Scientific Note

Intraspecific variations and additional information about *Cheletomimus (Hemicheyletia) wellsi* (Baker, 1949) (Trombiformes: Cheyletidae) from Brazil

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Abstract. In this paper, we presented additional information to the description of *Cheletomimus (Hemicheyletia) wellsi* (Baker, 1949) (Cheyletidae) collected on *Vitis vinifera* L. (Vitaceae), *Ruellia angustiflora* (Ness) Lindau ex Rambo (Acanthaceae) from Dois Lajeados, Marques de Souza and Pantano Grande municipalities in Rio Grande do Sul state, and on *Malus domestica* Borkh (Rosaceae) in Campo do Tenente municipality, Paraná state, Brazil. The specimens examined presented intraspecific variations from those described previously. These variations will be discussed herein. A key to the known Brazilian species of the genus is provided.

Keywords: morphology, Cheyletinae, Trombiformes, taxonomy.

The family Cheyletidae Leach, 1815 (Trombiformes: Cheyletidae) includes over 440 species in 75 genera (Bochkov & Abromov 2016; Salarzehi et al. 2018). This family comprises species that are free-living predators, parasites of birds and mammals and some of them can be both (Bochkov & Fain 2001; Bochkov 2009; Walter et al. 2009). One of the most representative genera within Cheyletinae is *Cheletomimus*, which was erected by Oudemans (1904) who designated *Cheletes berlesei* Oudemans as type species (Baker 1949; Summers & Price 1970; Fain et al. 2002). This genus comprises 36 species that can be found on plants playing an important role in pest control (Fain et al. 2002). They are known from all the continents, except Antarctica, but mostly from the warmer climatic regions (Fain et al. 2002; Bochkov & Sidorchuk 2016).

Fain et al. (2002) reduced *Hemicheyletia* and *Philippicheylea* Coruzzi-Raros to a subgenus of *Cheletomimus*. Thus, the genus *Cheletomimus* now consists of three subgenera, namely *Philippicheylea*, *Hemicheyletia* and *Cheletomimus* s.str. These subgenera differ from each other by: hysterontom with a pair of lateral shields in *Cheletomimus* s.str.; hysterontom with a single shield in *Hemicheyletia*; and hysterontom without shield in *Philippicheylea*.

The genus *Cheletomimus* can be easily distinguished by the following characteristics: Palp: palpal tarsi with 4 setae and a short solenidia; 2 dorsal comb-like setae with numerous teeth and 2 sickle-like ventral setae; palpal claw with teeth in the basal part; palpal tibia with 3 setae, dorsal and outer ventral setae variable in shape from hair-like to serrate lanceolate, inner seta always fine, hair-like; peritremes arch-like. Dorsum: with eyes present; propodonotal shield present, granulated; hysterontonal shield present or lacking, variable in shape; all dorsal setae homeomorphic (fan-like or lanceolate) or median setae aberrant, staghorn-like, bulb-like, cloud-like, dendrite-like; number and shape of median setae variable. Genital: genital region with three aggenital, two genital and three pseudoanal setae respectively. Legs: tibia I with four or five setae; tarsus I with elongate solenidium.

Three *Cheletomimus* species are reported for Brazil: *C. (C.) duosetosus* (Muma, 1964) (Feres & Flechtmann 1995); *C. (H.) wellsi* (Baker, 1949) (Chiavegato 1980); and *C. (H.) gracilis* Fain, Bochkov & Corpuz-Raros, 2002 (Da Silva et al. 2013). Recently, *C. (H.) wellsi* has been found on *Vitis vinifera* L. (Vitaceae) (Johann et al. 2009; Da Silva et al. 2020), on *Malus domestica* Borkh (Rosaceae) (personal communication), in rubber trees (Hernandes & Feres 2006), in bird nests (Silva et al. 2018), in poultry systems (Horn et al. 2018), and in natural environments of the Southern Pampa Biome (Toldi et al. 2021). In this paper, we complement the description of *C. (H.) wellsi*, analyzing specimens collected in southern Brazil, presenting measurements of the structures that were not previously measured and described. We also reported intraspecific variation in the morphological characters of *C. (H.) wellsi*. Furthermore, a key to the Brazilian species of the genus is provided.

Three specimens were collected from *V. vinifera* in Dois Lajeados (28° 59’ 01” S, 51° 50’ 13” W) ‘Rainha Itália’ variety; one from *V. vinifera* in Marques de Souza (29° 19’ 39” S, 52° 05’ 33” W) ‘BRS Vitória’ variety; the other was collected in Campo do Tenente (25° 56’ 37.0” S, 49° 42’ 50.0” W), Paraná state. Individuals were collected between 2017-2019. Specimens were slide-mounted in Hoyer’s medium (Jeppson et al. 1975). Photographs and measurements were studied using a phase contrast microscope (Microscope Zeiss Imager Z2 phase). The drawings were prepared using a camera lucida. All measurement units were made with Zeiss Zen and are given in micrometers (μm). Drawings were edited using Corel Draw X3. Morphological terminology and generic classification follow Gerson et al. (1999) and Fain et al. (2002). Idiosomal setation follows Grandjean (1939) as adapted by Klethev (1990) for Prostigmata and then adapted for Cheyletidae by Skvarla et al. 2014. The nomenclature for leg setae follows Grandjean (1944). All females were deposited at Museu de Ciências (ZAUUCN), Universidade Vale do Taquari - Univates, Lajeado, Rio Grande do Sul state, Brazil.

The diagnosis of the examined species is as follows: Female (n=6) (Fig. 1): Dorsum (Fig. 1A) 304 (302-350) length (without gnathosoma) and 279 (259-290) width. Propodonotal shield 128 (112-130) length and 193 (163-193) width, measured at the level of setae scI; hysterontonal
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Gnathosoma 151 (129-165) long. Peritreme form an inverted U with six pairs of links, the first link is curving outward. Paltarsus with two comb-like tibiae, outer comb. with 15 in length and 18 (46-54) long, inner comb. with 18 in 22 and 25 (25-32) long, two smooth sickle-shape setae and one small solenidia. Paltibia claw with 6-7 teeth, with one thick serrated seta dorsally and one outer ventral setae serrated; paltibia may present an inner lobe or not (Fig. 1E, F). Palpemur has two fan-like setae dorsally, two smooth setae ventrally on a shield-like area. Palpemur shield is striated and granulated. Gnathosoma with three pairs of ventral setaceous setae (n, r21 and r22). Legs. Leg I with claws smaller than those of other legs; empodium is present in all legs (Fig. 1A); all legs have setaceous, barbed and fan-like setae; all tarsi with setae tc’, tc”, d1’, a1’, p1’ and p”. Setal formulae of legs I-V (Tarsus - Coxas): Tarsi: 7(1) - 7(1) - 7 - 7; Tibiae: 4(1) - 4(1) - 4; Genua: 2(1) - 2 - 2 - 2, Femora: 2 - 2 - 2 - 2; Trochanters: 1 - 1 - 1 - 1; Coxae: 2 - 1 - 2 - 2. Leg I: 2-1 (211-250) long, u1 20 (15-22), u2 5 (3-6), u3 3 (2-3); Leg II: 166 (162-175), u1 15 (14-17); Leg III: 180 (169-200); Leg IV: 182 (176-204). An important topic to be discussed is the difference between C. (H.) wellsia and C. (H.) wellsina. Following the original description provided by Baker (1949), C. (H.) wellsia have a narrow and slightly serrated setae on palpitalia; on the other hand, C. (H.) wellsina as redescribed by Fain et al. (2002) have the palpitalia setae smooth. The main difference to distinguish these two species in Fain et al. (2002) is the shape of the outer ventral palpitalpia setae, and due to this contradiction in Baker (1949) and Fain et al. (2002) makes the identification very confusing. Another confusing topic is the number of dorsomedical setae. Baker (1949) and Fain et al. (2002) observed that the number of dorsomedical setae is variable and cannot be used to differentiate species. In C. (H.) wellsia description, the number of dorsomedical setae on the propodonotal shield can vary from one to five pairs. In Baker’s additional material, namely, the two specimens from Puerto Rico, one of them has one pair of setae and the second has two pairs, while in two specimens from Mexico, one has three pairs and the other one has four pairs of setae. In the original description of C. (H.) wellsi, it is mentioned that the propodonotal shield has two to three pairs of dorsomedical setae, this is also mentioned in Fain et al. (2002). In all six specimens analyzed here, the palpitalia has three setae, a ventral smooth setae, an outer ventral and a dorsal setae serrated; also all presented four pairs of dorsomedical aberrant setae on the propodonotal shield. Thus, it is difficult to determine if the analyzed species are C. (H.) wellsia or C. (H.) wellsina. First, because there are no records of C. (H.) wellsia with four pairs of dorsal median setae on the propodonotal shield (only one to three) and two pairs of median setae on the hysteronotal shield (only one), and secondly, because in Fain et al. (2002) they describe the ventral palpitalpia setae as smooth, while in Baker (1949) as serrated. It seems as if the latter two observations may contradict each other and thus need further investigation if the shape of the ventral setae is strong enough to separate these two species. In our examined material, the palpitical claw bears 6-7 teeth, outer comb. with 15 to 18 teeth and 52 (46-54) long, inner comb. with 18 to 22 teeth and 25 (25-32) long while in Baker (1949), the palpitical claw can have up to eight teeth, outer comb with 15 and inner 20 teeth, respectively. The ventral palpitalpia seta in our individuals is thick and smooth, the outer ventral and dorsal setae are serrated; in Baker (1949) it is described the same shape for the palpitalpia setae. All specimens with four pairs of dorsomedical setae on the propodonotal shield and the hysteronotal shield have two pairs of median setae; on the other hand, the propodonotal shield may have up to five pairs of dorsomedical setae (can vary from one to five) in Baker (1949). Pseudoanodal setae are simple, smooth to slightly serrated and the same is given in the original description. Dorsal body with 350 long and solenidium 22, and in Baker (1949) is 363. Later, Summers & Price (1970) described the length of dorsal body 407, and the pattern of the microtubercles on the propodonotal shield as preponderantly of one size with a few microtubercles in the central area becoming elongated and forming several whorls of “dotted” striae, more transverse than longitudinal, but in our examined material the specimens were presented with more longitudinal pattern than transverse.
Figure 1. Cheletomimus (Hemicheyletia) wellsi (Baker, 1949) (Trombiformes: Cheyletidae) from Brazil: (A) Female dorsal view of idiosoma, gnathosoma and legs; (B) Ventral view of idiosoma and capitulum; (C) Propodonotal shield with median transverse serpentines; (D) Propodonotal shield with median longitudinal small dots; (E) Palptarsus with a basal lobe; (F) Palptarsus without lobe.
Authors’ contributions

GLB and GLS contributed with analysis, researches, drawings, identifications, photos and writing processes; LJ contributed with revisions and gave support with working tools; RTLs, EAU and NJF contributed with major revisions.

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