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## Redescription of four species of *Camelobaetidius* Demoulin, 1966 (Ephemeroptera: Baetidae) from Central and North America

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### Abstract

Four species of *Camelobaetidius* (*C. maidu*, *C. variabilis*, *C. kondratieffi*, and *C. shepardii*) are redescribed and diagnosed based on paratype material and original descriptions. Some omissions and inaccurate information in the original descriptions are emended, and illustrations of all taxonomically important structures are provided. Diagnostic characters are improved for a better discrimination from other species across the distribution range of the genus, especially in Central and North America and differences in some important taxonomic characters between these paratypes and the original descriptions are stressed.

**Key words:** mayfly, Neotropical, Nearctic, taxonomy

### Introduction

Studies on river water quality using aquatic insects have become a standard in Central America during the last 20 years (e.g., Fenoglio *et al.*, 2002; Rodríguez *et al.*, 2009; Pérez *et al.*, 2010; Guevara-Mora, 2011). However, in this geographical area it is usually very difficult to identify biological material to the species level due to the lack of appropriate keys and species descriptions. Which, in turn, hinders the association of valuable ecological data with species names.

*Camelobaetidius* Demoulin, 1966 is a very common group of small minnow mayflies (Ephemeroptera: Baetidae) characterized by their spatulate claws. It has a Pan-American distribution ranging from Argentina and Uruguay in the south (Traver & Edmunds, 1968) to Canada, in the north (Lehmkuhl, 1976). Presently the genus comprises 11 species in Central and North America, reported from Panama (2), Costa Rica (5), Nicaragua (4), Honduras (2), El Salvador (1), Belize (2), Guatemala (7), , Mexico (8), USA (7), and Canada (1) (Traver & Edmunds, 1968; Allen & Cohen, 1977; McCafferty & Klubertanz, 1994; Lugo-Ortiz & McCafferty, 1995; Lugo-Ortiz & McCafferty, 1996; McCafferty & Randolph, 1998; Wiersema, 1998; McCafferty & Randolph, 2000; Wiersema & Baumgardner, 2000; Randolph & McCafferty, 2001; McCafferty *et al.*, 2004; Jacobus & McCafferty, 2005; Meyer *et al.*, 2008; McCafferty, 2011a; McCafferty, 2011b; De Jong & Canton, 2015, Sibaja-Araya & Esquivel, 2018).

In the present paper, redescription of four of the species of *Camelobaetidius* reported for Panama, Costa Rica, Nicaragua, Belize, Guatemala, Mexico, and USA is made based on the examination of paratype material and original descriptions in order to facilitate future studies of this genus. Although the text of the original descriptions of the four species treated here provides information about body morphology (Lugo-Ortiz & McCafferty, 1995; Jacobus & McCafferty, 2005; Randolph & McCafferty, 2001; Wiersema, 1998), we improve diagnostic characters to distinguish these species from others across the distribution range of the genus.

### Material and methods

The material used in this study was preserved in 70% ethanol, and it includes only paratype specimens of *Camelo-*

*baetidius maidu* Jacobus & McCafferty, 2005, *C. variabilis* Wiersema, 1998, *C. kondratieffi* Lugo-Ortiz & McCafferty, 1995, and *C. shepardii* Randolph & McCafferty, 2001 loaned from Purdue Entomological Research Collection, West Lafayette, Indiana, USA [PERC] for detailed morphological study. Line drawings were made in ink from original pictures taken with an AmScope 1803 digital camera adapted to a Premiere® (MRP-161) microscope and stereomicroscope Premiere® SMZ-05. All of these paratypes were mentioned in the original descriptions of the species, but in the case of *C. shepardii*, the collection localities are erroneously indicated on the material labels (see details under **Material examined** of this species).

## Results

### *Camelobaetidius maidu* Jacobus & McCafferty, 2005

(Figures 1–3)

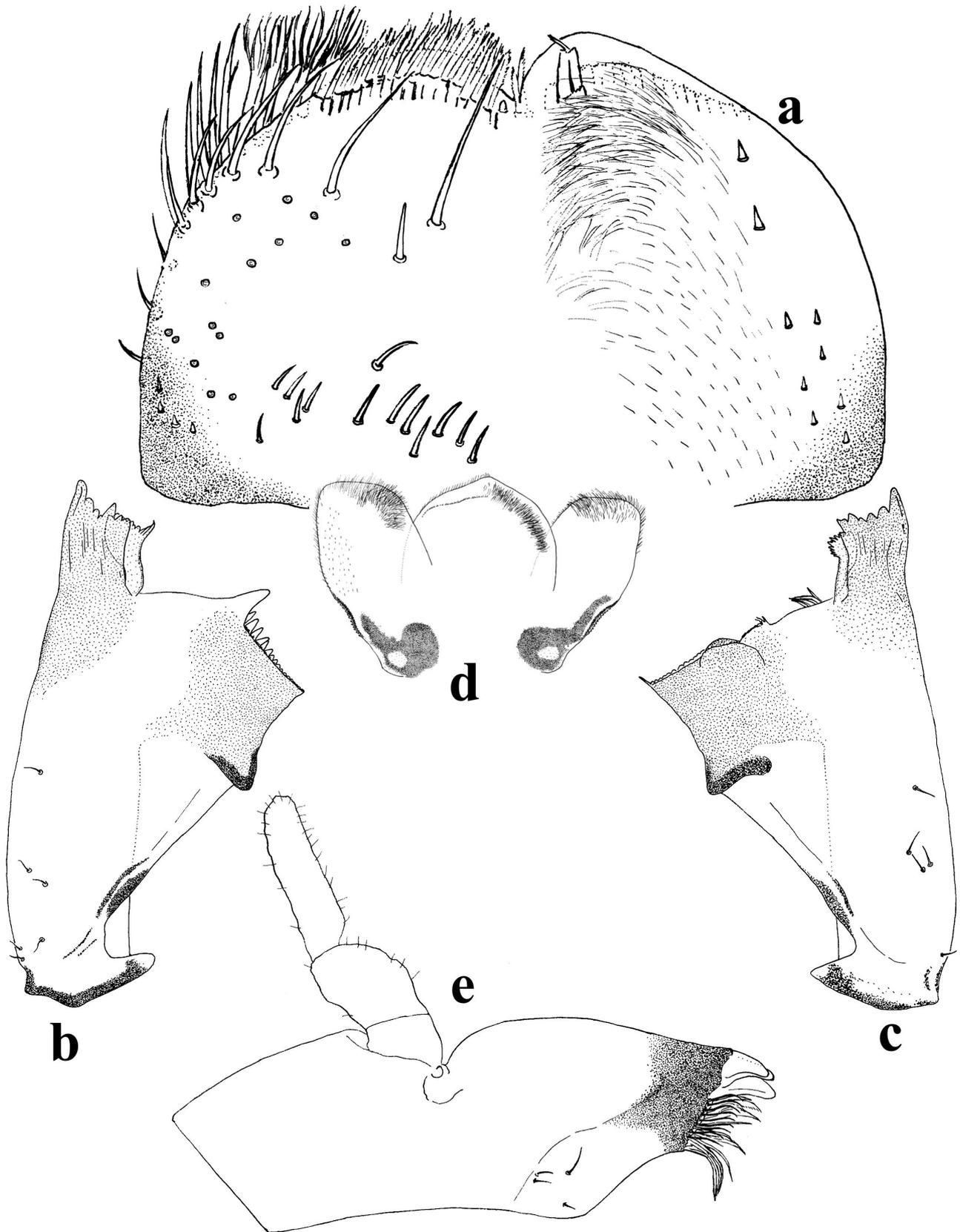
*Camelobaetidius maidu* Jacobus & McCafferty, 2005: 154; McCafferty, 2011b: 323.

**Diagnosis. Mature nymph.** The following combination of characters can be used to diagnose *C. maidu* from remaining species in the region: 1) labrum with anterior margin with 12–18 small, double, frayed setae; seven setae on anterodorsal arc, 13–17 anterolateral setae; intermediate seta present, though sometimes inconspicuous; numerous small, simple or spatulate setae near posterior margin; ventral surface with about nine short setae near lateral margin; one minute seta on anterior margin on both sides of cleft (Figs. 1a, 2); 2) mandibles with seven denticles on incisors, first outer denticle longer than other denticles (Fig. 1b, 1c); 3) maxillary palps with corrugated margin on segment II (Fig. 1e); 4) segment II of labial palp with a distomedial projection directed towards third segment (Figs. 3a); 5) one small osmobranchia at base of forecoxa; 6) tarsal claws each with with 6–11 denticles (Fig. 3b); 7) posterior margin of abdominal tergum IV with small triangular spines subequal in length (Fig. 3c); 8) paraproct with 5–7 spines (Fig. 3d).

**Description.** Mature nymph with body length: 4.5–6.1 mm; caudal filaments length 2.5–2.9 mm.

**Head:** Labrum (Fig. 1a): Broader than long; asymmetrically emarginate on apex, arc of anterodorsal setae with seven simple setae, inner seta longer than rest and extended beyond margin of labrum; intermediate seta present but sometimes missing due to detachment (in this case, the setal socket remains present, see figure 2); numerous small, simple or spatulate setae near posterior and lateral margin; anterior margin with 12–18 small, double, frayed setae; lateral margin with 5–7 simple setae and 8–10 apically frayed long setae; ventral surface with dense arc of short, fine setae near anterior margin; nine small setae near lateral margin; one minute seta on anterior margin on each side of cleft. Left mandible (Fig. 1b): incisors with seven denticles, first outer one longer than others, middle one very small; prosthema well-developed; no setae between prosthema and mola; several small, simple setae on basal region. Right mandible (Fig. 1c): incisor with seven denticles, first outer one longer than other denticles, middle one very small; prosthema well-developed; tuft of four long, simple setae between prosthema and mola; molar disk well developed (*sensu* Sibaja-Araya & Esquivel, 2018: p. 92); few small, simple setae on basal region. Hypopharynx (Fig. 1d): lingua about 1.5x width of superlinguae, equal in length to superlinguae, apically pointed, hairy on dorsal and ventral surfaces; superlinguae upper half hairy on dorsal and ventral surfaces and with serrate area at middle of lateral margin. Maxillae (Fig. 1e): robust; galea with three apical denticles, and two apical rows of setae, some setae of one of these rows large and thick, but others thin, and setae of other row shorter and curved; four setae on lacinia; palp not surpassing apical denticles, segment I short, segment II thick with corrugated margin and several marginal fine setae, segment III elongate with corrugated margin and several marginal fine setae, longer than segment II. Labium (Fig. 3a): robust; glossae shorter than paraglossae; both dorsally with numerous elongate and curved setae, ventrally with several elongate and curved setae; palpi with segment I thick, as long as segments II + III, dorsal surface with several micropores; segment II with a rounded distomedial projection directed towards third segment, dorsal surface with several fine marginal setae, and about six short simple setae on upper half; ventral surface with several fine marginal setae; segment III short and rounded, more developed than distomedial projection, with numerous short, robust spines on ventral surface, dorsal surface with row of short and robust setae on apex.

**Thorax:** Hind wing pads present; one small osmobranchia present at base of each forecoxa; each claw with 6–11 denticles (Fig. 3b).



**FIGURE 1.** *Camelobaetidius maidu* Jacobus & McCafferty 2005, nymph. a) labrum (left d. v., right v. v.), b) left mandible, c) right mandible, d) hypopharynx (left d. v., right v. v.), e) maxilla.

**Abdomen:** Posterior margin of tergum IV with small, triangular spines subequal in length and simple, fine setae not surpassing length of larger spines (Fig 3c); paraproct with 5–7 sclerotized spines, several micropores and simple, fine setae on dorsal surface, posterior margin with minute triangular spines and two simple fine setae (Fig. 3d).

**Distribution:** USA and Mexico (Jacobus & McCafferty, 2005).

**Material examined:** Paratypes, two mature nymphs (one male and one female); USA, California, Plumas County, North Fork Feather River, XI.2001, (mouthparts in microvial) [PERC].



**FIGURE 2.** *Camelobaetidius maidu* Jacobus & McCafferty 2005, nymph. Labrum with intermediary setae present (white oval) and detached with remaining setal socket (black oval).

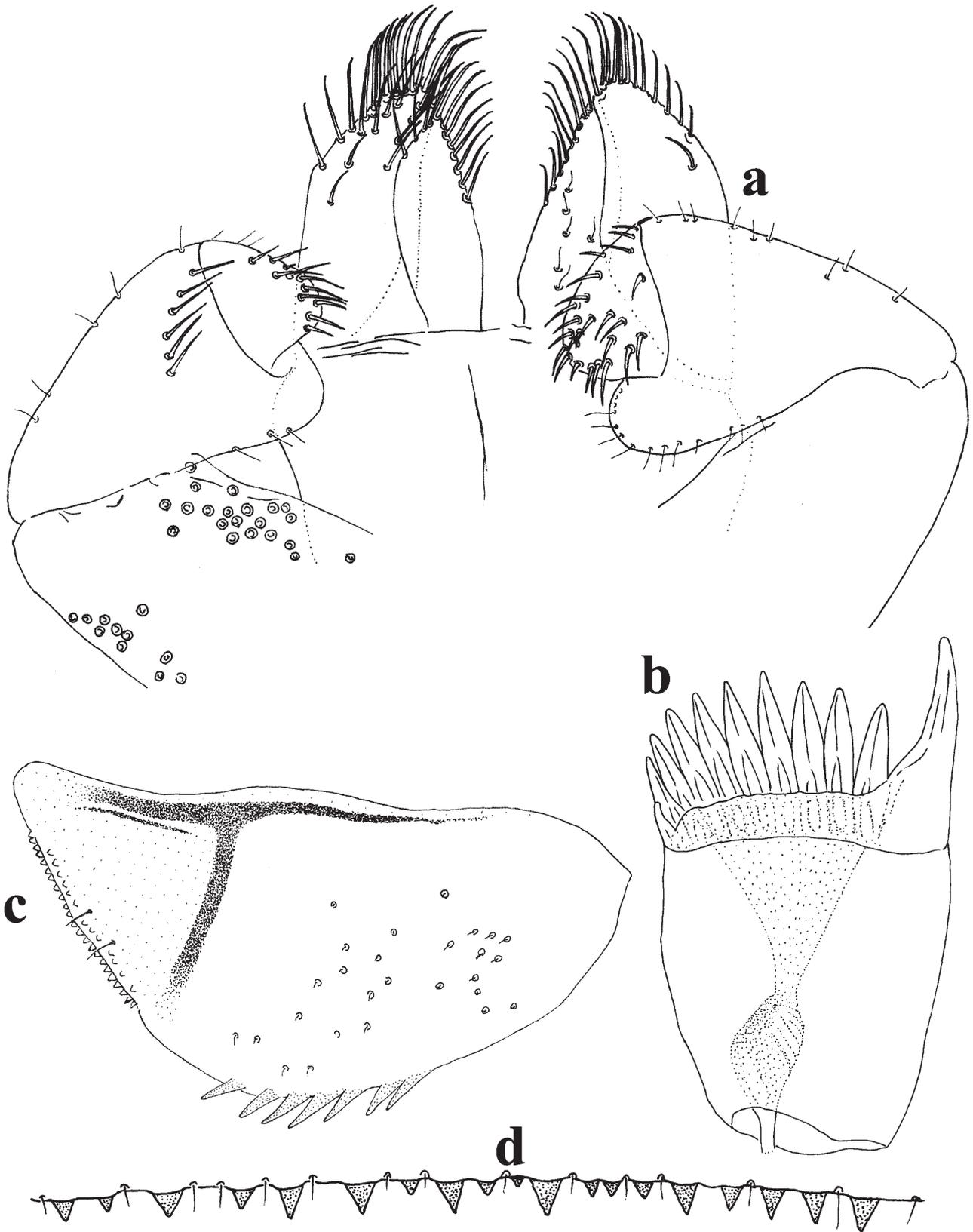
### ***Camelobaetidius variabilis* Wiersema, 1998**

(Figures 4–5)

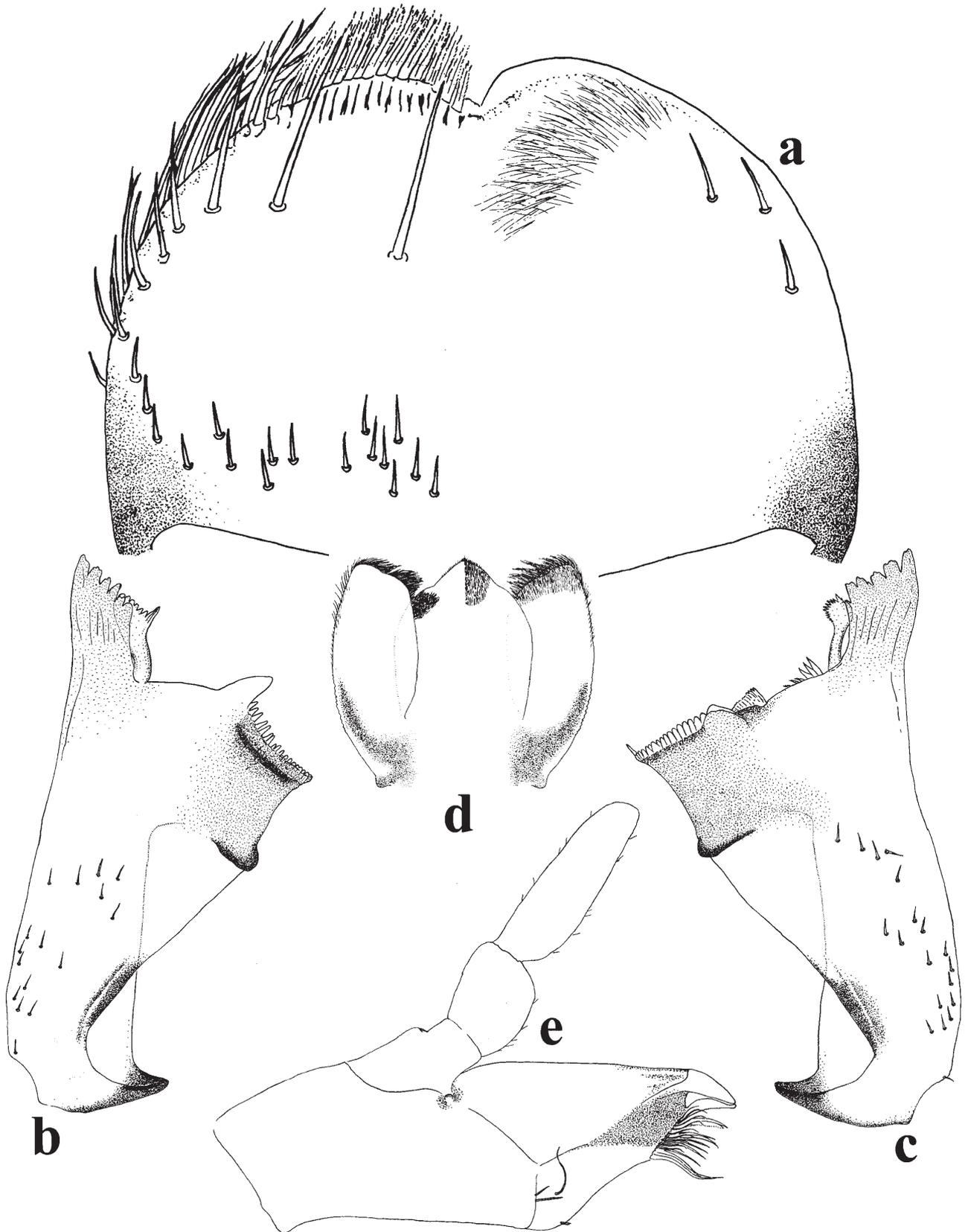
*Camelobaetidius variabilis* Wiersema, 1998: 22; McCafferty & Randolph, 2000: 263; McCafferty *et al.* 2001: 11; McCafferty *et al.* 2004: 207; McCafferty, 2011b: 323; Perry & Kennedy, 2016: 1.

**Diagnosis. Mature nymph.** The following combination of characters can be used to diagnose *C. variabilis* from remaining species in the region: 1) labrum anterior margin with about 16 small, double, frayed setae; seven setae on anterodorsal arc, about 18 anterolateral setae; intermediate setae absent; ventral surface with three long setae near lateral margin; minute seta on anterior margin absent (Fig. 4a); 2) mandibles with seven denticles on incisors (Fig. 4b, 4c); 3) segment II of labial palp with rounded distomedial projection (Figs. 5a); 4) one short osmobranchia present at base of each forecoxa and midcoxa; 5) tarsal claws with 5–9 denticles (Fig. 5b); 6) posterior margin of abdominal tergum IV with rounded spines sub equal in length (Fig. 5c); 7) paraproct with 7–11 spines (Fig. 5d).

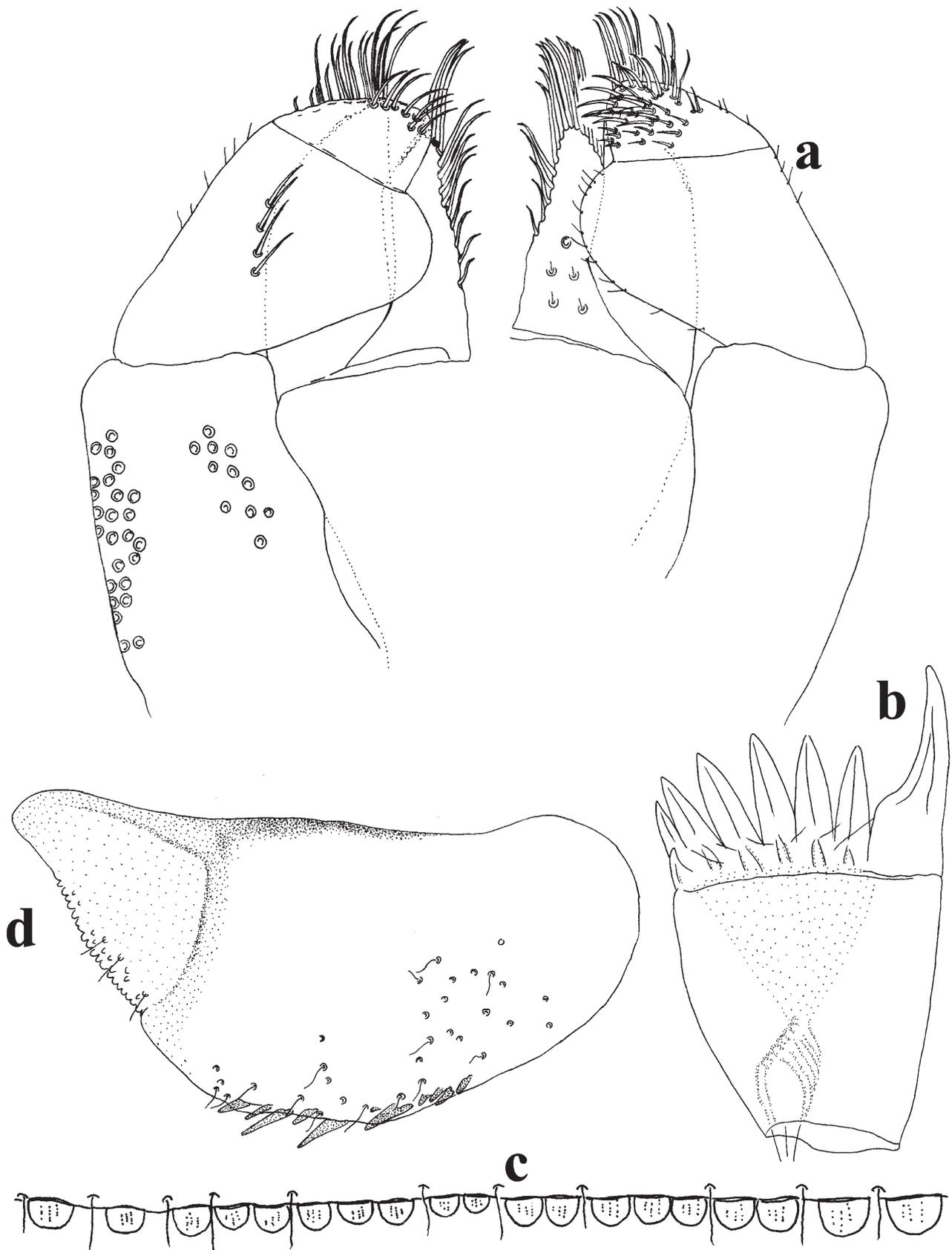
**Description.** Mature nymph body length: 5.6–7.0 mm; caudal filaments length 2.4–3.2 mm.



**FIGURE 3.** *Camelobaetidius maidu* Jacobus & McCafferty 2005, nymph. a) labium (left d. v., right v. v.), b) claws, c) IV tergum spines, d) paraproct.



**FIGURE 4.** *Camelobaetidius variabilis* Wiersema 1998, nymph. a) labrum (left d. v., right v. v.), b) left mandible, c) right mandible, d) hypopharynx (left d. v., right v. v.), e) maxilla.



**FIGURE 5.** *Camelobaetidius variabilis* Wiersema 1998, nymph. a) labium (left d. v., right v. v.), b) claws, c) IV tergum spines, d) paraproct.

**Head:** Labrum (Fig. 4a): Broader than long; asymmetrically emarginate at apex, arc of anterodorsal setae with seven simple setae, second inner seta extending beyond margin of labrum, further than others; intermediate seta absent; numerous small setae near posterior margin; anterior margin with about 16 small, double frayed setae; lateral margin with 3 simple setae and about 15 apically frayed, long setae; ventral surface with dense arc of short, fine setae near anterior margin; three long setae near lateral margin; minute seta on anterior margin absent. Left mandible (Fig. 4b): incisors with seven denticles, six similar in size and a middle one very small; prostheca well-developed; no setae between prostheca and mola; numerous small, simple setae on basal region. Right mandible (Fig. 4c): incisor with seven denticles, six similar in size and a middle one very small; prostheca well developed; tuft of six long, simple setae between prostheca and mola; molar disk well developed; numerous small, simple setae on basal region. Hypopharynx (Fig. 4d): lingua about 1.8x wider than superlinguae, equal in length to superlinguae, apically pointed, hairy on dorsal and ventral surfaces; superlinguae with upper half hairy on dorsal and ventral surfaces and serrate area at middle of lateral margin. Maxillae (Fig. 4e): robust; galea with three apical denticles, and two apical rows of setae, some setae of one of these rows large and thick while others thin, and setae of other row shorter and curved; four setae on lacinia; palp very robust, surpassing apical denticles, segment I short, segment II thick with several marginal fine setae, segment III elongate with several marginal fine setae, longer than segment II. Labium (Fig. 5a): robust; glossae shorter than paraglossae; both dorsally with numerous elongate and curved setae, ventrally with several elongate and curved setae; palpi with segment I thick, as long as segments II + III, dorsal surface with numerous micropores; segment II with rounded distomedial projection, dorsal surface with several fine marginal setae, and about 4–5 short simple setae in upper half; ventral surface with several fine marginal setae; segment III short and rounded, equally developed as distomedial projection, with numerous short, robust spines on ventral surface, dorsal surface with row of short and robust setae on apex.

**Thorax:** Hind wing pads present; one short osmobranchia present at bases of each forecoxa and midcoxa; each claw with 5–9 denticles (Fig. 5b).

**Abdomen:** Posterior margin of tergum IV with rounded spines subequal in length and simple, fine setae surpassing length of longer spines (Fig. 5c); paraproct with 7–11 sclerotized spines subequal in length interspersed, several micropores and simple, fine setae on dorsal surface, posterior margin with minute, rounded and triangular spines and three simple, fine setae (Fig. 5d).

**Distribution:** USA, Mexico and Guatemala (Wiersema, 1998; McCafferty *et al.*, 2001; McCafferty *et al.*, 2004).

**Material examined:** Paratype, one mature nymph (female): USA, Texas, Williamson County, Georgetown, San Gabriel River, riffles below low water crossing at San Gabriel Park, 30°/39'/20"N, 97°/39'/33"W, 20.I.1997, N. A. Wiersema [PERC].

### ***Camelobaetidius kondratieffi* Lugo-Ortiz & McCafferty, 1995**

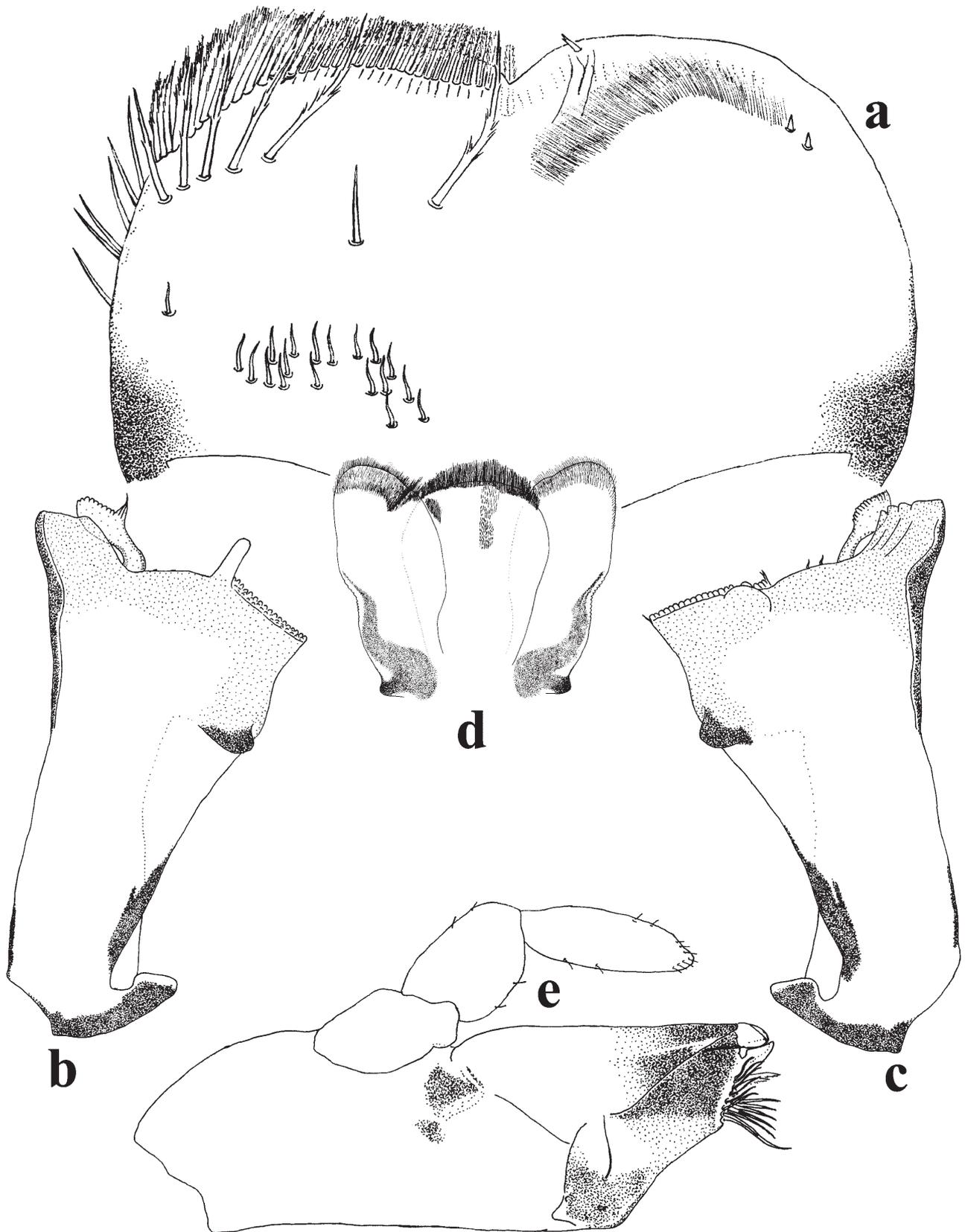
(Figures 6–7)

*Camelobaetidius kondratieffi* Lugo-Ortiz & McCafferty, 1995: 182; Lugo-Ortiz & McCafferty, 1996: 305; Wiersema & Baumgardner, 2000: 61; De Jong & Canton, 2015: 2.

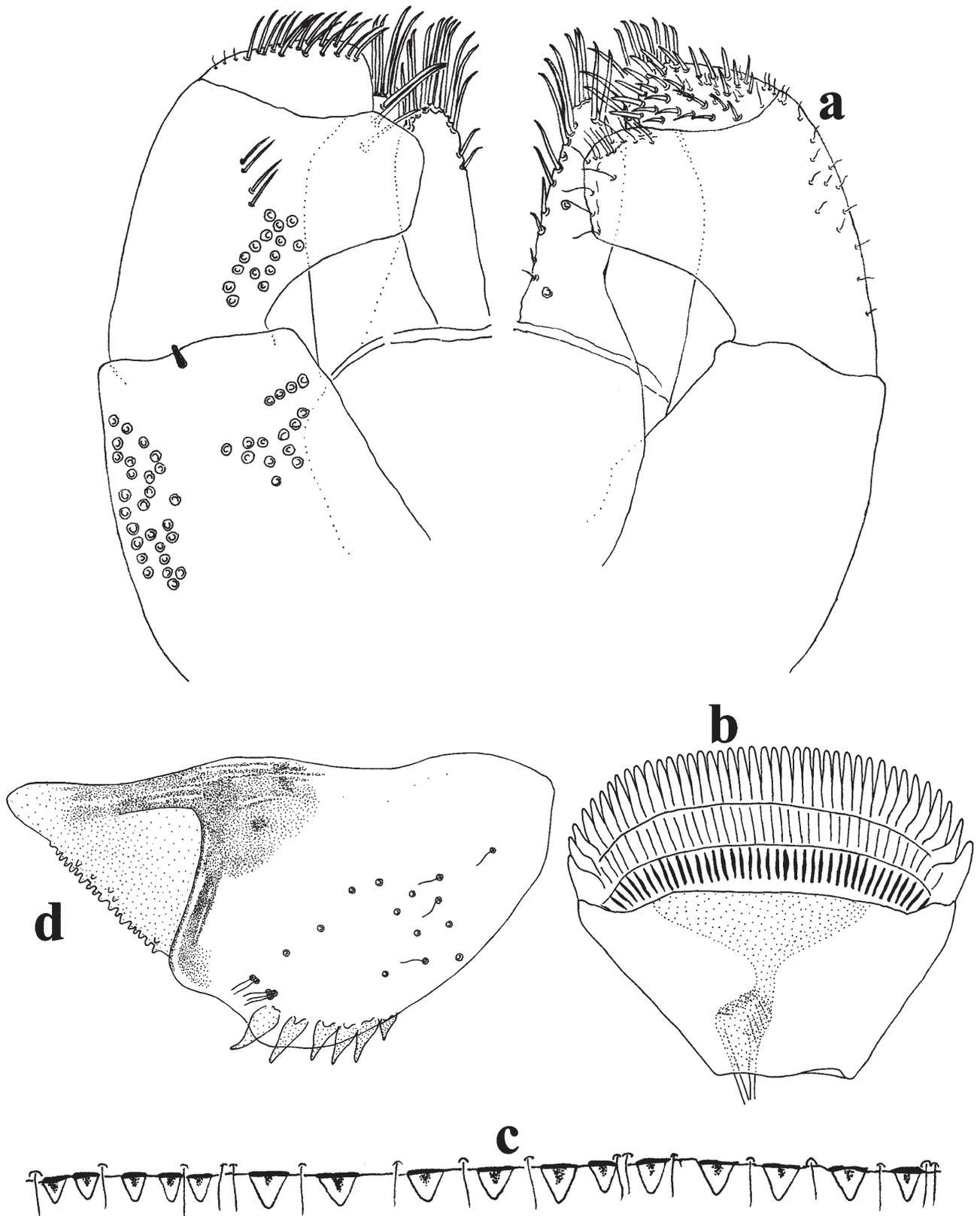
**Diagnosis. Mature nymph.** The following combination of characters can be used to diagnose *C. kondratieffi* from remaining species in the region: 1) labrum with anterior margin with about 20 small, double, frayed setae; 5–6 frayed setae on anterodorsal arc, about 24 anterolateral setae; intermediate seta present; numerous small, simple setae near posterior margin; ventral surface with two short setae near lateral margin; one minute seta on anterior margin on both sides of cleft (Fig. 6a); 2) segment II of labial palp with subrectangular distomedial projection (Fig. 7a); 3) one small osmobranchia present at base of each forecoxa, but sometimes inconspicuous; 4) each tarsal claw with 40–45 denticles (Fig. 7b); 5) posterior margin of abdominal tergum IV with small, triangular spines subequal in length (Fig. 7c); 6) paraproct with 4–6 spines (Fig. 7d).

**Description.** Mature nymph body length: 5.5–6.5 mm; caudal filaments length 2.2–3.0 mm.

**Head:** Labrum (Fig. 6a): Broader than long; round, symmetrically emarginate at apex, arc of anterodorsal setae with 5–6 frayed setae, all extending beyond margin of labrum; intermediate seta present; numerous small setae near posterior margin; anterior margin with about 20 small, double, frayed setae; lateral margin with six simple setae and about 18 apically frayed long setae; ventral surface with dense arc of short, fine setae near anterior margin;



**FIGURE 6.** *Camelobaetidius kondratieffi* Lugo-Ortiz & McCafferty 1995, nymph. a) labrum (left d. v., right v. v.), b) left mandible, c) right mandible, d) hypopharynx (left d. v., right v. v.), e) maxilla.



**FIGURE 7.** *Camelobaetidius kondratieffi* Lugo-Ortiz & McCafferty 1995, nymph. a) labium (left d. v., right v. v.), b) claws, c) IV tergum spines, d) paraproct.

two short setae near lateral margin; one minute seta near anterior margin on both sides of cleft. Left mandible (Fig. 6b): incisors worn; prosthema well developed; two minute setae between prosthema and mola. Right mandible (Fig. 6c): incisors worn; prosthema well-developed; two short, simple setae between prosthema and mola; molar disk well-developed. Hypopharynx (Fig. 6d): lingua about 1.8 x wider than superlinguae, but shorter than them, apically rounded, hairy on dorsal and ventral surfaces in upper half; superlinguae with upper half hairy on dorsal and ventral surfaces and serrate area at middle of lateral margin. Maxillae (Fig. 6e): robust; galea with four apical denticles, and two apical rows of setae, some setae of one of these rows large and thick but others thin, setae of other row shorter and curved; two setae on lacinia; palp robust and not surpassing apical denticles, segment I short, segment II thick with few marginal fine setae, segment III elongate with several marginal fine setae, longer than segment II. Labium (Fig. 6a): robust; glossae shorter than paraglossae; both dorsally with numerous elongate and curved setae, ventrally with several elongate and curved setae; palpi with segment I thick, as long as segments II + III, dorsal surface with numerous micropores; segment II with subrectangular distomedial projection, dorsal surface with several micropores, and 3–4 short, simple setae in upper half; ventral surface with numerous small marginal setae; segment III short and rounded, equally developed as distomedial projection, with numerous short, robust spines on ventral surface, dorsal surface with row of short and robust setae on apex.

**Thorax:** Hind wing pads present; one short osmobranchia present at base of each forecoxa but sometimes inconspicuous; each claw with 40–45 denticles (Fig. 7b).

**Abdomen:** Posterior margin of tergum IV with small triangular spines subequal in length and simple, fine setae surpassing length of longest spines (Fig. 7c); paraproct with 4–6 sclerotized spines, several micropores and simple fine setae on dorsal surface, posterior margin with small triangular spines (Fig. 7d).

**Distribution:** Belize, Guatemala, Costa Rica and Panama (Lugo-Ortiz & McCafferty, 1995; Lugo-Ortiz & McCafferty, 1996; Wiersema & Baumgardner, 2000; De Jong & Canton, 2015).

**Material examined:** Paratypes, three mature nymphs (two males and one female): Guatemala, dept. Izabal, Small stream in río Cahabón, near Cahaboncito, 4.I.1989[PERC].

### ***Camelobaetidius shepardii* Randolph & McCafferty, 2001**

(Figures 8–11)

*Camelobaetidius shepardii* Randolph & McCafferty, 2001: 17; McCafferty *et al.* 2004: 207; Meyer *et al.* 2008: 136; McCafferty, 2011b: 324.

**Diagnosis. Mature nymph.** The following combination of characters can be used to diagnose *C. shepardii* from remaining species in the region: 1) labrum with anterior margin with about 17 small, double frayed setae; 8–9 setae on anterodorsal arc, about 15 anterolateral setae; intermediate setae present but often inconspicuous; several micropores near anterodorsal arc; three short setae near lateral margin; one minute seta on anterior margin on both sides of cleft (Fig. 9a); 2) segment II of labial palp with round (female) or truncate (male) distomedial projection (Figs. 10a, 10b); 3) osmobranchia absent from coxal bases; 4) each tarsal claw with 21–29 denticles (Fig. 11a); 5) posterior margin of abdominal tergum IV with triangular spines subequal in length (Fig. 11b); 6) paraproct with 2–3 spines (Fig. 11c).

**Description.** Mature nymph body length: 4.0–6.2 mm; caudal filaments length 1.5–2.3 mm.

**Body coloration:** dark and light olive and white pattern; pronotum and metanotum homogeneous dark olive; mesonotum with elongate, dark olive spots; abdomen with tergum I and anterior half of tergum II white, posterior half of tergum II and terga III–VII dark and light olive, tergum VIII and anterior half of tergum IX white; small, light olive spots on tergum VIII; posterior half of tergum IX and tergum X dark olive (Figs. 8A, 8B, 8C)

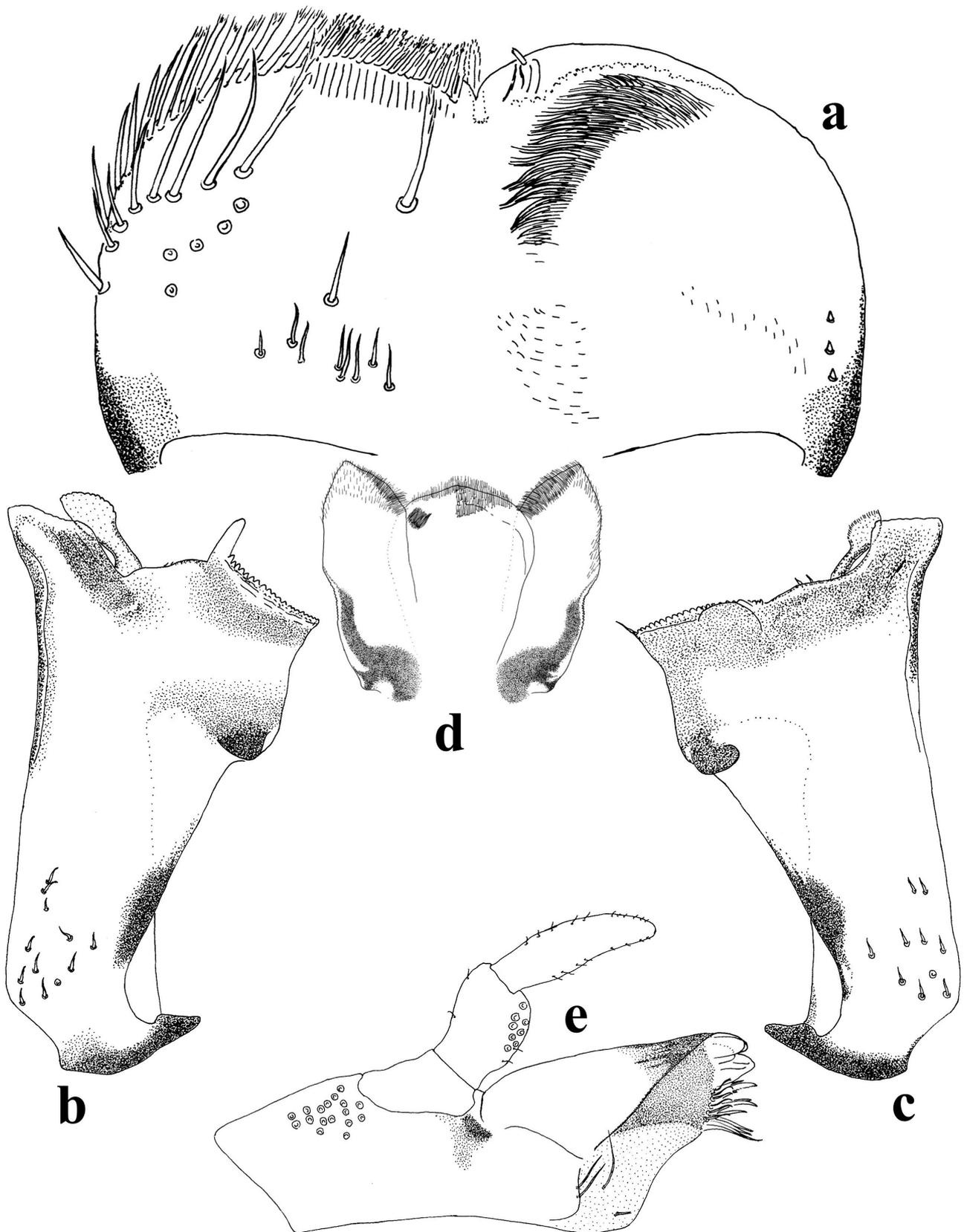
**Head:** Labrum (Fig. 9a): Broader than long; round, symmetrically emarginate at apex, arc of anterodorsal setae with 8–9 setae, two inner setae frayed, rest simple; intermediate seta present but sometimes inconspicuous; several micropores below anterodorsal arc; several small setae near posterior margin; anterior margin with about 17 small, double, frayed setae; lateral margin with 6 simple setae and 9 apically frayed, long setae; ventral surface with dense arc of short, fine setae near anterior margin; three short setae near lateral margin; one minute seta on anterior margin on both sides of cleft. Left mandible (Fig. 9b): incisors worn; prosthema well-developed; two minute setae between prosthema and mola; several small, simple setae on basal region. Right mandible (Fig. 9c): incisors worn; prosthema well-developed; two short, simple setae between prosthema and mola; molar disk well-developed; several small,

simple setae on basal region. Hypopharynx (Fig. 9d): lingua about 2x wider, but shorter than, superlinguae, apically pointed, hairy on dorsal and ventral surfaces in upper half; superlinguae with upper half hairy on dorsal and ventral surfaces and with serrate area at middle of lateral margin. Maxillae (Fig. 9e): robust, with several micropores on basal region; galea with four apical denticles and two apical rows of setae, some setae of one of these rows large and thick while others thin, and setae of other row shorter and curved; four setae on lacinia; palp not surpassing apical denticles, segment I short, segment II thick with few marginal fine setae and several micropores, segment III elongate with several marginal fine setae, longer than segment II. Labium (Figs. 10a, 10b): robust; glossae shorter than paraglossae, both dorsally with numerous elongate and curved setae; ventrally with several elongate and curved setae; palpi with segment I thick, as long as segments II + III, dorsal surface with numerous micropores; segment II with truncate (male, Fig. 9a) or round (female, Fig. 9b) distomedial projection, dorsal surface with numerous micropores, and 3–6 short, simple setae in upper half; ventral surface with numerous fine setae; segment III short and rounded, more developed than distomedial projection, with numerous short, robust spines on ventral surface, dorsal surface with row of short and robust setae on apex.

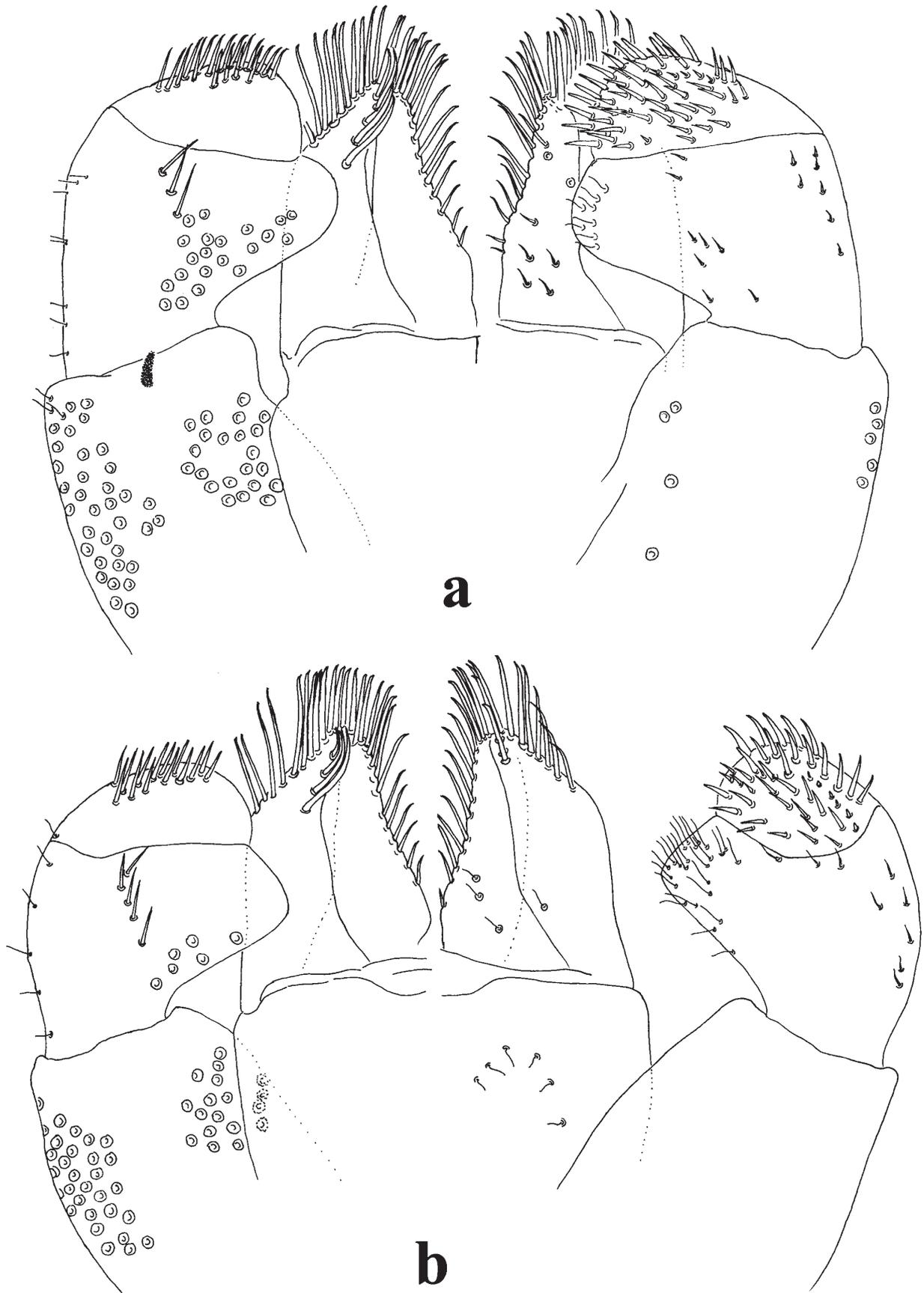
**Thorax:** Hind wing pads present; osmobranchia absent from coxal bases; each claw with 21–29 denticles (Fig. 11a).



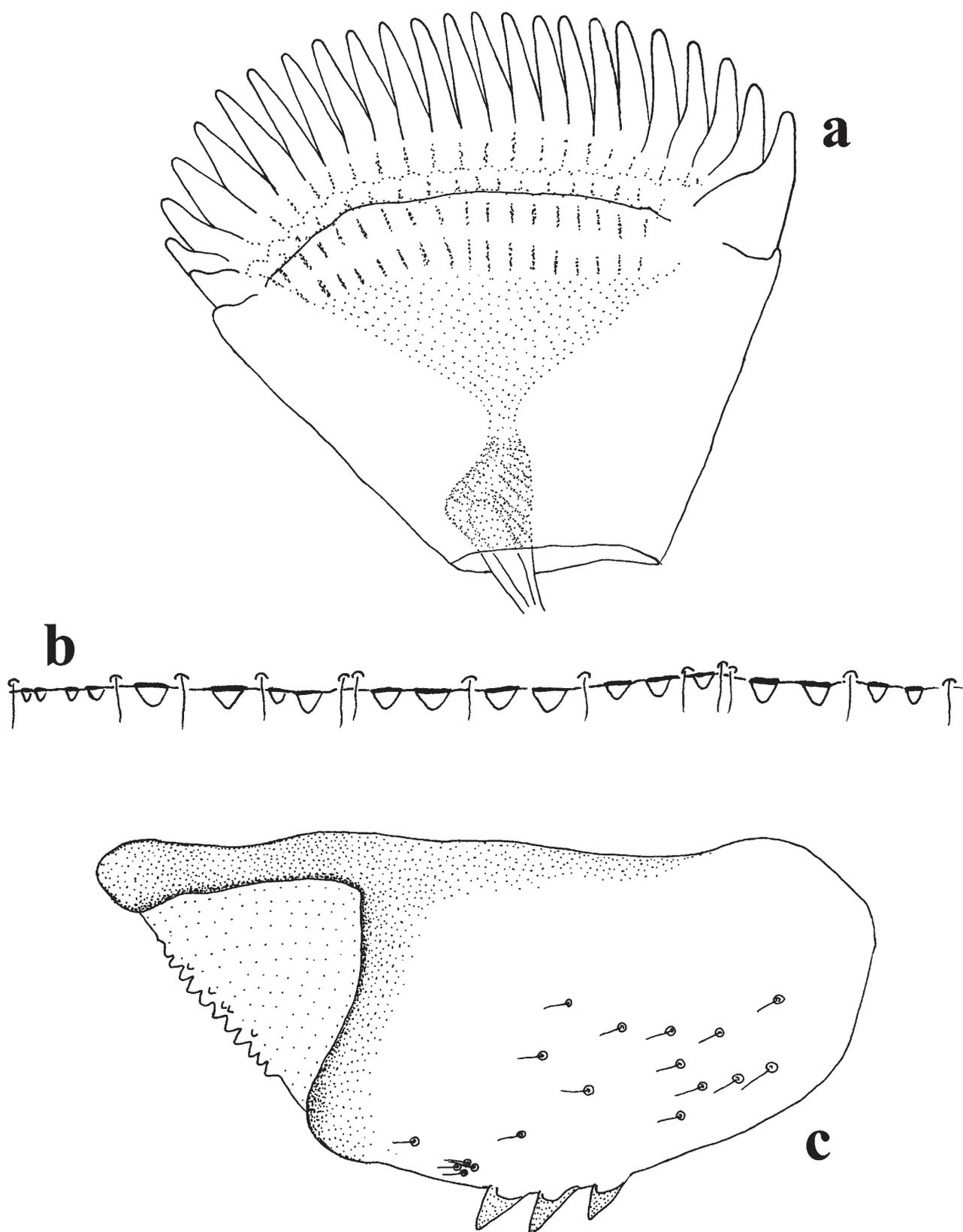
**FIGURE 8.** *Camelobaetidius shepardi* Randolph & McCafferty 2001, nymphs. Body coloration, A–B) males, C) female.



**FIGURE 9.** *Camelobaetidius shepardi* Randolph & McCafferty 2001, nymph. a) labrum (left d. v., right v. v.), b) left mandible, c) right mandible, d) hypopharynx (left d. v., right v. v.), e) maxilla.



**FIGURE 10.** *Camelobaetidius shepardi* Randolph & McCafferty 2001, nymph. labium (left d. v., right v. v.), a) female, b) male.



**FIGURE 11.** *Camelobaetidius shepardi* Randolph & McCafferty 2001, nymph. a) claws, b) IV tergum spines, c) paraproct.

**Abdomen:** Posterior margin of tergum IV with small, triangular spines subequal in length and simple, fine setae surpassing length of longest spines (Fig. 11b); paraproct with 2–3 sclerotized spines, and simple, fine setae on dorsal surface, posterior margin with small triangular spines (Fig. 11c).

**Distribution:** Mexico, Guatemala and Nicaragua (Randolph & McCafferty, 2001; McCafferty *et al.*, 2004; Meyer *et al.*, 2008).

**Material examined:** Paratypes, three mature nymphs (two males and one female): México, Queretaro, Neblinas, Río Ayutla, 13.VII.2000, W. D. Shepard [PERC] [There is no Ayutla River on Neblinas and on the list of the examined material Randolph & McCafferty (2001) wrote exactly the same data listed above, except for Río Verdito instead of Río Ayutla. Our conclusion, therefore, is that the name of the river on the paratypes label is not correct].

## Discussion

Among the species of *Camelobaetidius* from Central and North America, *C. maidu* is extremely similar to *C. warreni* (Traver & Edmunds, 1968), while *C. kondratieffi* is extremely similar to *C. musseri* (Traver & Edmunds, 1968). Until now, these species were distinguished from each other by a few overlapping characteristics, such as number of denticles on tarsal claws and body coloration, or by traits inaccurately or insufficiently described, such as labrum setation (Traver & Edmunds, 1968; Allen & Chao, 1978; Allen & Murvosh, 1987; Lugo-Ortiz & McCafferty, 1995; Dominique *et al.*, 2002; Jacobus & McCafferty, 2005), which is usually a relevant diagnostic character for species identification in South American *Camelobaetidius* and in other Baetidae genera such as *Baetodes* Needham and Murphy, 1924 and *Cloeodes* Traver, 1938 (Nieto, 2003; Nieto, 2004; Boldrini *et al.*, 2012; Massariol *et al.*, 2013).

The redescription of *C. maidu* presented here allows for a better discrimination from *C. warreni*, which are separated by: length of first outer incisor (longer than the other denticles in *C. maidu* (Figs. 1b, 1c), similar in size to the others in *C. warreni*); maxillary palp segment III (corrugated margin in *C. maidu* (Fig. 1e), smooth margin in *C. warreni*); and shape of labial palp segment II distomedial projection (rounded and directed towards third segment in *C. maidu* (Fig. 3a), rounded and not directed towards third segment in *C. warreni*). In the same way, *C. kondratieffi* and *C. musseri* may be differentiated by: setae below the anterodorsal arc of the labrum (absent in *C. kondratieffi* (Fig. 6a); several simple, short setae present in *C. musseri*); and shape of labial palp segment II distomedial projection (subrectangular in *C. kondratieffi* (Figs. 7a), truncated in *C. musseri*).

Also, the original descriptions of the four species treated here omit some structures that are very useful to correctly identify *Camelobaetidius* species. For instance, the intermediate setae of the labrum are mentioned as absent for the type material of *C. maidu* and *C. shepardii* (Jacobus & McCafferty, 2005; Randolph & McCafferty, 2001), and the osmobranchiae, according to Lugo-Ortiz & McCafferty (1995), are lacking in the type material of *C. kondratieffi*. Nevertheless, these structures were found in the paratype material when studied under the microscope, suggesting that these characters are inconspicuous and easily overlooked on some individuals, as has been found in other *Camelobaetidius* species (Boldrini *et al.*, 2013; Sibaja-Araya & Esquivel 2018). Additionally, Jacobus & McCafferty (2005) stated that there are spatulate setae near the posterior margin of the labrum of *C. maidu*; however, close examination of these setae on paratype material reveals that they are simple, short setae.

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