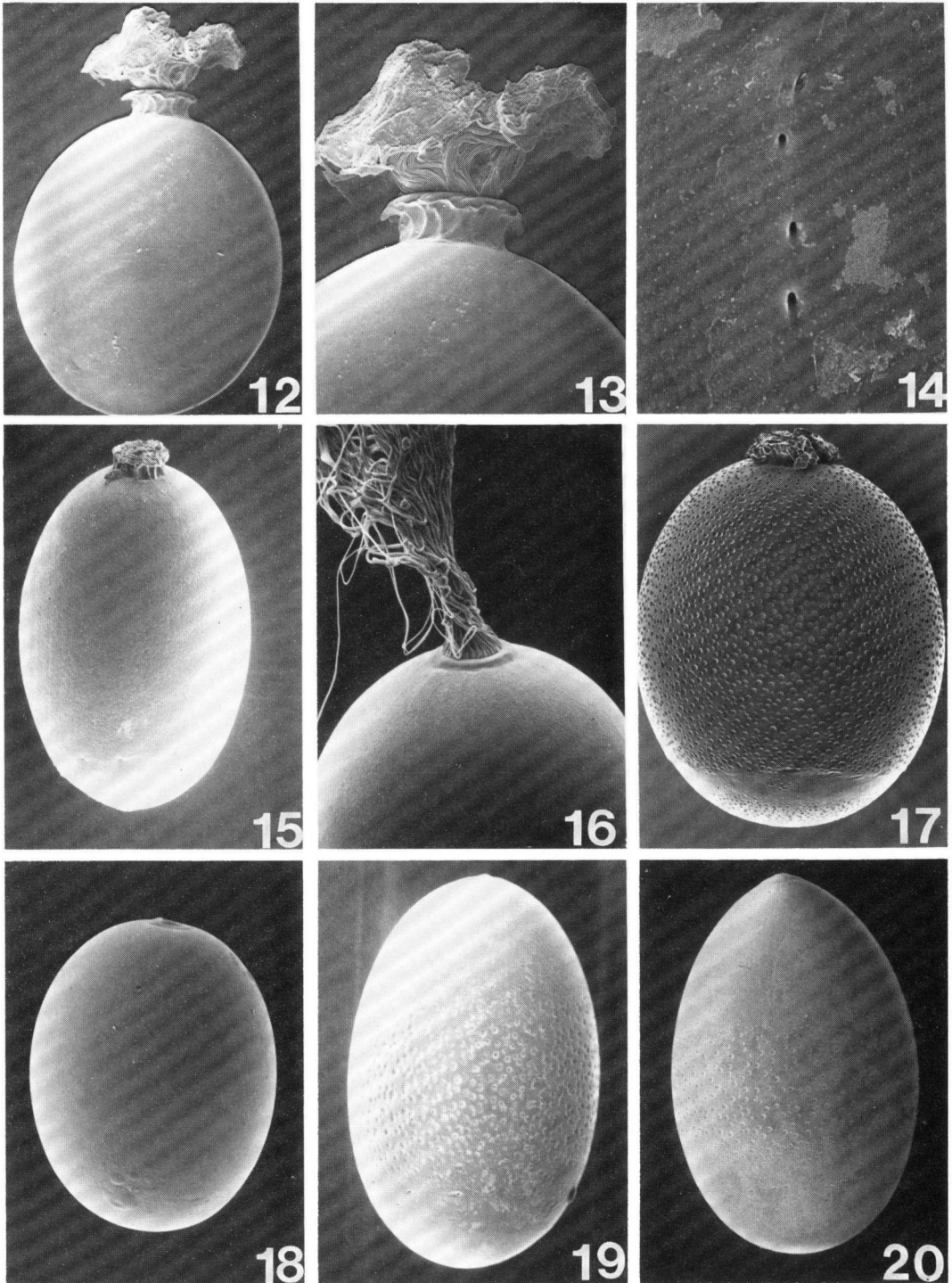
Figs. 7-11. *Perlesta* external genitalia. 7. *P. frisoni*, T10 sensilla basiconica patch, 65×. 8. Same, 1300×. 9. *P. decipiens*, left paraproct, lateral aspect, 175×. 10. *P. browni*, left paraproct, lateral aspect, 305×. 11. *P. sp.*, left paraproct, lateral aspect, 330×.

pole (Fig. 14). Anchor plates typically consist of a cluster of spaghetti-like fibers loosely covered by a membranous cap (Figs. 13,16).

*Nymphs.* - A distinctive, freckled appearance resulting from brown pigment spots at the bases of abdominal intercalary setae is typical of several species, but others have a more uniformly brown appearance. All species have an irregular, but nearly complete, occipital setal row, and well developed anal gills.

**Key to adult *Perlesta***

- 1. Intercostal margin pale; paraprocts variable but typically straight or curved mesad; subgenital plate lobes well developed, notch variable (Figs. 25, 30) ..... 2
- Intercostal margin dark; paraprocts short and curved strongly laterad (Figs. 60-61); subgenital plate lobes slightly produced, notch wide and shallow (Fig. 62) ..... *P. baumanni*
- 2. Wing membrane, veins and body pale; penis without caecum (Fig. 55) ..... 3



Figs. 12-20. *Perlesta* eggs. 12. *P. decipiens* [Texas], 145 $\times$ . 13. Same, 300 $\times$ . 14. Same [Wyoming], 600 $\times$ . 15. *P. browni* [Oklahoma], 150 $\times$ . 16. *P. placida* [Mississippi], 315 $\times$ . 17. *P. cinctipes* [Kansas], 140 $\times$ . 18. *P. frisoni* [Virginia], 140 $\times$ . 19. *P. bolukta* [Oklahoma], 150 $\times$ . 20. *P. adena* [Ohio], 180 $\times$ .

- Wing membrane amber to black, veins dark, body with areas of dark pigmentation; penis with caecum (Fig. 1) . . . . . 4
- 3. T10 sensilla basiconica arranged in a pair of circular, slightly elevated, dense patches; paraprocts short, stout, bearing a prominent mesal spine (Figs. 51-52); subgenital plate outline triangular, notch V-shaped (Fig. 53) . . . . . *P. frisoni*
- T10 sensilla basiconica sparse (Fig. 65); paraprocts slender (Figs. 65-67); subgenital plate outline rounded, notch U-shaped (Fig. 68) . . . . . *P. nelsoni*
- 4. Wings dark brown to black; dorsal body color predominantly dark brown to black . . . . . 5
- Wings yellow-brown to amber; dorsal body color predominantly yellowish . . . . . 7
- 5. Paraproct spine extending to midlength (Figs. 10, 78); subgenital plate truncate with a small mesal notch (Fig. 79) . . . . . *P. browni*
- Paraproct spine subapical (Figs. 28, 72); subgenital plate lobes rounded, notch prominent (Figs. 30, 74) . . . . . 6
- 6. Penis tube + sac long and slender; dorsal patch not well developed laterally (Fig. 32); egg chorion coarsely pitted throughout (Fig. 17); collar stalked (Fig. 31) . . . . . *P. cinctipes*
- Penis tube + sac plump; dorsal patch extensively developed laterally (Fig. 76); egg chorion smooth around poles, pitted mesally (Fig. 20); collar button-like (Fig. 73) . . . . . *P. adena*
- 7. Paraprocts long, thin in lateral aspect; spine poorly developed or absent (Figs. 21-23); subgenital plate width less than half that of S8, inner shoulder lower than outer shoulder (Fig. 25) . . . . . *P. placida*
- Paraprocts stout; spine usually well developed (Figs. 38, 57-58, 83-84, 90, 96); subgenital plate width greater than half that of S8, inner shoulder equal to or higher than outer shoulder (Figs. 44-48, 59, 87, 91, 97) . . . . . 8
- 8. Paraproct spine prominent in lateral aspect (Figs. 35, 90, 96); subgenital plate lobes typically truncate (Figs. 44, 91, 97) . . . . . 9
- Paraproct spine directed mesad, usually indistinct in lateral aspect (Figs. 57, 83); subgenital plate lobes rounded (Figs. 59, 87) . . . . . 11
- 9. Penis caecum about twice as long as wide (Figs. 42, 92); egg collar stalked (Figs. 45, 93) . . . . . 10
- Penis caecum about as long as wide (Fig. 98); egg collar button-like (Fig. 99) . . . . . *P. lagoi*
- 10. Paraproct apex bird-like in lateral aspect (Figs. 38-41); rim of egg collar flanged, wide; anchor pedicel composed of a cluster of fibers (Figs. 45-49) . . . . . *P. decipiens*
- Paraproct apex not bird-like (Fig. 90); rim of collar smooth, narrow; anchor pedicel a single thick stalk (Fig. 93) . . . . . *P. shubuta*
- 11. Apical half of paraprocts gradually tapered to a point (Fig. 57); subgenital plate with numerous long setae (Fig. 59) . . . . . *P. nitida*
- Apical half of paraprocts essentially cylindrical (Fig. 83); subgenital plate with few long setae (Fig. 87) . . . . . *P. bolukta*

### *Perlesta placida* (Hagen)

(Figs. 16, 21-26, 102)

*Perla placida* Hagen, 1861. Lectotype ♂ (MCZ #253), Washington, D. C.

*Chloroperla virginica* Banks, 1898. Holotype ♀ (MCZ #11330), West Virginia. Syn. Needham & Claassen (1925).

*Perlesta virginica immaculata* Klapálek, 1921. Lectotype ♀ (NMP), North Carolina. Syn. Needham & Claassen (1925).

**Male.** - Forewing length 7-8 mm. General color yellow-brown. Head yellow except for brown quadrangular area over ocelli, and small brown triangular area forward of median ocellus. Pronotum brown, abdomen yellow-brown, femora yellow-brown without banding. Paraprocts long, slender, with only a tiny anteapical spine (Figs. 21-23). Sparse mesal sensilla basiconica patch on T10. Penis tube + sac moderately long, caecum prominent; lateral sclerites long and slender; dorsal patch broad basally, covering entire dorsal surface of sac, slightly narrowing apically (Fig. 24).

**Female.** - Forewing length 9.5-10.5 mm. Subgenital plate with small lobes separated by a shallow triangular notch (Fig. 25).

**Egg.** - Length ca. 0.31 mm, width ca. 0.21 mm. Collar short almost sessile in some specimens and ca. 0.03 mm wide. Chorionic surface with minute shallow pits throughout (Figs. 16, 26).

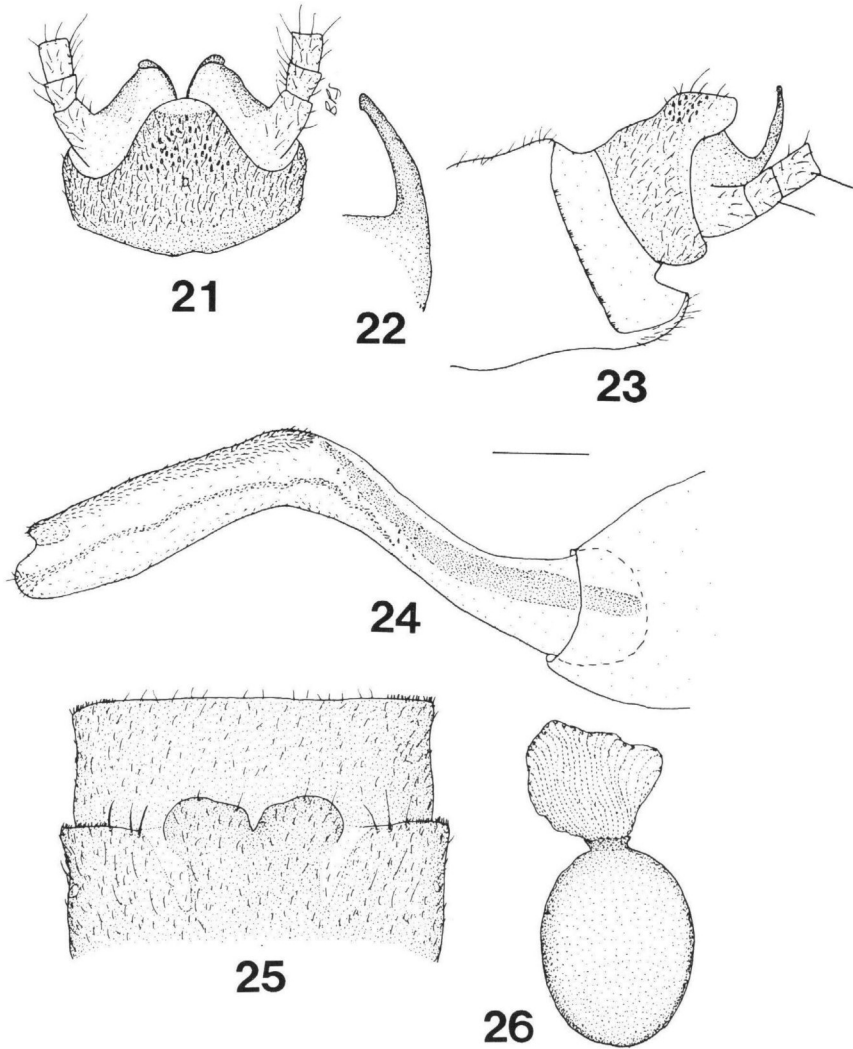
**Nymph.** - Unknown.

### Discussion

The *P. placida* type series in the MCZ includes two males both bearing "Washington, Sacken", "Type, 253", and "Hagen" labels. One of these males is an *Isoperla* species, and was so labelled by P. W. Claassen; I designate the other specimen as lectotype.

The *C. virginica* Banks holotype female (MCZ #11330) from "West Virginia, August", is in such poor condition that a reliable determination of which *Perlesta* species it represents could not be made. I am accepting Banks' (1948) opinion that "it is only a color form" because his concept of *P. placida* was evidently correct at that time.

The surviving syntypes of *P. virginica immaculata* Klapálek include two females in the Prague Museum and perhaps others in the Selys collection in Brussels (Ricker 1938). Since both Prague specimens are consistent in subgenital plate and egg structure with typical *P. placida* specimens, I design-



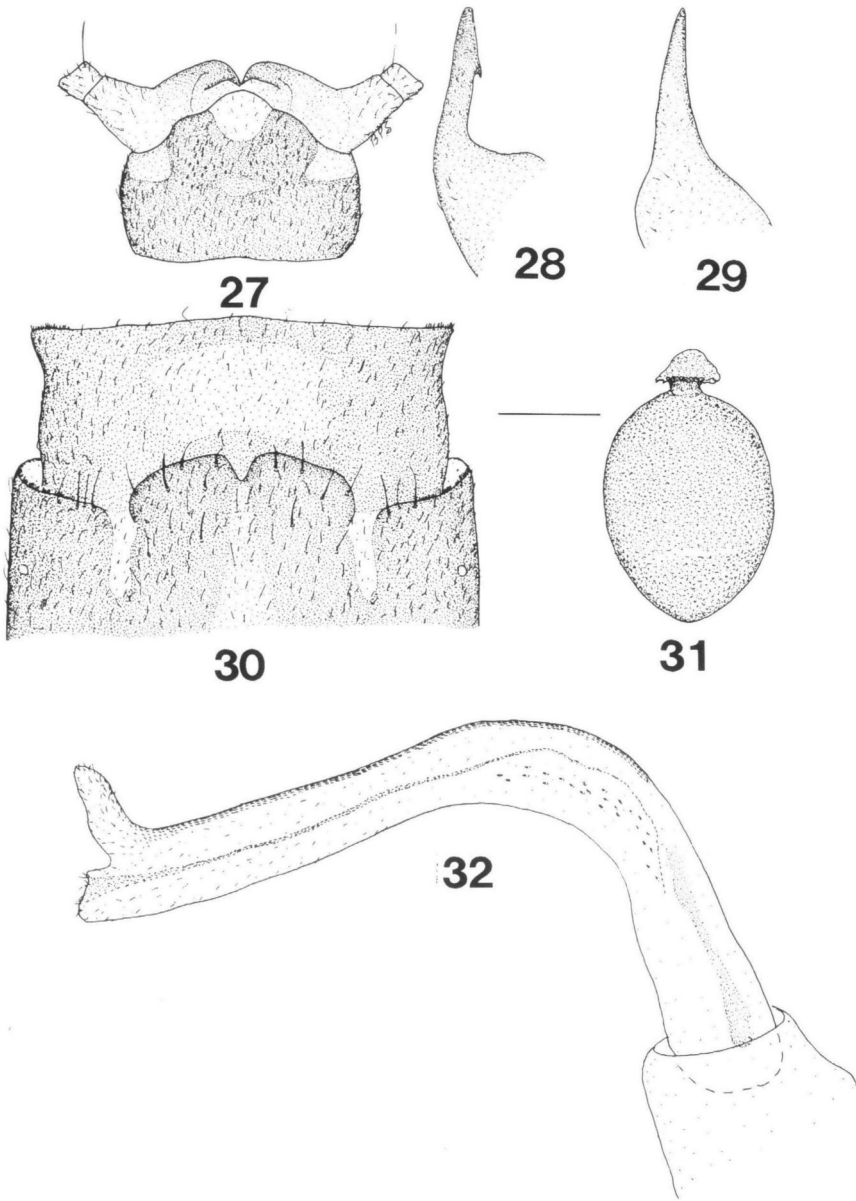
Figs. 21-26. *P. placida*. 21. Lectotype ♂ terminalia. 22. Paraproct, lateral. 23. Lectotype ♂ terminalia, lateral. 24. Penis, lateral. 25. ♀ sternite 8-9. 26. Egg. Scale = 0.30 mm (21, 23, 25), 0.15 mm (22, 24, 26).

nate as lectotype, the specimen bearing label # 45 in a microvial with genitalia.

*P. placida* is apparently the most common Gulf Coastal Plains and mid-Atlantic member of the complex. Specimens have been taken from as far north as Maine, but no valid records are known from west of the Mississippi River (Fig. 102).

**Material examined.** - ALABAMA: 5♂, 15♀, Chilton Co., Mulberry Creek, Hwy 82, 31.v.1985, S. Harris (UA). 4♂, 1♀, Wilcox Co., Chitachee Creek, Hwy 5, 2.vi.1985, S. Harris (UA). DISTRICT OF COLUMBIA: 1♂ (lectotype), Washington, Sacken (MCZ # 253). FLORIDA:

6♂, 7♀, Santa Rosa Co., Blackwater River, Bryant Bridge, 26.iv.1973, M. Pescador & W. L. Peters (BPS). GEORGIA: 3♂, Effingham Co., Ogeechee River, 3.vi.1983, S. Harris (UA). LOUISIANA: 4♂, 16♀, Livingston Par., Little Natalbany River, Albany, 27.vi.1973, B. Stark (BPS). MAINE: 3♂, 5♀, Penobscot Co., Orono, 3.vii.1980, S. Blackington (BYU). MISSISSIPPI: 1♂, George Co., 14 km southwest of Lucedale, 19.v.1987, P. K. Lago (UM). 10♂, 8♀, Harrison Co., 5 km northeast of Saucier, 14.v.1984, P. K. Lago (UM). 2♂, 3♀, Hinds Co., Clinton, 20.v.1977, B. Stark (BPS). 8♂, Lauderdale Co., Chunky River, Dunn's Falls, 13.v.1988, C. M. & O. Flint (USNM). 7♂, 6♀, Pike Co., Tangipahoa River, Hwy 51, 10.vi.1977, B. Stark (BPS). 11♂, 15♀, Simpson Co., Mill Creek, Hwy 472, 2.vi.1986, B. Stark (BPS). 43♂, 7♀,



Figs. 27-32. *P. cincitipes*. 27. ♂ terminalia. 28. Paraproct, lateral. 29. Paraproct, caudal. 30. ♀ sternite 8-9. 31. Egg. 32. Penis, lateral. Scale = 0.30 mm (27, 30), 0.15 mm (28, 29, 31, 32).

Strong River, 2 km northeast of Pinola, 15.v.1988, C. M. & O. S. Flint (USNM). NORTH CAROLINA: 2 ♀ (*P. im-maculata* syntypes), unknown locality, Morrison (NMP). VIRGINIA: 6♂, 2♀, Fairfax Co., Bull Run Park, 28.vi.1962, O. S. Flint (USNM). 5♂, 5♀, Warren Co., Front Royal, 27.vi.1982, R. F. Surdick (RFS).

***Perlesta cincitipes* (Banks); sp. rev.**

(Figs. 17, 27-33, 102)

*Perlinella cincitipes* Banks, 1905. Lectotype ♂ (MCZ # 11331), Onaga, Pottawatomie Co., Kansas.



**Male.** – Forewing length 9-10 mm. General color dark brown, wings black except for pale costal area, femora banded. Obscure sensilla basiconica scattered over posterolateral areas of T10 (Fig. 27). Paraprocts long, slender apically, and bearing a prominent mesoapical tooth visible in lateral aspect (Figs. 27-28); tooth not visible in caudal aspect (Fig. 29). Penis tube + sac long and slender; dorsal patch narrow basally and slightly expanded on caecum (Fig. 32).

**Female.** – Forewing length 12-13 mm. Subgenital plate with a shallow V-shaped notch; outer shoulder of lobes rounded and lower than inner shoulder. Mesal field of plate typically with a longitudinal weakly sclerotized band (Fig. 30).

**Egg.** – Length ca. 0.36 mm, width ca. 0.30 mm. Collar short and relatively wide, length ca. 0.02 mm, width ca. 0.04 mm. Chorion covered with shallow irregular pits, largest pits with a diameter of ca. 0.008 mm; posterior end circumscribed by a wide, mostly smooth eclosion line; line width ca. 0.036 mm; micropyles located along upper margin of line (Figs. 17, 31).

**Nymph.** – General color yellow-brown with dark brown transverse band crossing ocelli and extending to antennal bases. Pronotal disc dark, with a large pale mesal area. Abdominal terga yellow-brown with pale mesal band; scattered intercalary bristles with brown sockets give freckled appearance. Occipital setal row usually not approaching eclypsial suture (Fig. 33).

### Discussion

The type series includes two pinned males from Onaga, Kansas. Both specimens bear small MCZ “Type” labels, but one specimen bears an additional large handwritten label inscribed “*Perlesta cinctipes* Bks”, and “type”. This latter male is selected as lectotype.

The Oklahoma series, tentatively assigned to this species, exhibits subtle differences in pigmentation and size and may represent a sibling species. Eggs from male-associated Ouachita females are needed to confirm this placement. The species is primarily known from areas to the north and west of the Ozarks (Fig. 102).

**Material examined.** – IOWA: 1♂, Story Co., Ames, 24.vi.1951, J. Bellamy (BPS). KANSAS: 2♂, Douglas Co., Kansas River, Eudora, 21.v.1986, R. W. Baumann & C. R. Nelson (BYU). 1♂, Kansas River, Lawrence, 23.v.1986, R. W. Baumann & C. R. Nelson (BYU). 4♂, 9♀, Geary Co.,

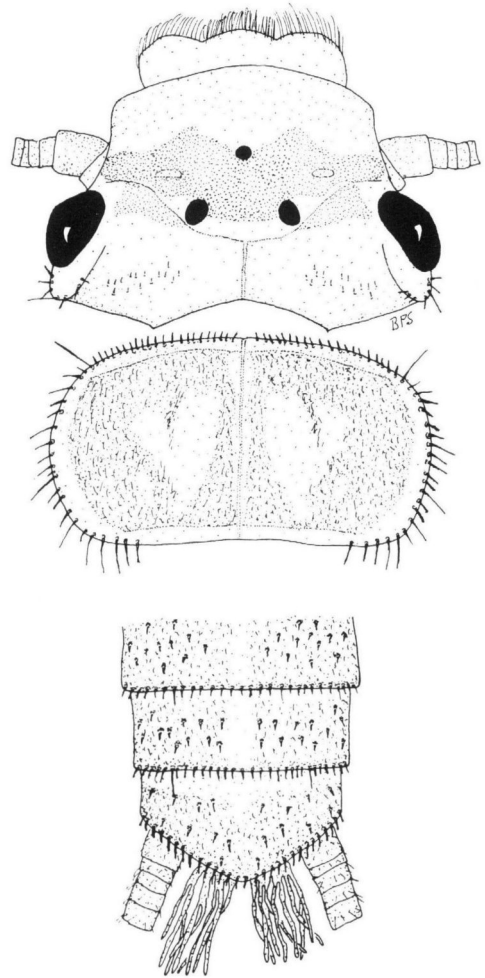


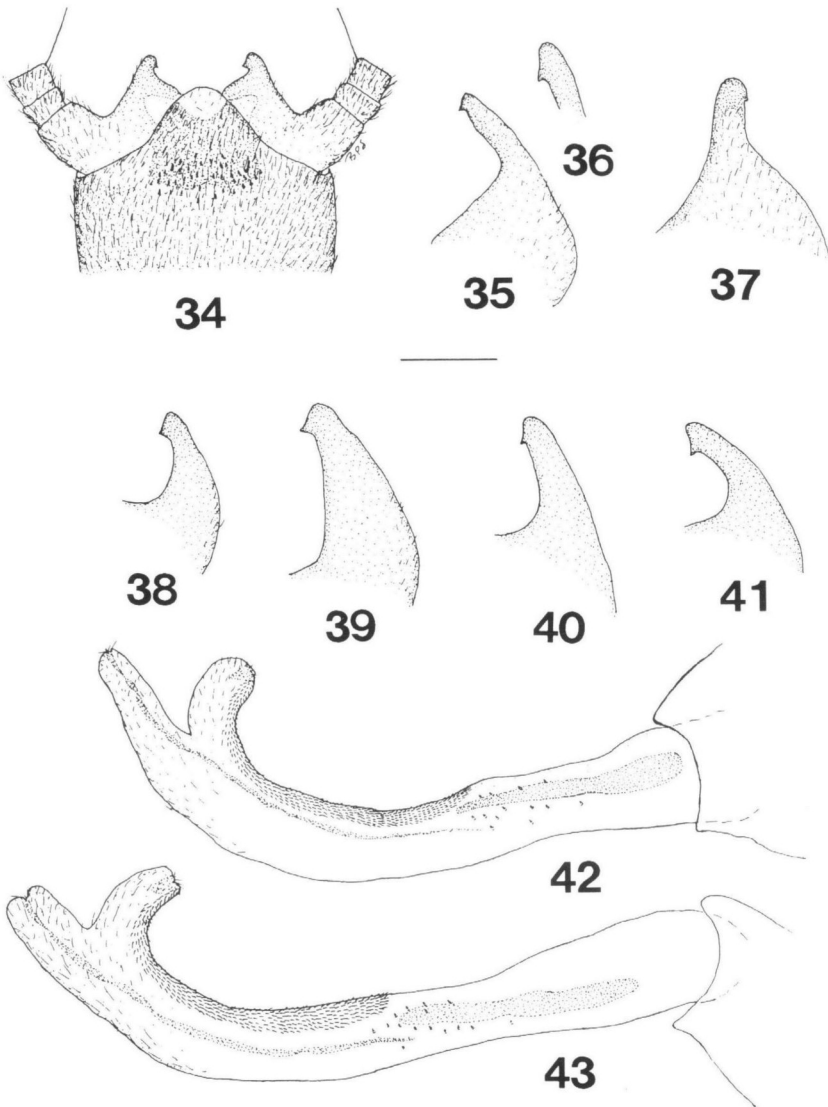
Fig. 33. *P. cinctipes* nymphal head, pronotum, and abdominal apex [Geary Co., Kansas].

10 km east Junction City, 4.vi.1986, S. M. & B. S. Clark (BYU). 2♂, Pottawatomie Co., Onaga (MCZ # 11331). 1♀, Riley Co., Deep Creek, Pillsbury Crossing, 20.v.1986, R. W. Baumann & C. R. Nelson (BYU). MISSOURI: 3♂, 4♀, Davies Co., Grand River, near Gallatin, 23.v.1986, R. W. Baumann & C. R. Nelson (BYU). OKLAHOMA: 2♂, 6 nymphs, Latimer Co., Rock Creek, 6 km north of Red Oak, 10.v.1985, B. Stark (BPS). 1♂, 11♀, LeFlore Co., 3 km east of Page, 11.v.1985, B. Stark (BPS).

### *Perlesta decipiens* (Walsh); sp. rev.

(Figs. 12, 14, 34, 41-50, 103)

*Perla decipiens* Walsh, 1862. Lectotype ♂ (MCZ # 10129), Rock Island, Rock Island Co., Illinois.



Figs. 34-43. *P. decipiens* male genitalia. 34. Lectotype ♂ terminalia. 35. Paraproct, lateral. 36. Paraproct, inner aspect. 37. Paraproct, caudal. 38-41. Paraproct variations. 38. *brunnipennis* lectotype. 39. *texana* lectotype. 40. *costalis* holotype. 41. Yuma Co., Colorado. 42. Penis, lateral, Yuma Co., Colorado. 43. Same, Denton Co., Texas. Scale = 0.30 mm (34), 0.15 mm (35-43).

*Perla* (*Chloroperla*) *brunnipennis* Walsh, 1862. Lectotype ♂ (MCZ # 10131), Rock Island, Rock Island Co., Illinois. **Syn. n.**

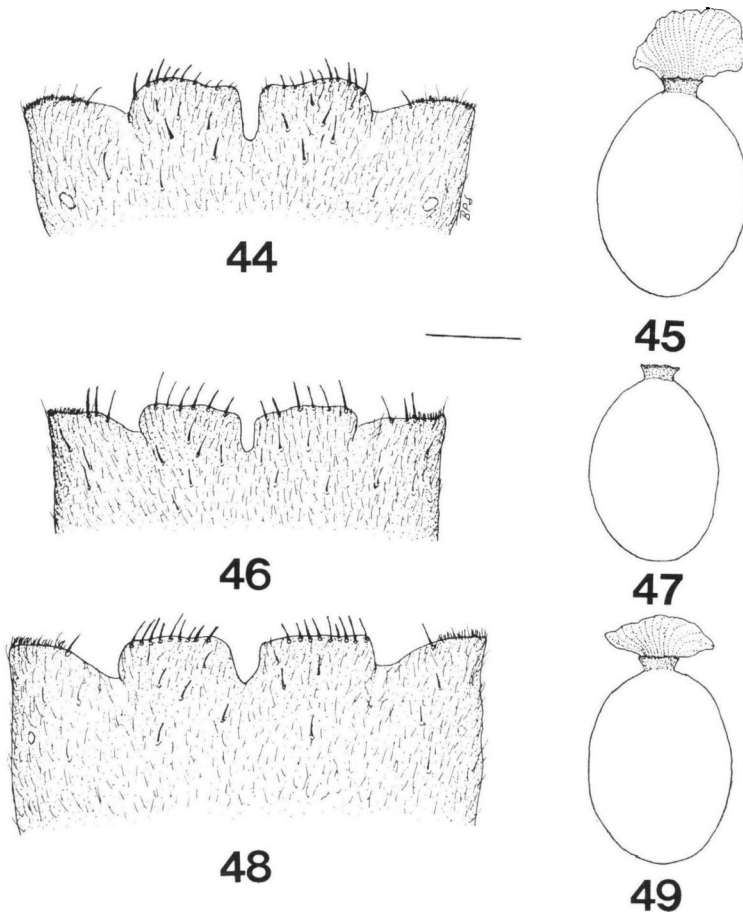
*Isoperla texana* Banks, 1914. Lectotype ♂ (USNM # 18185), Kerrville, Kerr Co., Texas. **Syn. n.**

*Perlesta costalis* Klapálek, 1921. Holotype ♂ (NMP), Heyne, Texas. **Syn. n.**

**Male.** - Forewing length 9-10 mm. General color yellow-brown, usually with dark brown patch over

ocellar triangle. Pronotum brown, abdomen pale, femora yellow-brown. Paraproct spine anteapical (Figs. 34, 41) and usually directed mesad. Sparse sensilla basiconica on T10 (Fig. 34). Penis tube + sac moderately long; caecum prominent, dorsal patch broad basally and narrowing slightly to base of caecum (Figs. 42-43).

**Female.** - Forewing length 12-13 mm. Subgenital



Figs. 44-49. *P. decipiens* female subgenital plate and egg variations. 44-45. *decipiens* syntype. 46-47. Yuma Co., Colorado. 48-49. Denton Co., Texas. Scale = 0.30 mm (44, 46, 48), 0.15 mm (45, 47, 49).

plate with broad, truncate lobes which usually bear several prominent marginal setae; notch variable, but usually narrow and V-shaped (Figs. 44, 46, 48).

*Egg*. – Length ca. 0.34 mm, width ca. 0.26 mm. Collar short, ca. 0.03 mm long and 0.04 mm wide. Chorion smooth to slightly pitted. Micropylar orifices slanted mesad (Figs. 12, 14, 45, 47, 49).

*Nymph*. – General color yellow-brown with dark brown transverse band crossing ocelli and approaching antennal bases. Pronotal disc brown with scattered pale areas. Abdominal terga yellow-brown with pale mesal longitudinal band extending through T9; scattered intercalary setae each with brown socket giving abdomen a freckled appearance. Occipital setal row approaches ecdysial suture (Fig. 50).

*Discussion*

The *P. decipiens* type series (MCZ # 10129) includes two males and three females bearing the handwritten label “*P. decipiens*, Rock Isl., Walsh”; one male and one female bear MCZ type labels and the male also is labelled “658”. All represent the same species, but I designated the male # 658 as lectotype. The *P. brunnipennis* type series (MCZ # 10131) includes male and female syntypes from Rock Island. The female bears a holotype label but since this was obviously added after the original description, and since the female lacks eggs and cannot be associated positively, I select the male as lectotype. The *I. texana* type series is split between the USNM and the MCZ. A male (USNM # 18185) bearing label data “Kerrville, Tex., VI-19-08, F. C.

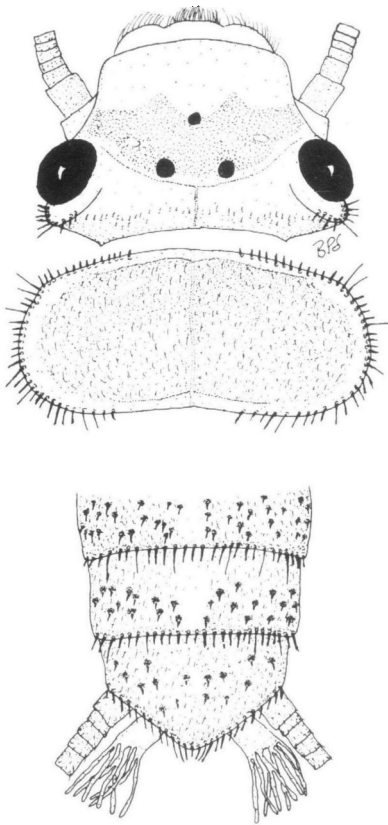


Fig. 50. *P. decipiens* nymphal head, pronotum, and abdominal apex [Denton Co., Texas].

Pratt", has a holotype label while a male (MCZ # 11335) from "Devils River, V-6-07, Bishop & Pratt", bears a cotype label and a female from Devils bears a "type" label. Because the type locality has traditionally been given as "Kerrville", I designate the USNM male as lectotype. *P. costalis* is represented by a holotype male from Heyne, Texas. This specimen in the National Museum, Prague, bears a label with locality data given by Ricker (1938) and a label with "typus *Perlesta costalis* Klapalek det".

This species is apparently widely distributed through the midwest, southwest and in the larger rivers of the plains and foothills of the Rocky Mountains (Fig. 103). The life history of this species was given by Snellen & Stewart (1979); details of reproductive morphology were given by Stewart et al. (1969).

**Material examined.** - COLORADO: 5♂, 6♀, Yuma Co., Chief Creek, Rd CC North, 28.vi-17.vii.1986, B. C. Kon-

dratieff (BCK). ILLINOIS: 4♂, 1♀, Carroll Co., Savanna, 20.vii.1927, T. H. Frison (INHS). 2♂, 3♀, Rock Island Co., Rock Island (MCZ # 10129); 1♂, 1♀, same location (MCZ # 10131). NEBRASKA: 11♂, 12♀, Hall Co., North Fork Platte River, Mormon Island State Park, 28.vi.1975, R. W. Baumann (BYU). OHIO: 15♂, 10♀, unknown Co., Sharon Woods, 30.v.1953, A. R. Gaufin (BYU). 1♂, Miami Co., Stillwater River, Covington, 9.v.1953, A. R. Gaufin (BYU). OKLAHOMA: 13♂, 28♀, Bryan Co., Blue River, Armstrong, 31.v.1973, B. Stark (BPS). TEXAS: 15♂, 10♀, Denton Co., Clear Creek, 26.v.1977, R. Snellen & K. W. Stewart (UNT). 5♂, 2♀, Kerr Co., Kerrville State Park, 16.v.1985, P. K. Lago (UM). 1♂, Kerrville, 19.vi.1908, F. C. Pratt (USNM # 18185). 1♂, unknown Co., Heyne, 1907, O. D. Wheele (NMP). VIRGINIA: 3♂, 2♀, Giles Co., Big Walker Creek, 12.v.1986, K. W. Stewart, B. C. Kondratieff & R. F. Kirchner (UNT). WISCONSIN: 2♂, 5♀, Burnett Co., near Siren, 24.vii.1965, D. Hansen (USNM). WYOMING: 8♂, 5♀, Goshen Co., Torrington, 17.vii.1947, D. G. Denning & R. E. Pfadt (USNM). 6♂, 5♀, Platte Co., Wheatland, 6.viii.1947, D. G. Denning & R. E. Pfadt (USNM).

### *Perlesta frisoni* Banks

(Figs. 7-8, 51-55, 104)

*Perlesta frisoni* Banks, 1948. Lectotype ♂ (MCZ # 27662), Newfound Gap, Great Smoky Mountains National Park, Tennessee.

**Male.** - Forewing length 10-11 mm. General color pale yellow, wings pale, femora yellow-brown without banding. Sensilla basiconica concentrated in two circular patches narrowly separated along midline of T10 (Figs. 7-8, 51). Paraprocts short, stout and bearing a prominent mesoapical spine (Figs. 51-52). Penis tube + sac exceptionally long and slender; dorsal patch pale and inconspicuous; caecum absent (Fig. 55).

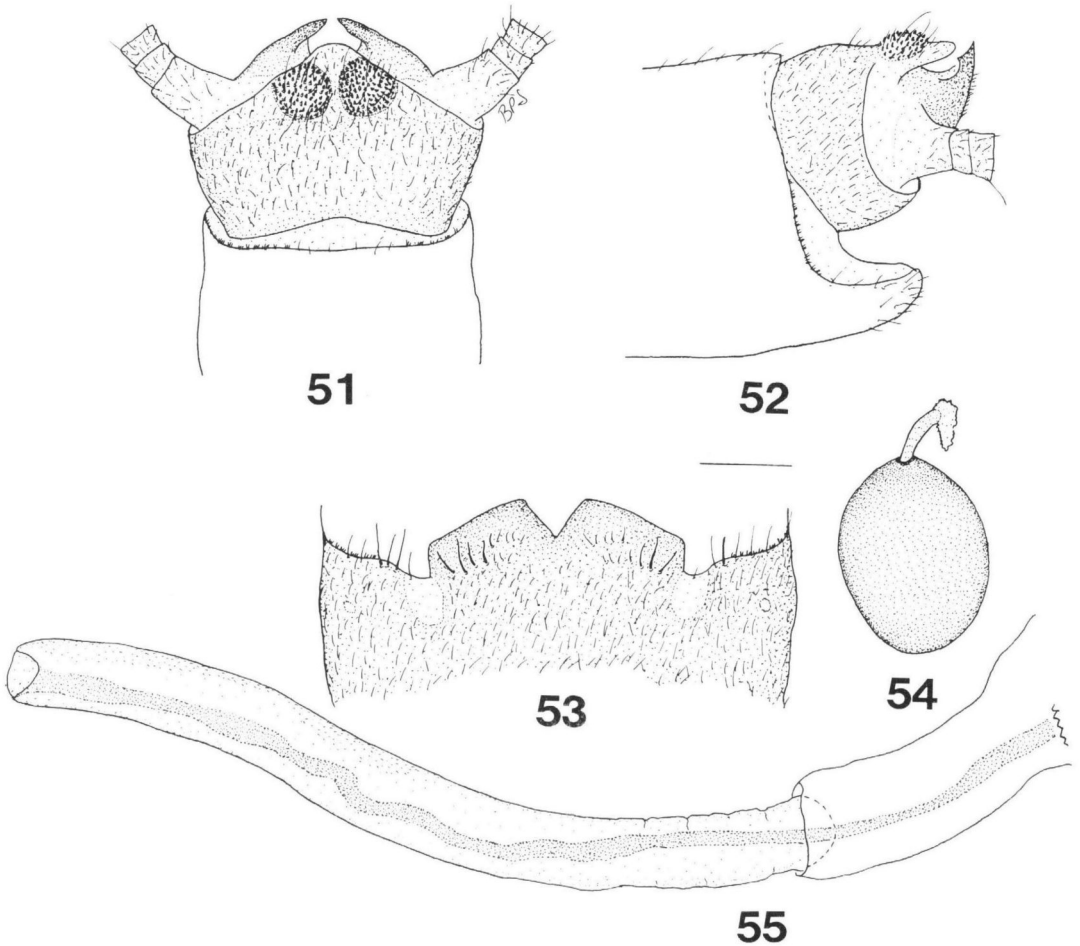
**Female.** - Forewing length 13-14 mm. Subgenital plate with a prominent V-shaped notch; lobes angular with inner shoulder much higher than outer shoulder (Fig. 53).

**Egg.** - Length ca. 0.33 mm, width ca. 0.26 mm. Collar sessile, chorion with an inconspicuous transverse mesal band of shallow pits (Figs. 18, 54).

**Nymph.** - Described by Frison (1942) as a variant of *P. placida*.

### Discussion

The type series includes six pinned specimens from Smokemont, Deep Creek, Nantahala Gorge, Hendersonville, Owen's Gap and Jefferson in North Carolina and the lectotype male and two female syntypes from Newfound Gap which were previously removed to alcohol. Banks (1948) indicates these



Figs. 51-55. *P. frisoni*. 51-52. Lectotype ♂. 53. ♀ subgenital plate. 54. Egg. 55. Penis, lateral. Scale = 0.30 mm (51-53), 0.15 mm (54-55).

three specimens were taken in Tennessee, although the label indicates "North Carolina-Tennessee". The lectotype which I designate here bears an identifying label written by C. H. Nelson. This summer emerging species occurs throughout the southern Appalachians (Fig. 104).

**Material examined.** - NORTH CAROLINA: 10♂, 3♀, Haywood Co., Cove Creek, Great Smoky Mountains National Park, 20.viii.1982, J. Weaver & P. Sieburth (CU). SOUTH CAROLINA: 1♂, Oconee Co., Wash Branch, Tamasee Road, 17.vi.1981, J. Weaver (BPS). 3♂, 2♀, Pickens Co., Wildcat Creek, 20-25.v.1976, P. Carlson (BPS). TENNESSEE: 2♂, 2♀, Sevier Co., Chimney Tops Campground, Great Smoky Mountains National Park, 15.viii.1982, J. Weaver & P. Sieburth (BPS). 1♂, 2♀, Little River, Elkmont, Great Smoky Mountains National Park, 18.viii.1979, C. H. Nelson & family (CHN). 1♂, 2♀, New-

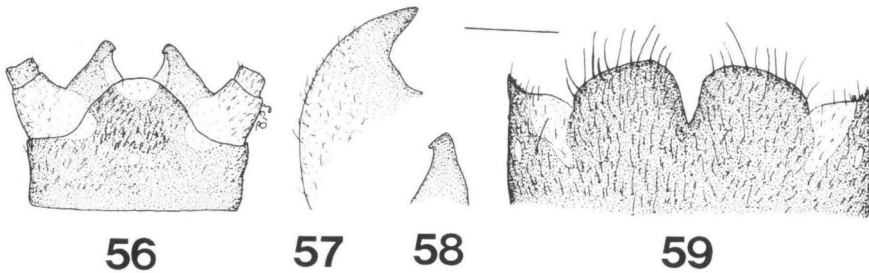
found Gap, ix.1930, N. Banks (MCZ # 27662). VIRGINIA: 2♂, 1♀, Grayson Co., Fox Creek, 3 km west Troutdale, 11.vii.1981, B. C. Kondratieff (BCK). 1♀, Shenandoah National Park, Rose River, Hogcamp B, 8.viii.1986, S. Hiner (BCK).

***Perlesta nitida* Banks; sp. rev.**

(Figs. 56-59, 103)

*Perlesta placida nitida* Banks, 1948. Lectotype ♂ (MCZ # 27673), Holliston, Middlesex Co., Massachusetts.

**Male.** - Forewing length 6.5-7.5 mm. General color brown. Head yellow except for brown quadrangular area covering ocelli and extending over clypeus; pronotum brown, proximal abdominal segments pale, distal brown; femora pale brown without



Figs. 56-59. *P. nitida*. 56-58. Lectotype ♂ terminalia and paraprocts. 59. ♀ subgenital plate. Scale = 0.30 mm (56, 59), 0.15 mm (57, 58).

banding. Paraprocts short, stout with small apical spine directed mesad (Figs. 56-58). T10 hairy with a few scattered sensilla basiconica.

*Female*. – Forewing length 8-9 mm. Subgenital plate with prominent hairy lobes separated by deep V-shaped notch (Fig. 59).

*Egg*. – Unknown.

*Nymph*. – Unknown.

#### Discussion

This species seems distinct from *P. decipiens* but may be only a small, dark variant of that species. Preparations of internal male genitalia and eggs are needed to confirm the status of *P. nitida*. The type series (MCZ # 27673) includes two pinned males collected on different dates by N. Banks at Holliston, Massachusetts. The male collected on “I-VII” bears a type label, while the other male bears a paratype label. I designate the former specimen as lectotype. The species is currently known only from the northeastern United States (Fig. 103).

*Material examined*. – CONNECTICUT: 1♂, 1♀, New London Co., Pachaug River, Pachaug, 14.vi.1967, S. W. Hitchcock (USNM). MASSACHUSETTS: 1♂, 1♀, Franklin Co., Mill River, Montague, 22.vii.1959, D. Shepardson (USNM). 2♂, Middlesex Co., Holliston, 22.vi-1.vii, N. Banks (MCZ # 27673). PENNSYLVANIA: 1♂, 1♀, Butler Co., Slippery Rock Creek, 25.vi.1967, J. W. Richardson (BYU). 1♂, Philadelphia Co., Philadelphia, 1.v.1903 (USNM).

#### *Perlesta baumannii* sp. n.

(Figs. 60-64, 104)

*Male*. – Forewing length 6.5-7.5 mm. General color dark brown; head and pronotal sutures black (Fig. 64). Wings dark brown, without pale costal area. Femora without distinctive banding, but pale in proximal half, shading to brown distally; tibia

brown. Paraprocts short, strongly curved laterad, bearing a spine near apex (Figs. 60-61, 63). T10 without sensilla basiconica patch.

*Female*. – Forewing length 8.5-9.5 mm. Subgenital plate lobes short, rounded and darkly pigmented around margins; notch broad (Fig. 62).

*Egg*. – Unknown.

*Nymph* (from exuviae). – General color brown, almost concolorous. Frons uniformly brown forward of ecdysial suture; abdomen without freckled appearance. Occipital setal row sparse; lateral pronotal fringe composed of exceptionally long setae.

#### Discussion

This species is most easily recognized by the absence of a pale costal area in the wings. No gravid females and no males with an everted penis have been collected. Nymphs are distinguished from known sympatric congeners by the absence of a freckled abdomen. The species is presently known from scattered localities in the Ouachita Mountains (Fig. 104).

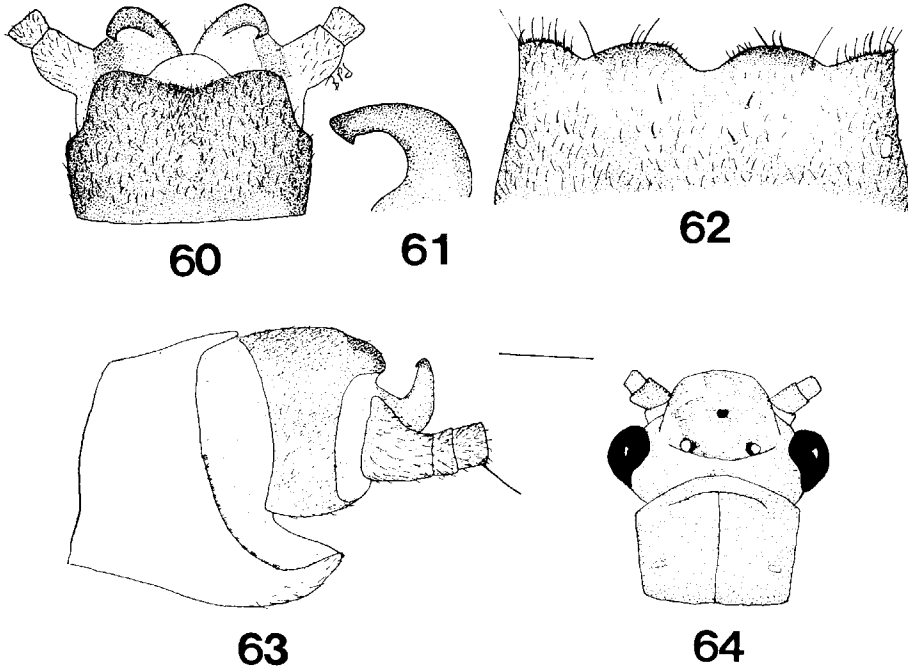
*Etymology*. – This species is named in honor of R. W. Baumann. Our independent collections of this distinctly pigmented species in 1972, caused both of us to question the concept of *P. placida* as a widespread variable species.

*Type material*. – Holotype ♂, 2♂ and 9♀ paratypes from ARKANSAS, Scott Co., Mill Creek near Y-City, 30.iv.1972, R. W. Baumann & S. W. Szczytko (USNM, BYU). Additional paratypes: OKLAHOMA: 3♂, 3♀, Latimer Co., Turkey Creek, Hwy 270, 13.v.1972, B. Stark (BPS). 1♂, 4♀, LeFlore Co., Cedar Creek, Hwy 59, 30.iv.1972, R. W. Baumann & S. W. Szczytko (BYU).

#### *Perlesta nelsoni* sp. n.

(Figs. 65-70, 105)

*Male*. – Forewing length 8-9 mm. General body color pale yellow, wings pale. Femora yellow-brown



Figs. 60-64. *P. baumanni*. 60. ♂ terminalia. 61. Paraproct, lateral. 62. ♀ subgenital plate. 63. ♂ terminalia, lateral. 64. ♂ head and pronotum. Scale = 0.60 mm (64), 0.30 mm (60, 62, 63), 0.15 mm (61).

without distinctive banding. Sensilla basiconica scattered in two sparse patches narrowly separated along midline of T10 (Fig. 65). Paraprocts slender apically, moderately long, and bearing a prominent mesoapical tooth (Figs. 65-67). Penis tube + sac long and slender; caecum absent (Fig. 70).

*Female*. – Forewing length 10-11 mm. Subgenital plate with a deep U-shaped notch; outer shoulder of lobes rounded and lower than inner shoulder (Fig. 68).

*Egg*. – Length ca. 0.31 mm, width ca. 0.23 mm. Collar short and slender; chorion smooth (Fig. 69).

*Nymph*. – Unknown.

*Discussion*

This species is similar to, and sympatric with, *P. frisoni* (Fig. 105). Males lack the prominent T10 sensilla basiconica patches typical of *P. frisoni*, and females are distinguished by the broad U-shaped subgenital plate notch and by the egg which bears a delicate collar.

*Etymology*. – The patronym honors C. H. Nelson, who first collected and recognized this species as distinct from *P. frisoni*.

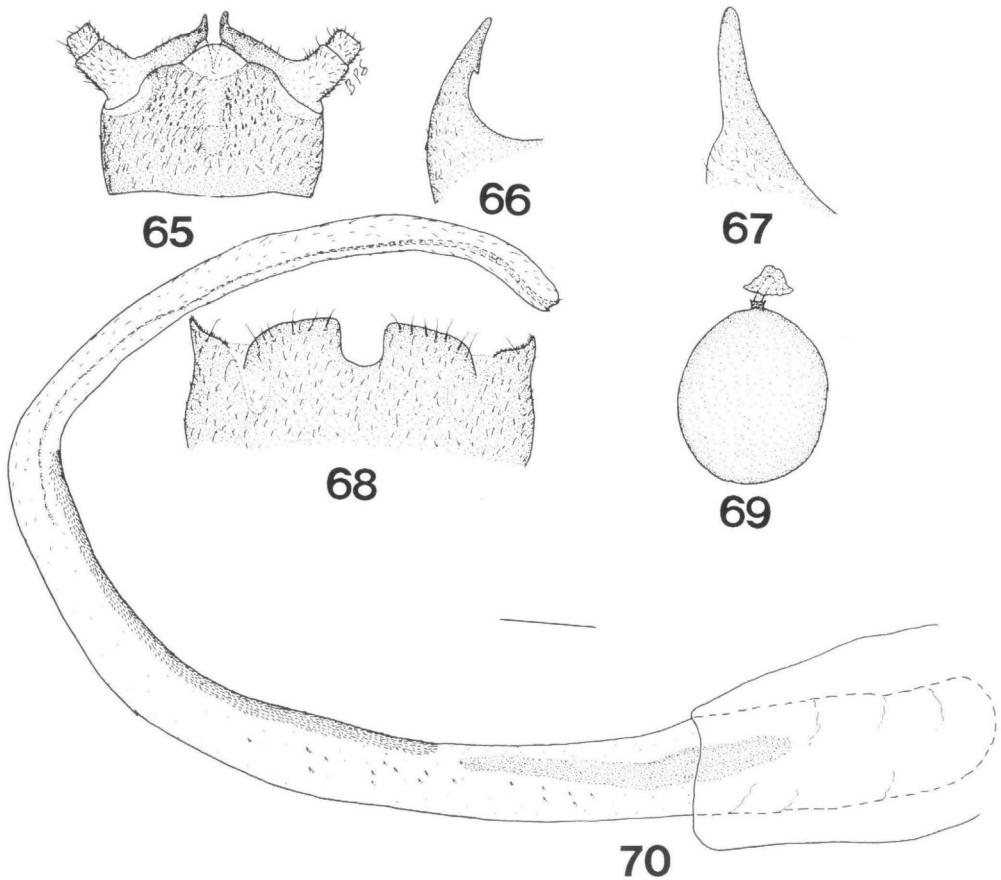
*Type material*. – Holotype ♂, 3♂ and 11♀ paratypes from NORTH CAROLINA, Swain Co., Deep Creek, Great Smoky Mountains National Park, 10.viii.1982, J. Weaver & P. Sieburth (USNM, BPS). Additional paratypes: NORTH CAROLINA: 2♂, 1♀, Haywood Co, Big Creek, Great Smoky Mountains Park, 21.viii.1982, J. Weaver & P. Sieburth (BPS). 1♂, 14♀, Chestnut Branch, Big Creek Camp, Great Smoky Mountains National Park, 21.viii.1982, J. Weaver & P. Sieburth (BPS). SOUTH CAROLINA: 4♂, 8♀, Oconee Co., Chauga River, 6.vii.1969, Douglass & Carlson (CU). TENNESSEE: 1♂, 1♀, Sevier Co., Little Pigeon River, Great Smoky Mountains National Park, 15.viii.1977, C. H. Nelson (CHN). 2♂, 3♀, Middle prong Little Pigeon River, Greenbriar Cove, Great Smoky Mountains National Park, 21.vii.1979, C. H. Nelson & family (CHN). 1♂, 1♀, Little River, Elkmont, Great Smoky Mountains National Park, 21.vii.1979, C. H. Nelson & family (CHN).

*Perlesta adena* sp. n.

(Figs. 71-76, 104)

*Perlesta cinctipes*: (Gaufin 1956, in part), not Banks.

*Male*. – Forewing length 9-10 mm. General body color dark brown, wings black except for pale costal area. Head brown with dark brown quadrangular area over ocelli (Fig. 75); abdomen brown, femora banded. Paraprocts long, slender, and prominently



Figs. 65-70. *P. nelsoni*. 65. ♂ terminalia. 66. Paraproct, lateral. 67. Paraproct, caudal. 68. ♀ subgenital plate. 69. Egg. 70. Penis, lateral. Scale = 0.30 mm (65, 68), 0.15 mm (66, 67, 69, 70).

toothed (Figs. 71-72). T10 with mesal sclerite almost divided by longitudinal membranous band (Fig. 71). Penis tube + sac short and plump; dorsal patch broadly overlaps lateral margins of sac and does not cover caecum; ventral sac extension short; dorsum of tube covered with rows of fine spinules (Fig. 76).

*Female*. – Forewing length 11-12 mm. Subgenital plate lobes rounded and separated by a broad, V-shaped notch. Plate dark laterally and membranous mesally (Fig. 74).

*Egg*. – Length ca. 0.31 mm, width ca. 0.20 mm. Collar buttonlike. Chorion smooth around anterior and posterior poles, pitted in mesal third. Ecllosion line absent. Micropylar row below mesal pitted field (Figs. 20, 73).

*Nymph*. – Unknown.

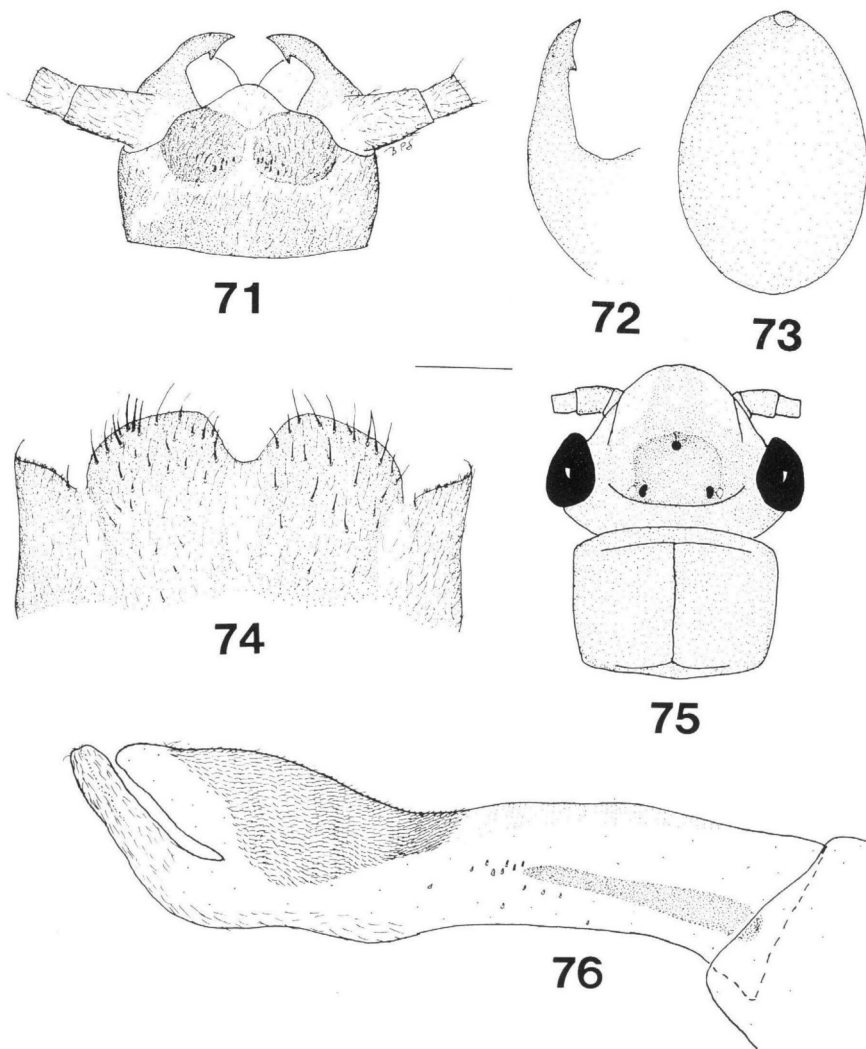
#### Discussion

This species closely resembles *P. cinctipes* in pigmentation and external genitalia, and the entire type series was so determined by A. R. Gaufin (Gaufin 1956). The egg and penial structures, however, are quite different (Figs. 17, 20, 32, 76). The known ranges of these species do not overlap (Figs. 102, 104).

*Etymology*. – This species is named for the people of the extinct Adena culture who once inhabited the southern Ohio area.

*Type material*. – Holotype ♂, 1 ♂ and 2 ♀ paratypes from OHIO, Miami Co., Stillwater River, Hwy 185, 2.vi.1953, A. R. Gaufin (USNM, BYU). Additional paratypes: OHIO: 5 ♂, 5 ♀, Butler Co., Seven Mile Creek, north of Collinsville, 2.vi.1953, A. R. Gaufin (BYU, BPS). 6 ♂, 6 ♀,





Figs. 71-76. *P. adena*. 71. ♂ terminalia. 72. Paraproct, lateral. 73. Egg. 74. ♀ subgenital plate. 75. ♂ head and pronotum. 76. Penis, lateral. Scale = 0.60 mm (75), 0.30 mm (71, 74), 0.15 mm (72, 73, 76).

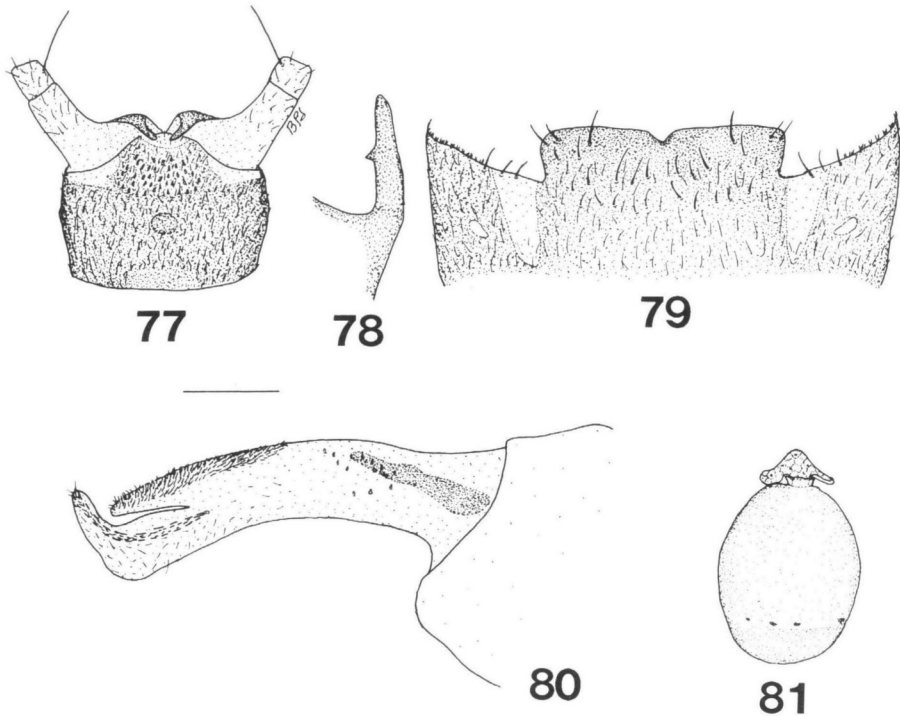
Montgomery Co., Stillwater River, Faulkner Road, 3-4.vi.1953, A. R. Gaufin, (BYU, USNM, BPS). 45♂, 5♀, Clinton Co., Cowan Creek, 7.vi.1951/8.vi.1952, A. R. Gaufin (BYU, BPS). 2♂, 2♀, Clark Co., Little Miami River, Clifton, 30.v.1953, A. R. Gaufin (USNM).

***Perlesta browni* sp. n.**

(Figs. 10, 15, 77-81, 105)

*Male*. - Forewing length 8-8.5 mm. General color brown. Wings dark brown except for pale costal

area. Abdomen dark brown dorsally, yellow ventrally; femora banded. Head with dark brown quadrangular area over ocelli; pale brown areas behind ecdysial suture and forward of medial ocellus; yellow between eyes and ocelli. Paraprocts long, slender, and slightly curved posteriad at apex; small spine located at midlength (Figs. 10, 77-78). Mesal sclerite of T10 with scattered sensilla basiconica; not as dark as anterior sclerite (Fig. 77). Penis tube + sac short; dorsal patch short, wide and extending to apex of caecum (Fig. 80).



Figs. 77-81. *P. browni*. 77. ♂ terminalia. 78. Paraproct, lateral. 79. ♀ subgenital plate. 80. Penis, lateral. 81. Egg. Scale = 0.30 mm (77, 79), 0.15 mm (78, 80, 81).

**Female.** – Forewing length 10.5-12 mm. Subgenital plate truncate, notch shallow (Fig. 79).

**Egg.** – Length ca. 0.34 mm, width ca. 0.21 mm. Collar short, sides prominently ribbed. Surface finely punctate throughout except for smooth eclosion line near posterior pole. Micropylar row set around anterior surface of eclosion line (Figs. 15, 81).

**Nymph.** – Unknown.

#### Discussion

Light trap collections reported as *P. placida* from Upper Three Runs Creek, South Carolina (Stark 1980) include a similar, but slightly smaller species. The eggs and internal genitalia for these populations are indistinguishable, but paraprocts (Figs. 10-11) and subgenital plates differ. B. C. Kondratieff provided associated nymphs of the South Carolina population which differ significantly from drawings of *P. browni* nymphs provided by B. Poulton (*in litt.*). Because these populations are widely disjunct, and in view of these variations, the

South Carolina specimens were not included in this study, and *P. browni* is regarded as an Ozark-Ouachita species (Fig. 105).

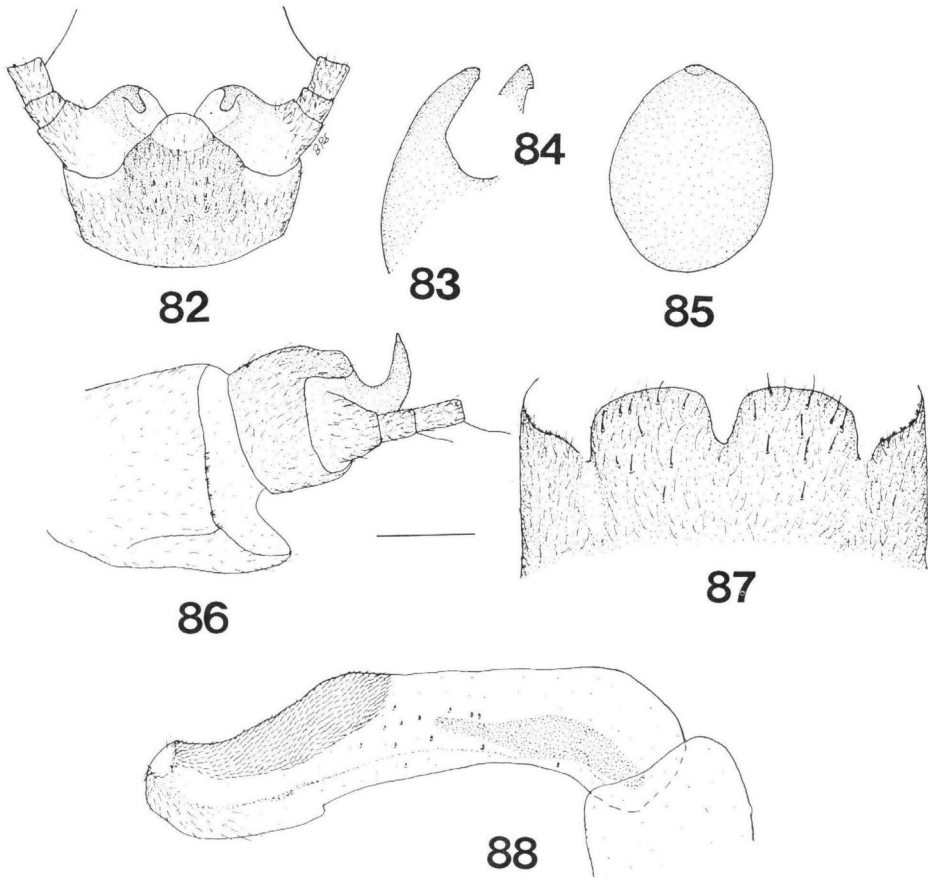
**Etymology.** – The patronym honors H. P. Brown for his encouragement and generosity in sharing specimens and information about collecting sites in Oklahoma.

**Type material.** – Holotype ♂, 70 ♀ and 91 ♀ paratypes from OKLAHOMA, Latimer Co., Rock Creek, 7 km north of Red Oak, 10.v.1985, B. & Stark (BPS, BYU). Additional paratypes: ARKANSAS: 1 ♂, 4 ♀, Polk Co., Ouachita River, 3 km west Acorn, 2.vi.1973, J. Morse (CU). 8 ♂, 6 ♀, Sebastian Co., Hartford 9.vi.1966, R. W. Hodges (BYU). OKLAHOMA: 15 ♂, 10 ♀, Latimer Co., Red Oak Creek, Denman, 8.vi.1973/1.vi.1977, B. Stark (BPS).

#### *Perlesta bolukta* sp. n.

(Figs. 19, 82-88, 103)

**Male.** – Forewing length 8-9 mm. General color yellow-brown. Head yellow except for brown quadrangular area over ocelli. Abdomen yellow, femora yellow-brown without banding. Paraprocts stout, apices truncate in dorsal aspect; spine small and directed mesad (Figs. 82-84, 86). T10 with sparse



Figs. 82-88. *P. bolukta*. 82. ♂ terminalia. 83. Paraproct, lateral. 84. Paraproct, inner aspect. 85. Egg. 86. ♂ terminalia, lateral. 87. ♀ subgenital plate. 88. Penis, lateral. Scale = 0.30 mm (82, 86, 87), 0.15 mm (83-85, 88).

sensilla basiconica (Fig. 82). Penis tube + sac moderately long; dorsal patch wide and extending to apex of caecum (Fig. 88).

*Female*. – Forewing length 11-12 mm. Subgenital plate notch deep, V-shaped; lobes rounded (Fig. 87).

*Egg*. – Length ca. 0.36 mm, width ca. 0.25 mm, Collar button-like. Surface with mesal band of shallow, irregular pits. Eclosion line absent. Micropylar row located at posterior margin of pitted area (Figs. 19, 85).

*Nymph*. – Unknown.

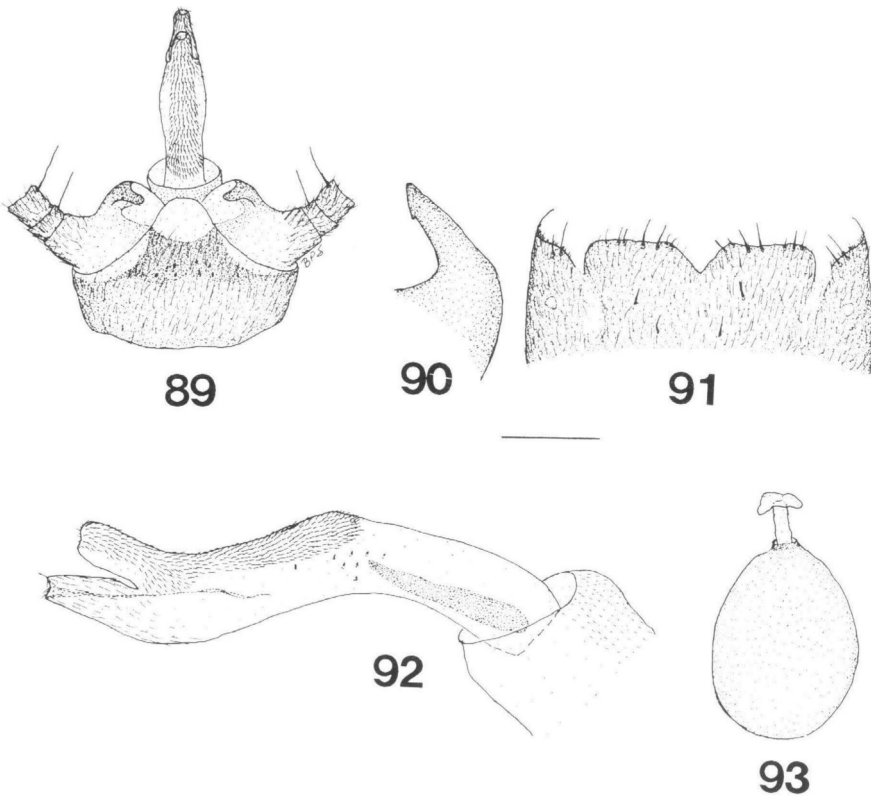
#### Discussion

This species is paler than sympatric congeners *P. browni*, *P. baumanni*, and *P. cinctipes*, but generally

resembles *P. decipiens* in coloration. Gravid females are easily distinguished from *P. decipiens* by egg morphology (Figs. 12, 19), and males have truncate paraproct apices and a less conspicuous paraproct spine than *P. decipiens*. A gynandromorph with one well developed paraproct, and aberrant subgenital plate, and numerous eggs was taken with the type series. The species is presently known from two Ouachita Mountain streams (Fig. 103).

*Etymology*. – The species name, *bolukta*, is derived from a Choctaw word referring to the square paraproct apices.

*Type material*. – Holotype ♂, 10 ♂ and 5 ♀ paratypes from OKLAHOMA, Latimer Co., Red Oak Creek, Denman, 8.vi.1973, B. Stark (USNM, BPS). Additional paratypes: OKLAHOMA: 3 ♂, 19 ♀ Latimer Co., Rock Creek, 7 km north of Red Oak, 14.vii.1982, B. & J. Stark (BPS). 3 ♂, type locality, 1.vii.1975, B. Stark (BPS).



Figs. 89-93. *P. shubuta*. 89. ♂ terminalia with penis extruded. 90. Paraproct, lateral. 91. ♀ subgenital plate. 92. Penis, lateral. 93. Egg. Scale = 0.30 mm (89, 91), 0.15 mm (90, 92, 93).

***Perlesta shubuta* sp. n.**

(Figs. 89-94, 104)

**Male.** - Forewing length 6.0-7.0 mm. General color brown. Head brown with dark brown quadrangular area over ocelli and dark triangular area forward of median ocellus. Pronotum brown with darker reticulations and a narrow pale mesal band. Wings dark brown except for pale costal area. Abdomen and femora yellow-brown. Paraprocts short, apical tooth prominent but directed mesad (Figs. 89-90). T10 with sparse sensilla basiconica patch. Penis tube + sac moderately long, sinuate; dorsal patch broad basally, slightly extending around base of caecum, and merging with fine setal-like spines of the sac extension (Fig. 92).

**Female.** - Forewing length 8.5-9.5 mm. Subgenital plate lobes short, truncate, and separated by a small V-shaped notch (Fig. 91).

**Egg.** - Length ca. 0.30 mm, width ca. 0.22 mm. Collar short, anchor pedicel thick, without obvious fibers (Fig. 93). Chorion smooth.

**Nymph.** - General color yellow-brown. Dark areas on head with blotches of brown pigment giving freckled appearance. Pronotal disc with a pair of large mesal light areas. Abdominal terga yellow-brown with prominent brown pigment spots around intercalary setae. Occipital setal row approaches ecdysial suture (Fig. 94).

**Discussion**

This species has frequently been collected with *P. placida* (Fig. 104) but adults are smaller and darker than *P. placida* and the emergence peak may occur slightly later. Nymphs with the extremely freckled habitus have been taken at many other localities including the Ouachita Mountains.

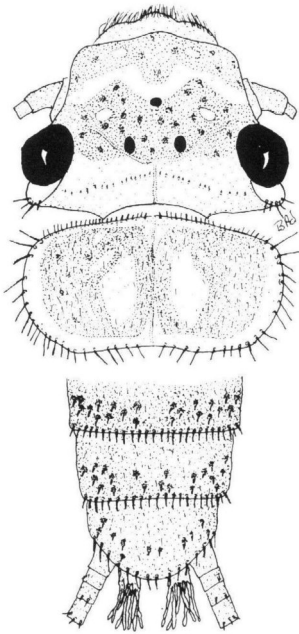


Fig. 94. *P. shubuta* nymphal head, pronotum, and abdominal apex [Simpson Co., Mississippi].

*Etymology.* - The species name, *shubuta*, is based on the Choctaw word for smoking. This refers to the dark appearance of the adults.

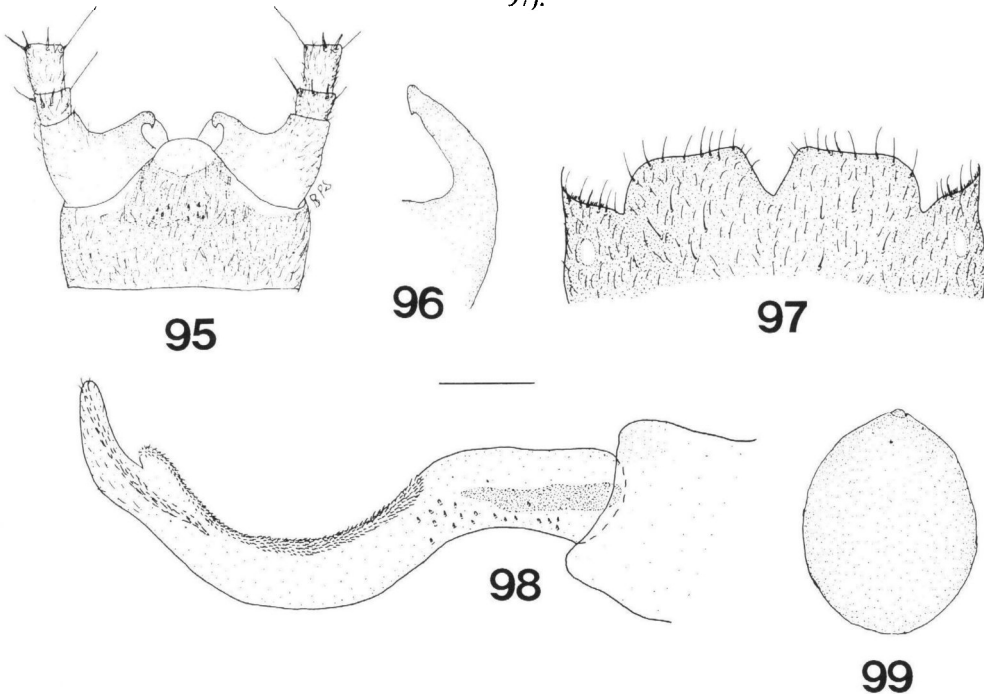
*Type material.* - Holotype ♂ and 2♂ paratypes from MISSISSIPPI, Simpson Co., Mill Creek, Hwy 472, 2.vi.1986, B. Stark (USNM, BPS). Additional paratypes: MISSISSIPPI: 6♂, 3♀, Clarke Co., Moore Mill Creek, Clarkco State Park, 22.v.1985, B. Stark (BPS). 3♂, 3♀, 2 nymphs, Simpson Co., type locality, 14.v.1981, B. Stark (BPS). 5♂, 4♀, type locality, 24.vi.1982, B. Stark (BPS). 2♂, Mill Creek, above Hwy 472, 13.v.1985, B. Stark (BPS).

***Perlesta lagoi* sp. n.**

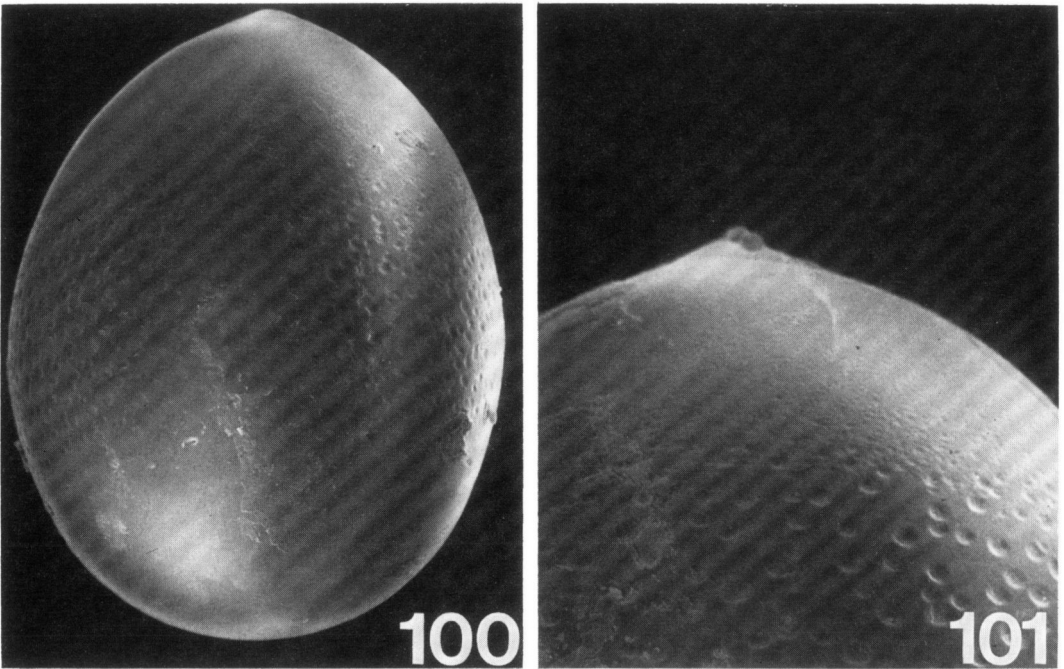
(Figs. 95-101, 105)

*Male.* - Forewing length 7.5-8.5 mm. General color yellow-brown. Head with dark brown quadrangular area over ocelli. Wings brown except for pale costal area; abdomen and femora yellow-brown. Paraprocts short, small apical spine directed mesad (Figs. 95-96). T10 with sparse sensilla basiconica patch. Penis tube + sac moderately long and sinuous; dorsal patch slender (Fig. 98).

*Female.* - Forewing length 9.5-10.5 mm. Subgenital plate lobes relatively large, rounded on outer shoulder and separated by a V-shaped notch (Fig. 97).



Figs. 95-99. *P. lagoi*. 95. ♂ terminalia. 96. Paraproct, lateral. 97. ♀ subgenital plate. 98. Penis, lateral. 99. Egg. Scale = 0.30 mm (95, 97), 0.15 mm (96, 98, 99).



Figs. 100-101. *P. lagoi* egg. 100. Entire egg, lateral, 335 $\times$ . 101. Anterior pole 630 $\times$ .

*Egg.* – Length ca. 0.25 mm, width ca. 0.20 mm. Collar buttonlike. Chorion with mesal band of shallow punctations. Micropyles located along posterior margin of punctate zone (Figs. 99-101).

*Nymph.* – Unknown.

#### Discussion

This species is larger and paler than others in Mississippi (Fig. 105). The egg is similar to those of *P. adena* (Fig. 20), *P. bolukta* (Fig. 19), and an undetermined population in South Carolina.

*Etymology.* – The patronym honors P. K. Lago, an active participant in the “Perlesta Molester Club”.

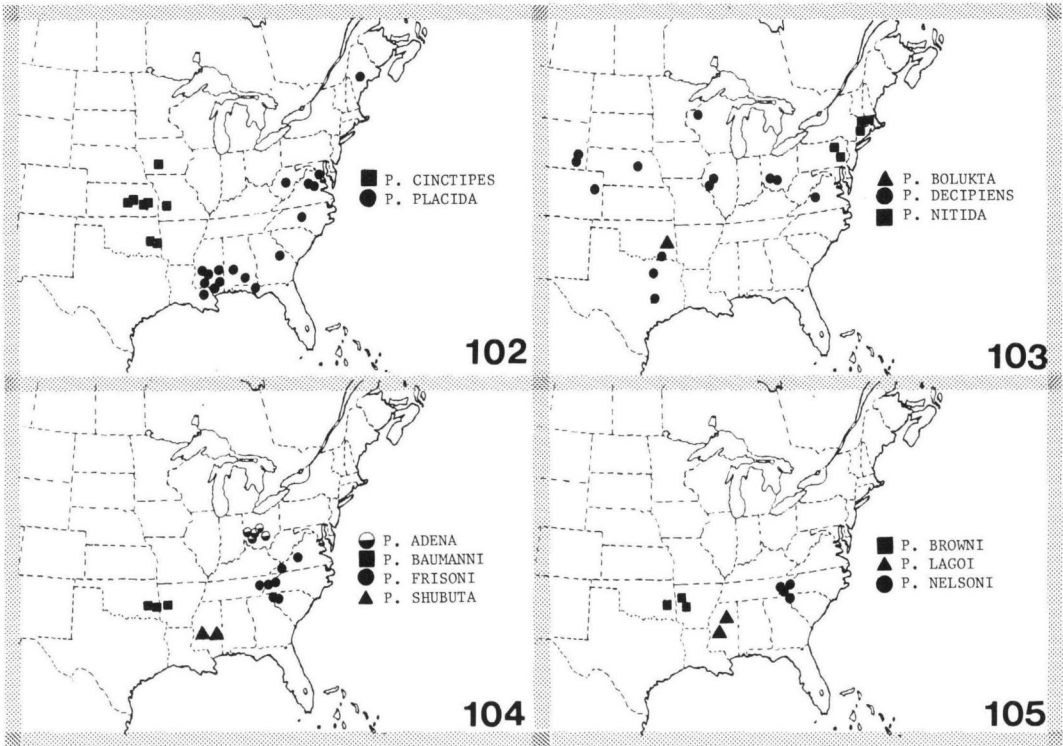
*Type material.* – Holotype  $\sigma$ , 2 $\sigma$  and 2 $\text{q}$  paratypes from MISSISSIPPI, Hinds Co., Bogue Chitto Creek, Kickapoo Road, 21.v.1977, B. Stark (USNM, BPS). Additional paratypes: MISSISSIPPI: 2 $\sigma$ , Hinds Co., Clinton, 23.v.1978, B. Stark (BPS). 1 $\sigma$ , 5 $\text{q}$ , same location, 20.v.1977, B. Stark (BPS). 2 $\sigma$ , 4 $\text{q}$ , Lafayette Co., Oxford, 27.v.1982, P. K. Lago (UM).

#### Acknowledgements

Peter Zwick, Schlitz, West Germany, and curators at the Museum of Comparative Zoology are thanked for their help in obtaining types. Numerous colleagues assisted by providing specimens, but a few formed the “Perlesta molester club” and provided “squeezed” males which were of particular value in this study. These include: R. W. Baumann, D. K. Burton, P. K. Lago, B. C. Kondratieff, C. H. Nelson, B. C. Poulton, and K. W. Stewart. B. C. Poulton also provided notes from his study of Ozark-Ouachita stoneflies. This study was supported, in part, by NSF grant # BSR 8407455.

#### References

- Banks, N. 1898. Descriptions of new North American neuropteroid insects. *Trans. Am. ent. Soc.* 25: 199-201.
- 1905. New genera and species of Perlidae. *Psyche* 12: 55-57.
- 1906. New species of Perlidae. *Can. Ent.* 38: 335-338.
- 1914. New neuropteroid insects, native and exotic. *Proc. Phil. Acad. nat. Sci.* 66: 608-611.
- 1948. Notes on Perlidae. *Psyche* 55: 113-130.
- Feminella, J. W. & Stewart, K. W. 1986. Diet and predation by three leaf-associated stoneflies (Plecoptera) in an Arkansas mountain stream. *Freshwat. Biol.* 16: 521-538.



Figs. 102-105. Distribution maps for nearctic *Perlesta* species. Plots represent county records.

Frison, T. H. 1942. Studies of North American Plecoptera with special reference to the fauna of Illinois. *Bull. Ill. nat. Hist. Surv.* 22: 235-355.

Gaufin, A. R. 1956. An annotated list of the stoneflies of Ohio (Plecoptera). *Ohio J. Sci.* 56: 321-324.

Hagen, H. 1861. Perlina. Pp. 14-38 in *Synopsis of the Neuroptera of North America, with a list of South American species. Smithson. misc. Collns* 4, xx+347 pp.

Hitchcock, S. W. 1974. Guide to the insects of Connecticut. Part VII. The Plecoptera or stoneflies of Connecticut. *Bull. Conn. St. geol. nat. Hist. Surv.* 107, 262 pp.

Illies, J. 1966. Katalog der rezenten Plecoptera. *Tierreich* 82, XXX+632 pp. Berlin.

Klapálek, F. 1921. Plecopteres nouveaux. *Ann. Soc. ent. Belg.* 61: 57-67.

Kondratieff, B. C. & Kirchner, R. F. 1987. Additions, taxonomic corrections, and faunal affinities of the stoneflies (Plecoptera) of Virginia, USA. *Proc. ent. Soc. Wash.* 89: 24-30.

Lake, R. W. 1980. Distribution of the stoneflies (Plecoptera) of Delaware. *Ent. News* 91: 43-48.

Mingo, T. M. 1983. An annotated checklist of the stoneflies (Plecoptera) of Maine. *Ibid.* 94: 65-72.

Needham, J. G. & Claassen, P. W. 1925. A monograph of the Plecoptera or stoneflies of America north of Mexico. 397 pp. La Fayette, Indiana.

Ricker, W. E. 1938. Notes on specimens of American Plecoptera in European collections. *Trans. R. Can. Inst.* 22: 129-156.

Snellen, R. K. & Stewart, K. W. 1979. The life cycle of *Perlesta placida* (Plecoptera: Perlidae) in an intermittent stream in northern Texas. *Ann. ent. Soc. Am.* 72: 659-666.

Stark, B. P. 1980. Plecoptera. Pp. 85-86 in Morse et al.: Aquatic insects of Upper Three Runs Creek, Savannah River Plant, South Carolina. Part I: Orders other than Diptera. *J. Georgia ent. Soc.* 15: 1-79.

Stark, B. P. & Gaufin, A. R. 1976. The Nearctic genera of Perlidae (Plecoptera). *Misc. Publs ent. Soc. Am.* 10: 1-79.

Stark, B. P. & Harris, S. C. 1986. Records of stoneflies (Plecoptera) in Alabama. *Ent. News* 97: 177-182.

Stark, B. P. & Szczytko, S. W. 1981. Contributions to the systematics of *Paragnetina* (Plecoptera: Perlidae). *J. Kans. ent. Soc.* 54: 625-648.

Stewart, K. W. & Huggins, D. G. 1977. Kansas Plecoptera (Stoneflies). *Tech. Publs Kans. St. biol. Surv.* 4: 31-40.

Stewart, K. W., Atmar, G. L. & Solon, B. M. 1969. Reproductive morphology and mating behavior of *Perlesta placida* (Plecoptera: Perlidae). *Ann. ent. Soc. Am.* 62: 1433-1438.

Walsh, B. D. 1862. Perlina. Pp. 362-367 in: *List of the Pseudoneuroptera of Illinois contained in the cabinet*

of the writer, with descriptions of over forty new species, and notes on their structural affinities. *Proc. Acad. nat. Sci. Philad.* 13: 361-402.

Wu, C. F. 1938. *Plecoptorum Sinensium: A monograph of the stoneflies of China (Order Plecoptera)*. 210 pp. Peking.

- 1948. Third-sixth supplements to the stoneflies of China (Order Plecoptera). *Bull. Peking Soc. nat. Hist.* 16: 265-272, 17: 75-80, 145-150, 251-261.

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