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DEPARTAMENTO DE ZOOTECNIA E CIÊNCIAS BIOLÓGICAS
CURSO DE CIÊNCIAS BIOLÓGICAS – LICENCIATURA PLENA**

Carolina Rangel

**PRIMEIRA ESPÉCIE INSULAR DE *HYALELLA* (AMPHIPODA, HYALELLIDAE),
FLORIANÓPOLIS, ESTADO DE SANTA CATARINA, BRASIL**

Palmeira das Missões, RS

Agosto de 2021

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Trabalho de Conclusão de Curso, apresentado ao curso de Ciências Biológicas - Licenciatura Plena, da Universidade Federal de Santa Maria *campus* Palmeira das Missões, em preparação para submissão à revista Zootaxa, como requisito parcial para obtenção de título de **Graduada em Ciências Biológicas – Licenciatura**

Orientadora: Profa. Dra. Daniela da Silva Castiglioni

Coorientador: Ms. Márcio Limberger

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Ministério da Educação
Universidade Federal de Santa Maria
UFSM - CAMPUS DE PALMEIRA DAS MISSÕES
Curso de Ciências Biológicas

ATA DA COMISSÃO EXAMINADORA DE TRABALHO DE CONCLUSÃO DE CURSO EM CIÊNCIAS BIOLÓGICAS APRESENTADA E DEFENDIDA POR CAROLINA RANGEL

Aos dezesseis dias do mês de agosto do ano de dois mil e vinte e um, às nove horas, por meio de ambiente online, realizou-se a Defesa de Trabalho de Conclusão de Curso intitulado “Primeira espécie insular de *Hyaella* (Amphipoda, Hyaellidae), Florianópolis, Estado de Santa Catarina, Brasil” do discente Carolina Rangel do Curso de Ciências Biológicas/Licenciatura Plena da Universidade Federal de Santa Maria, Campus de Palmeira das Missões, matrícula 201620674.

A Comissão Examinadora foi organizada obedecendo ao disposto no Regulamento do Projeto Pedagógico de Curso de Ciências Biológicas, sendo constituída pelos membros: Daniela da Silva Castiglioni (orientador e presidente da banca), Sandro Santos (Examinador Interno) e Giovanna Monticelli Cardoso (Examinador externo, Universidade Federal de Lavras).

Após o candidato apresentar seu Trabalho de Conclusão de Curso, tendo obedecido o tempo estipulado no Projeto Pedagógico de Curso de Ciências Biológicas, foi dada a palavra aos examinadores para arguição na seguinte ordem: Giovanna, Sandro e Daniela, tendo o candidato respondido às perguntas formuladas satisfatoriamente. A seguir, a Comissão Examinadora reuniu-se para proceder ao julgamento, sendo atribuída a nota 9,75. Assim sendo, a Comissão Examinadora considerou o candidato APROVADO, com nota final 9,75. Nada mais havendo a tratar, o Presidente da Comissão deu por encerrados os trabalhos e foi lavrada a presente Ata, que vai devidamente assinada pelos membros da banca.

Palmeira das Missões, 16 de agosto de 2021

Giovanna Monticelli Cardoso

Daniela Castiglioni

RESUMO

PRIMEIRA ESPÉCIE INSULAR DE *HYALELLA* (AMPHIPODA, HYALELLIDAE), FLORIANÓPOLIS, ESTADO DE SANTA CATARINA, BRASIL

AUTORA: Carolina Rangel

ORIENTADORA: Profa. Dra. Daniela da Silva Castiglioni

COORIENTADOR: Ms. Márcio Limberger

O gênero *Hyaella* compreende um grupo de crustáceos anfípodos de água doce endêmico das Américas. No Brasil, a maior diversidade de espécies conhecidas até o momento está concentrada no estado do Rio Grande do Sul, mas recentemente novas descobertas foram feitas no estado vizinho, em Santa Catarina. O presente trabalho descreve a primeira espécie de ilha do gênero *Hyaella* ocorrente no Brasil e a quinta ocorrente no estado de Santa Catarina. A espécie foi encontrada em trechos de duas micro-bacias localizadas no Monumento Natural Municipal da Lagoa do Peri, uma importante área de proteção ambiental localizada na ilha de Florianópolis, sul do Brasil. *Hyaella* sp. n. apresenta as seguintes características: gnatópodo 1 com 7 setas serradas na face interna do própodo, gnatópodo 2 com própodo oval, pedúnculo do urópodo 3 com 10 setas cuspidadas, télson retangular e mais largo que longo, com 6 setas cuspidadas e 2 setas plumosas em cada lateral. *Hyaella* sp. n. difere das outras espécies ocorrentes em Santa Catarina, *H. catarinensis*, *H. rioantensis*, *H. sambaqui* e *H. lagoana*, principalmente quanto ao tamanho do corpo, número e formato de setas dos gnatópodos, urópodos e télson. Foi realizada uma comparação também com as espécies dos estados vizinhos, Rio Grande do Sul e Paraná. A descrição de *Hyaella* sp. n. no presente estudo contribui para ampliar o conhecimento da diversidade do gênero *Hyaella* no estado de Santa Catarina, até então pouco conhecida.

Palavras-chave: Dulcícola. Peracarida. Taxonomia.

First island species of *Hyaella* (Amphipoda, Hyaellidae) from Florianópolis, state of Santa Catarina, Brazil

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Abstract

The *Hyaella* comprises a group of freshwater amphipods endemic to the Americas. In Brazil, the greatest diversity of species known so far is concentrated in the state of Rio Grande do Sul, but recently discoveries were made in the neighboring state of Santa Catarina. The present work describes the first island species of the genus *Hyaella* in Brazil and the fifth with occurrence in the state of Santa Catarina. The species was found in streams of two watersheds, located at the Monumento Nacional Municipal da Lagoa do Peri, an important environmental protection area on the island of Florianópolis, Southern Brazil. *Hyaella* sp. n. shows the following characters: inner face of propodus of gnathopod 1 with 7 serrate setae, gnathopod 2 with propodus ovate, peduncle of uropod 3 with 10 cuspidate setae, telson rectangular, wider than long, with 6 cuspidate setae and 2 plumose setae laterally close to each distal seta. *Hyaella* sp. n. differs from the other species with occurrence in Santa Catarina, *H. catarinensis*, *H. rioantensis*, *H. sambaqui* and *H. lagoana*, mostly concerning to the body size, number and shape of setae of the gnathopods, uropods and telson. A comparison was also made with species from the neighboring states, Rio Grande do Sul and Paraná. The description of *Hyaella* sp. n. in the present study contributes to increasing the knowledge of the *Hyaella* diversity in the state of Santa Catarina, little known so far.

Keywords: *Freshwater, Peracarida, taxonomy.*

Introduction

The Subphylum Crustacea is included in the Phylum Arthropoda and is a group with high ecological and evolutionary success in nature and a large abundance of representatives, which gives them a great diversity of habits and body forms (Martin & Davis 2001). Among the different classes that compose Crustacea, the most representative is the Class Malacostraca, which includes crabs, shrimp, lobsters and other abundant and known crustaceans that are divided into different

superorders, being the two main ones: Peracarida and Eucarida (Buckup & Bond-Buckup 1999; Martin & Davis 2001). The Superorder Peracarida includes two successful orders, Amphipoda and Isopoda.

Amphipods are characterized by having a high occurrence around the world, and despite the diversity of the group being mostly marine, at least 20% of amphipods live in freshwater ecosystems, inhabiting surface and underground waters (Väinölä *et al.* 2008). The Order Amphipoda includes six Suborders: Pseudogolfiellidea, Hyperiidea, Colomastigidea, Hyperioptidea, Amphilochidea and Senticaudata, in this last one is inserted the superfamily Talitroidea and the family Hyalellidae (Lowry & Myers 2017). The family Hyalellidae has exclusively freshwater species and is represented only by a single genus, *Hyalella* Smith, 1874, which occurs in Brazil (Bueno *et al.* 2014).

Hyalella composes a group of freshwater amphipods endemic of the Americas (Baldinger 2004; Bueno *et al.* 2014), with 84 species formally described at the moment (Bueno *et al.* 2014; Streck *et al.* 2017; Bueno *et al.* 2019; Peralta & Miranda 2019; Drumm & Knight-Gray 2019; Streck-Marx & Castiglioni 2020; Reis *et al.* 2020; Rogers *et al.* 2020; Marrón-Becerra *et al.* 2020; Talhaferro *et al.* 2021; Limberger *et al.* 2021). In Neotropical region, 71 species have been registered (about 82% of the genus diversity) (Peralta & Miranda 2019, Rogers *et al.* 2020; Reis *et al.* 2020; Talhaferro *et al.* 2021; Limberger *et al.* 2021), of which 34 were found in Brazil, the country with the largest number of species described at the moment (Bueno *et al.* 2014; Cardoso *et al.*, 2014; Streck *et al.* 2017; Bastos-Pereira *et al.* 2018; Bueno *et al.* 2019; Streck-Marx & Castiglioni 2020; Reis *et al.* 2020; Talhaferro *et al.* 2021; Limberger *et al.* 2021).

In Brazil, the species were described only for the South and Southeast regions, with the majority corresponding to the state of Rio Grande do Sul, with 15 species described so far: *H. curvispina* Shoemaker, 1942; *H. montenegrinae* Bond-Buckup & Araujo, 1998; *H. pseudoazteca* González & Watling, 2003; *H. pleoacuta* González, Bond-Buckup & Araujo, 2006; *H. castroi* González, Bond-Buckup & Araujo, 2006; *H. bonariensis* Bond-Buckup, Araujo & Santos, 2008; *H. pampeana* Cavalieri, 1968; *H. imbya* Rodrigues & Bueno, 2012; *H. kaingang* Bueno & Araujo, 2013; *H. georginae* Streck & Castiglioni 2017; *H. gauchensis* Streck & Castiglioni, 2017; *H. lagoana* Talhaferro & Bueno, 2021; *H. minuana* Talhaferro & Bueno, 2021, *H. palmeirensis* Streck-Marx & Castiglioni, 2020 and *H. longipropodus* Limberger, Graichen & Castiglioni, 2021 (González *et al.* 2006; Cardoso *et al.* 2011; Bueno *et al.* 2013; Cardoso *et al.* 2014; Rodrigues *et al.* 2014; Streck *et al.* 2017; Streck-Marx & Castiglioni 2020; Talhaferro *et al.* 2021; Limberger *et al.* 2021).

Beyond the state of Rio Grande do Sul, *Hyalella* species have also been recorded in the states of Paraná (2 species: *H. brasiliensis* Bousfield, 1996; *H. formosa* Cardoso & Araujo, 2014),

Rio de Janeiro (2 species: *H. gracilicornis* Faxon, 1876 and *H. longistila* Faxon, 1876), São Paulo (3 species: *H. caeca* Pereira, 1989; *H. dielaii* Pereira, 2004; *H. meinerti* Stebbing, 1899), Minas Gerais (6 species: *H. gracilicornis* and *H. longistila*; *H. warmingi* Stebbing, 1899; *H. carstica* Bastos-Pereira & Bueno, 2012; *H. minensis* Bastos-Pereira & Bueno, 2013; *H. xakriaba* Bueno & Araujo, 2013) and recently, the first species of Santa Catarina state were described, *H. catarinensis* Reis & Bueno, 2020, *H. rioantensis* Penoni & Bueno (Reis *et al.* 2020) and *H. sambaqui* Talhaferro & Bueno, 2021 (Talhaferro *et al.* 2021). In his work, Talhaferro *et al.* (2021) also described two other new species for the state of Rio Grande do Sul, one of them with occurrence in Santa Catarina state: *H. lagoana* Talhaferro & Bueno, 2021.

The species of *Hyaella* live in different freshwater environments, commonly associated with the marginal aquatic vegetation, swimming in the water column, or confined in the sediment (Grosso & Peralta 1999; Bueno *et al.* 2014). Their diet consists mainly of algae, associated bacteria and plant material, which configures the genus habits as herbivory and detritivore (Cooper 1965; Hargrave 1970; Pilgrim & Burt 1993). Thus, hyalellid amphipods have a fundamental role in the trophic chains of freshwater ecosystems, as they serve as food for many other animals (fish, birds and invertebrates), enabling the transfer of energy from primary producers to higher-level consumers (Dudgeon *et al.* 2006; Wellborn & Cothran 2007; Bueno *et al.* 2014).

Furthermore, *Hyaella* species have a significant biological value because they are animals with high sensitivity to environmental disturbances, acting as bioindicators of water quality (Neuparth *et al.* 2002; Ding *et al.* 2011). Thus, these crustaceans are being used in ecotoxicological studies, due to their wide coverage in freshwater ecosystems and easy adaptation to cultivation and laboratory experiments (Neuparth *et al.* 2002).

The populations of *Hyaella* are generally characterized by being small, isolated and endemic. Due to the absence of a dispersal life stage (a consequence of the direct development), it is difficult for these crustaceans to expand to other locations, which causes geographical isolation of populations and makes them even more susceptible to extinction by anthropogenic factors (Bueno *et al.* 2014; Rodrigues 2016).

Considering that freshwater environments are the most threatened ecosystems in the world and that the knowledge of invertebrates' diversity does not contemplate the real dimension of the current existing richness of species (Rodrigues 2016), scientific studies that range from the biotope to the biodiversity of these environments are fundamental as a subsidy for their conservation. Each species has an essential and irreplaceable role in maintaining the environment in which it lives and can influence the existence of other species. Thus, taxonomic studies allied to ecology, genetics and other areas, comprise a small, but important step towards biodiversity conservation.

In Brazil, recent taxonomic research regarding the description of new species of the genus demonstrates that the diversity of *Hyaella* and the knowledge on the real distribution of the species already described is probably underestimated (Cardoso *et al.* 2011; Bastos-Pereira & Bueno 2012; Rodrigues *et al.* 2012; Bueno *et al.* 2014; Cardoso *et al.* 2014; Rodrigues *et al.* 2014; Streck-Marx & Castiglioni 2020; Reis *et al.* 2020; Talhaferro *et al.* 2021; Limberger *et al.* 2021). Possibly, many species of the genus have not yet been discovered due to the lack of taxonomic studies in the different regions. In addition, the accelerated degradation of freshwater environments caused by anthropic factors complicates the research on this group of crustaceans.

Thus, the present study describes a new species of *Hyaella*, the first insular species of the genus in Brazil, recorded in the Monumento Natural Municipal da Lagoa do Peri, municipality of Florianópolis, in the Santa Catarina Island, state of Santa Catarina. This species is the fifth species described for the state of Santa Catarina.

Material and Methods

This study was performed in two small watersheds located within a legally protected area, at the Monumento Natural Municipal da Lagoa do Peri (MNMLP) (27°43'30"S-48°32'18"W) (Figure 1), located at the Florianópolis municipality, in the Santa Catarina Island, state of Santa Catarina, Southern Brazil. The island is about 18 km wide (east-west) and 54 km long (north-south), with a total area of 424 km², with a minimum distance of at least 500 m from the continent (Siegloch *et al.* 2018). The Monumento Natural Municipal da Lagoa do Peri is considered one of the most important areas of environmental protection on the Santa Catarina Island, which comprises one of the last remnants of Atlantic Forest (Dense Ombrophilous Submontane Forest) in the region, consisting of a Conservation Unit (UC), a Biological Reserve Area, Cultural Landscape Area and Leisure (Sbroglia & Beltrame 2012).

The area comprises two different watersheds (Figure 1), two kilometers apart: (1) The Cachoeira Grande watershed is located in the Western portion of the Monumento Natural Municipal da Lagoa do Peri, is composed of first, second and third order streams, that drains an area of 1.66 km². In this portion, the Atlantic Rainforest is at an advanced stage of regeneration (Caruso 1983), with a thick canopy cover of 73–88%; by contrast, (2) The Ribeirão Grande watershed is located in the Southern portion of the conservation unit, being composed of first, second and third order streams. The vegetation is in an intermediate stage of conservation because of anthropogenic impact, e.g., deforestation watershed. The streams have riparian vegetation composed of secondary forest and introduced species; thus, the tree cover shows a sparse canopy, and the streams receive greater solar insolation. The surrounding area is characterized by traditional families who explore the preserved area by developing subsistence agriculture (Schmitt *et al.* 2019).

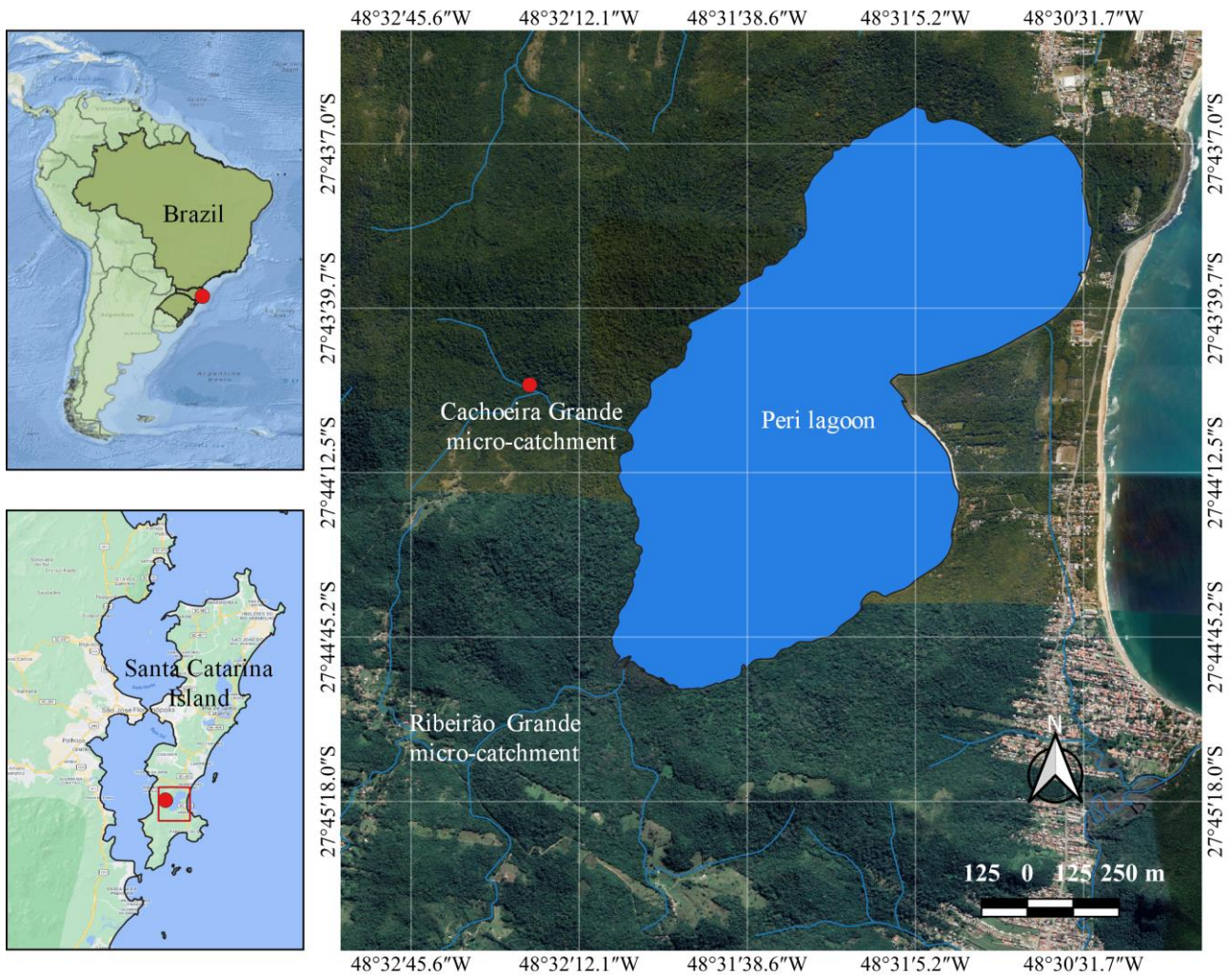


FIGURE 1. Map showing the area that include the Santa Catarina Island, state of Santa Catarina, Brazil; and the watersheds of the Cachoeira Grande (West portion) and Ribeirão Grande (South portion) in the Monumento Natural Municipal da Lagoa do Peri, sampling sites of the *Hyaella* sp. n. Adapted of Sticca (2013).

The specimens of the *Hyaella* were sampled with other aquatic invertebrates in an ecological study carried out in the two watersheds located at the Monumento Natural Municipal da Lagoa do Peri, in 2010 and 2011. The samples were collected using a Surber sampler (area of 0.0361 m² and mesh of 250 μ m) in different substrates (leaves and stones) inside pool and riffle systems on the Cachoeira Grande and Ribeirão Grande watersheds. The samples were washed under water in the laboratory using 0.25 mm mesh sieves, and all invertebrates retained in the mesh were sorted, counted and preserved in 70% alcohol.

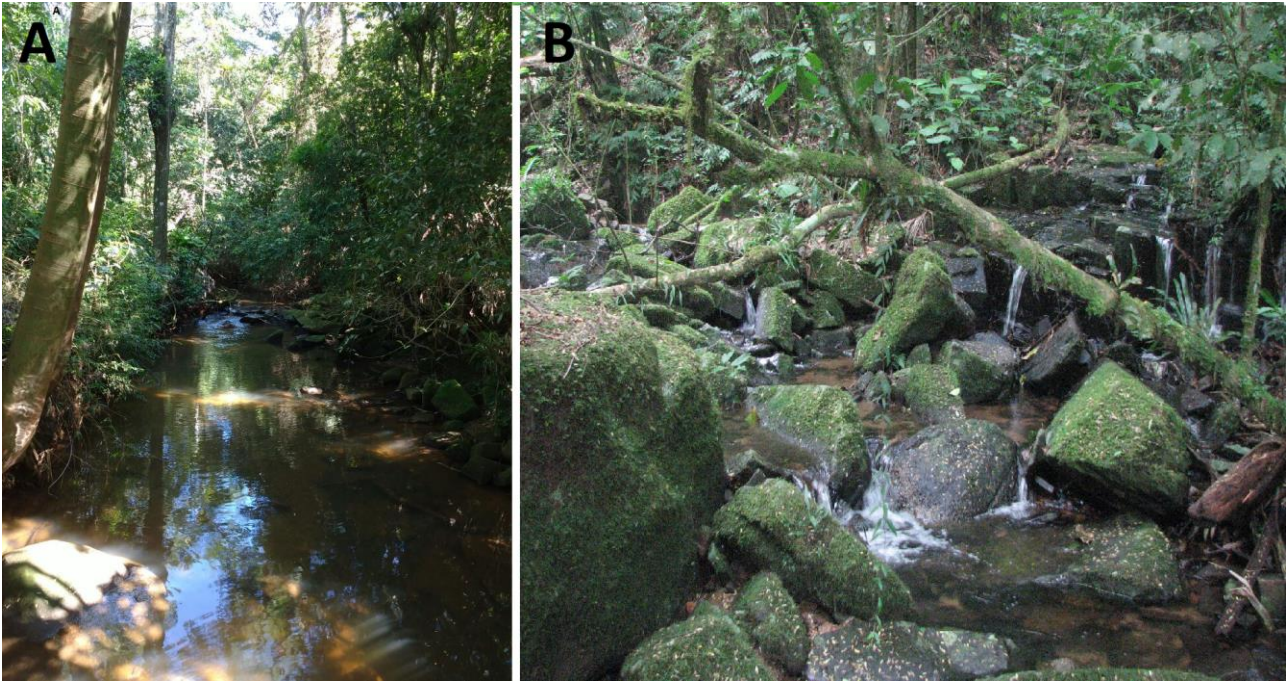


FIGURE 2. Overview (A) and local (B) at the stream where was sampled of holotype of *Hyaella* sp. n. at a second-order stream at the Cachoeira Grande watershed, Monumento Natural Municipal da Lagoa do Peri, municipality of Florianópolis, state of Santa Catarina, Brazil.

The total length (TL) and the cephalothorax length (CL) of 12 adult individuals (6 females and 6 males) were measured with the aid of a stereomicroscope. The total length was measured from the limit of the cephalothorax to the base of the telson, which has a high variation between the different species of *Hyaella* already describe. Subsequently, the specimens were preserved in 70% alcohol and colored with the Bengal Rose, for subsequent dissection. Thus, the specimens were dissected and the appendages were mounted on semi-permanent slides, which were used for the illustrations and for the description of the species. The illustrations were produced directly on digitized images of the semi-permanent slides, using the Adobe Photoshop CS6 portable program.

For the identification of the morphological characteristics, the same pattern as the previous descriptions of the *Hyaella* in Brazil was used, and in this way, the following characteristics were analyzed: number, shape and arrangement of the setae of buccal appendages, antennae, gnathopods, pereopods, uropods and telson (González & Watling 2003a b; González *et al.* 2006; Rodrigues *et al.* 2012; Bastos-Pereira & Bueno 2013; Bueno *et al.* 2013; Rodrigues *et al.* 2014; Streck *et al.* 2017; Streck-Marx & Castiglioni 2020; Reis *et al.* 2020; Talhaferro *et al.* 2021). The terminology used follows Zimmer *et al.* (2009). The type material is deposited at the Universidade Federal de Santa Maria (UFSM), *Campus* de Palmeira das Missões and at the Museu Nacional do Rio de Janeiro (MNRJ).

Results

Taxonomy

Order Amphipoda Latreille, 1816

Suborder Senticaudata Lowry & Myers, 2013

Family Hyalellidae Bulycheva, 1957

Genus *Hyalella* S. I. Smith, 1874

***Hyalella* sp. n. Rangel & Castiglioni**

(Figures 3 - 8)

Type material: MNRJ 30138 - **Holotype male**. Body length = 5.87 mm, head length = 0.62 mm, Cachoeira Grande, Monumento Natural Municipal da Lagoa do Peri, municipality of Florianópolis, Santa Catarina Island, state of Santa Catarina, Brazil (48°32'22"W 27°43'55.00"S), 27 August 2010, Lisboa, Lemos & Siegloch cols. MNRJ 30139 - **Allotype female**. Body length = 4.26 mm, head length = 0.45 mm, with the same place and data as holotype. MNRJ 30140 - **Paratypes** (3 males and 3 females), with the same place and data as holotype. Measurements from paratypes: males – mean body length 5.33 ± 0.599 mm, mean head length 0.56 ± 0.06 mm; females – mean body length 4.86 ± 0.76 mm, mean head length 0.51 ± 0.08 mm. UFSM 100 – Site 1 - **Paratypes**: 7 males and 13 females (being two ovigerous females wholes; 5 males and 2 females in slides), with the same place and data as holotype.

Other material: UFSM 101 – Ribeirão Grande, Sertão do Peri, Monumento Natural Municipal da Lagoa do Peri, municipality of Florianópolis, Santa Catarina Island, state of Santa Catarina, Brazil (48°32'03"W 27°44'08"S), 28 May 2010, Coelho & Siegloch cols., 2 males and 4 females.

Type locality. Brazil, state of Santa Catarina, municipality of Florianópolis, Santa Catarina Island, locality of Monumento Natural Municipal da Lagoa do Peri, Cachoeira Grande stream (48°32'22"W 27°43'55.00"S), 27 August 2010.

Diagnosis. Body surface smooth. Epimeral plates not acuminate. Eyes pigmented. Antenna 1 shorter than antenna 2. Mandible incisor toothed. Maxilla 1 palp short, longer than wider, reaching less than half length the distance between base of palp and tip of setae on outer plate; inner plate slender, with two papposerrate apical setae; outer plate with nine serrate setae apically. Maxilla 2 inner margin of inner plate with two papposerrate setae, being one longer. Propodus of gnathopod 1 hammer-shaped, inner face with seven serrate setae, denticles as comb scales on disto-anterior and disto-posterior margins, posterior lobe of carpus with pectinate border.

Gnathopod 2 propodus ovate, elongated, irregular palm, disto-posterior margin of denticles as comb-scales, posterior lobe of carpus with pectinate border. Uropod 1 male inner ramus with curved setae. Uropod 3 peduncle with ten cuspidate setae with accessory setae, ramus with eight simple setae and one cuspidate seta. Telson apically rounded, with six cuspidate setae with accessory setae. Sternal gills on segments 2 to 7.

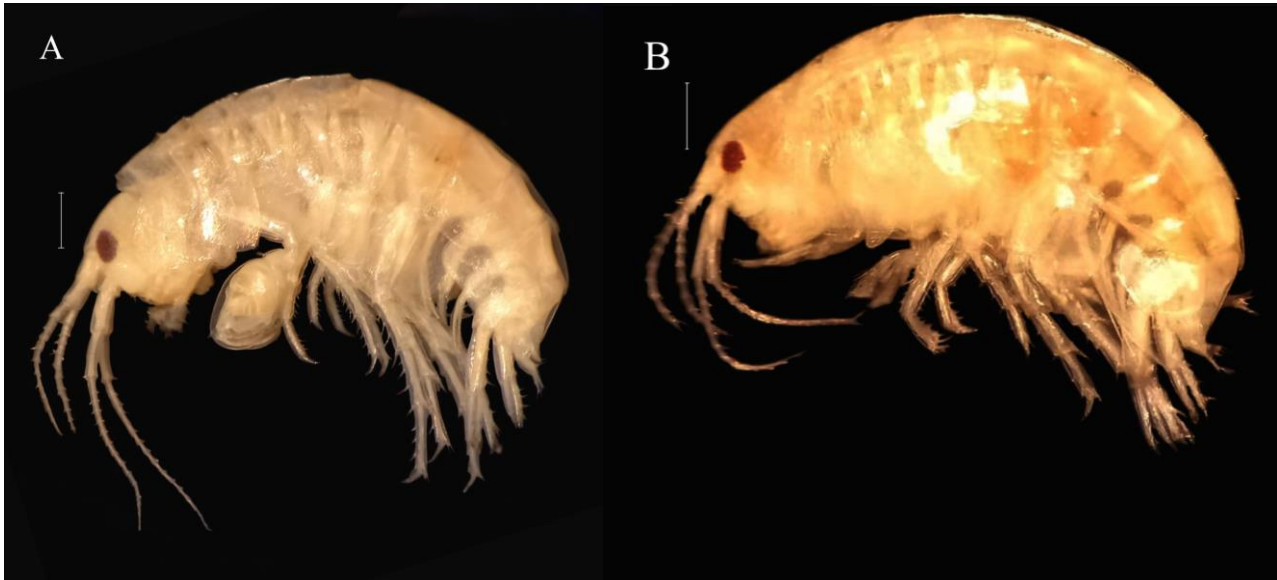


FIGURE 3. *Hyalella* sp. n. Rangel & Castiglioni. Holotype male (A) and Paratype female (B). Scale bars: A= 0.62 mm of CL; B= 0.49 mm of CL.

Description of males paratypes (Figure 3A). Mean body length: 5.87 ± 0.74 (N = 10), minimum body length = 4.70 mm, maximum body length = 6.81 mm; mean head length: $0.62 \text{ mm} \pm 0.09 \text{ mm}$ (N = 10), minimum head length = 0.50 mm, maximum head length = 0.72 mm. Body surface smooth. Epimeral plates not acuminate. Head smaller than first two thoracic segments. Eyes round and pigmented.

Antenna 1 less than half of body length, shorter than antenna 2, longer than peduncle of antenna 2, peduncle shorter than head; flagellum with 11-12 articles, longer than peduncle, basal article not elongated; aesthetascs on flagellum on articles 5 (2), 6 (2), 7 (2), 8 (2) and 9 (2) distally (Fig. 4B).

Antenna 2 less than half of body length; peduncle with similar size of the head; flagellum with 14 to 15 articles (Fig. 4C)

Basic amphipodan mandible (in the sense of Watling 1993) without palp; incisor toothed; left *lacinia mobilis* with five teeth, setae row with three pappose setae, molar process large, cylindrical, with large accessory setae; right mandible with three pappose setae (one shorter), molar large, cylindrical, triturative with accessory seta (Fig. 4D).

Upper-lip margin rounded, distal margin covered by several short setules on ventral and dorsal faces (Fig. 4E).

Lower-lip lobes rounded without notches or excavations, with several small setules on dorsal and ventral faces (Fig. 4F).

Maxilla 1 palp uniarticulate, longer than wider, short, reaching less than half length the distance between base of palp and tip of setae on outer plate, inner plate slender, smaller than outer plate, with two papposerrate apical setae and margin with several simple setae; outer plate with nine serrate setae (4G).

Maxilla 2 inner plate wider than outer plate and with two papposerrate setae, 10 pappose setae and several simple setae apically and several setules distally; outer plate apex with abundant long simple seta (Fig. 4H).

Maxilliped inner plates apically rounded, with three strong cuspidate distal setae, five serrate setae and five pappose setae; outer plate larger than inner plate, apically rounded, apical, medial and facial with simple setae; palp longer than outer plate, with four articles, margin with several simple setae; dactylus unguiform, smaller than third article, with simple setae and distal nail (Fig. 4I).

Gnathopod 1 subchelate; basis, ischium and merus with simple setae; carpus longer than wide, as long as propodus, with strong and wide posterior lobe, margin with polygonal pattern (border pectinate), one row of denticles as comb-scales and one row of serrate setae, ten serrate setae on ventral face; propodus length about 1.5 times maximum width (rectangular), hammer shape, inner face with seven serrate setae and five short simple setae and some triangular setae, disto-posterior border with two cuspidate setae, denticles as comb-scales and three simple setae, antero-posterior border with comb-scales and cluster of simple setae; dactylus claw-like not surpassing the palm, with denticles as comb scales, one plumose setae dorsally (Fig. 5A).

Gnathopod 2 subchelate; basis (long), ischium and merus with cluster of simple setae on disto-posterior border; carpus wider than long, narrow posterior lobe, margin elongated with border pectinate, one row of serrate setae and one row of denticles as comb scales; propodus ovate (length 1.2 maximum width), palm shorter than posterior margin, slope oblique, palm with irregular margin with several long and short cuspidate setae with accessory setae and some simple setae, disto-posterior margin with denticles as comb scales, two short and strong cuspidate setae with accessory setae and some simple setae, disto-anterior margin with two cluster of simple setae; dactylus claw-like, shorter than propodus, with distal setae and one plumose setae dorsally (Fig. 5B).

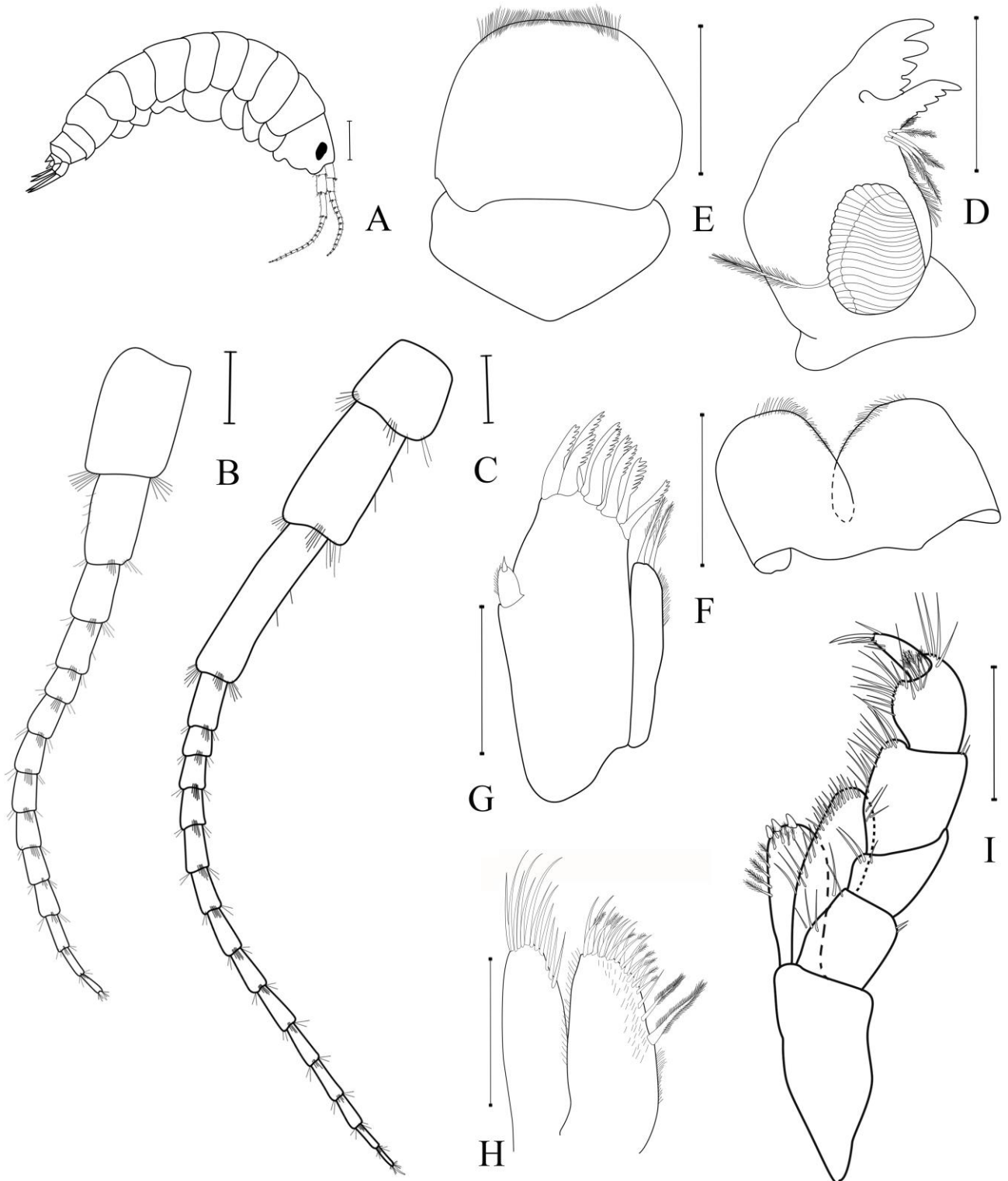


FIGURE 4. *Hyalella* sp. n. Rangel & Castiglioni, Cachoeira Grande, Monumento Natural Municipal da Lagoa do Peri, municipality of Florianópolis, state of Santa Catarina, Brazil. Male. (A) habitus from holotype; (B) antenna 1; (C) antenna 2; (D) left mandible; (E) upper-lip; (F) lower-lip; (G) maxilla 1; (H) maxilla 2; (I) maxilliped. Scales: 0.2 mm.

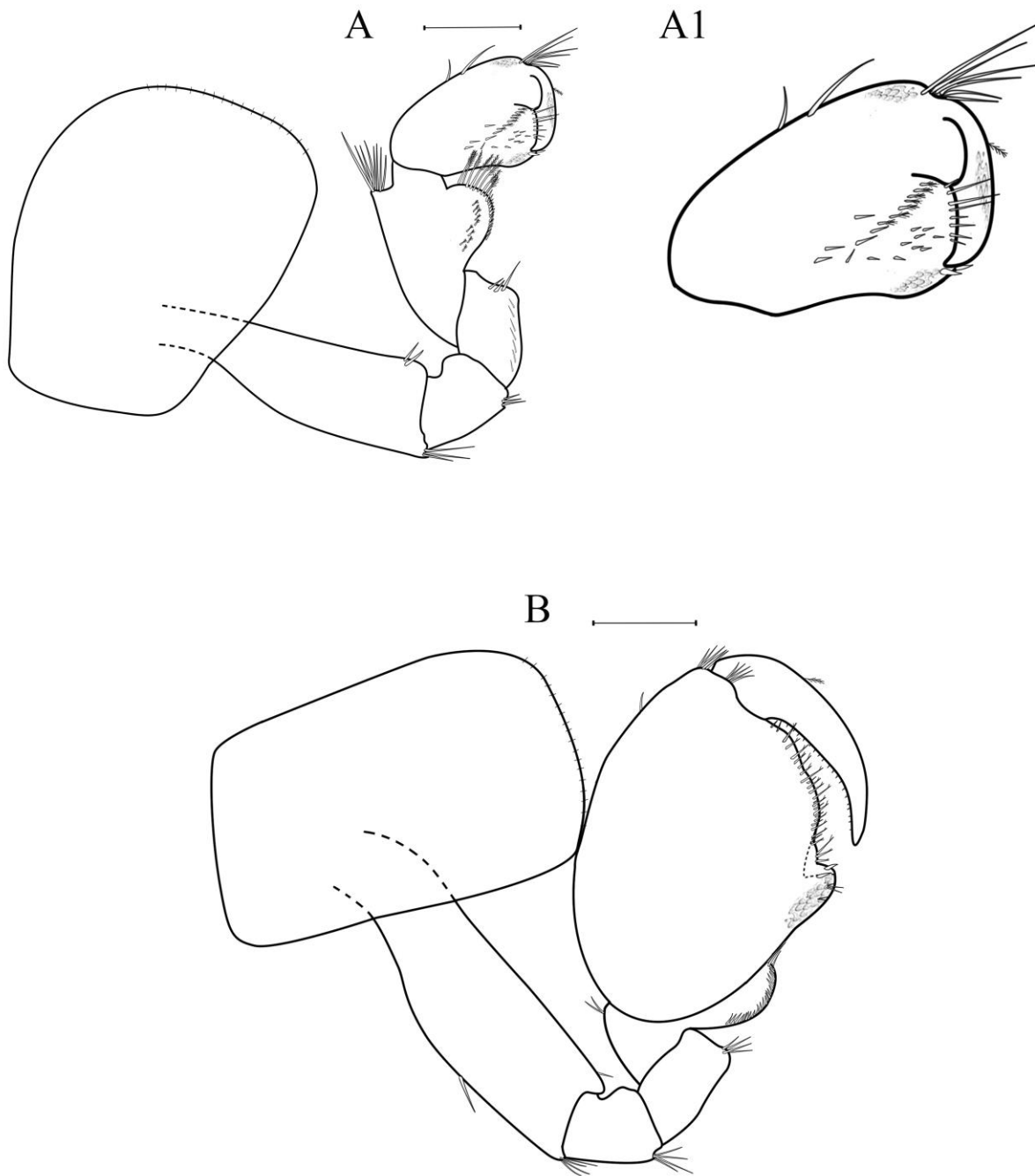


FIGURE 5. *Hyalella* sp. n. Rangel & Castiglioni, Cachoeira Grande, Monumento Natural Municipal da Lagoa do Peri, municipality of Florianópolis, state of Santa Catarina, Brazil. Male. (A) gnathopod 1; (A1) propodus of the gnathopod 1; (B) gnathopod 2. Scales: 0.2 mm.

Peraeopods 3 to 7 simple; merus, carpus and propodus posterior margins with clusters of 2-3 cuspidate setae with accessory setae, cluster of simple setae on anterior and posterior borders; peraeopods 3 to 7 dactylus less than half-length of propodus; peraeopods 3 to 6 with similar size and peraeopod 7 slightly longer; coxal plates of peraeopod 3, 5, 6 and 7 longer than wide, with small simple setae on margin; peraeopod 4 coxal plate excavated posteriorly (Fig. 6A - E).

Pleopods not modified and all similar in shape; peduncle slender; ramus longer than peduncle, with two coupling setae (Fig. 7A).

Uropod 1 longer than uropod 2; peduncle longer than ramus, seven cuspidate setae with accessory setae on dorsal surface; inner ramus slightly longer than outer ramus with three cuspidate setae with accessory setae and one curved seta on lateral margin, apex with five cuspidate setae with accessory setae and two strong cuspidate setae; outer ramus with four dorsal cuspidate setae with accessory setae and four distal cuspidate setae (two with accessory setae) (Fig. 7B).

Uropod 2 peduncle longer than wide, similar size of ramus with five cuspidate setae with accessory setae; inner ramus with three dorsal cuspidate setae with accessory seta and six distal cuspidate setae (four with accessory setae); outer ramus with four dorsal and four distal setae (two with accessory setae) (Fig. 7C).

Uropod 3 peduncle rectangular and slightly longer than ramus, with ten strong cuspidate setae with accessory setae, outer margin with one simple seta and three simple setae on basis; inner ramus absent; outer ramus uniarticulate with eight simple setae (some longer than others) and one small cuspidate seta (Fig. 7D).

Telson wider than long, apically rounded, with six cuspidate setae with accessory setae and two small plumose setae laterally close to each distal seta (Fig. 7E).

Coxal gills sac-like, on segments 2 to 6. Sternal gills tubular, on segments 2 to 7.

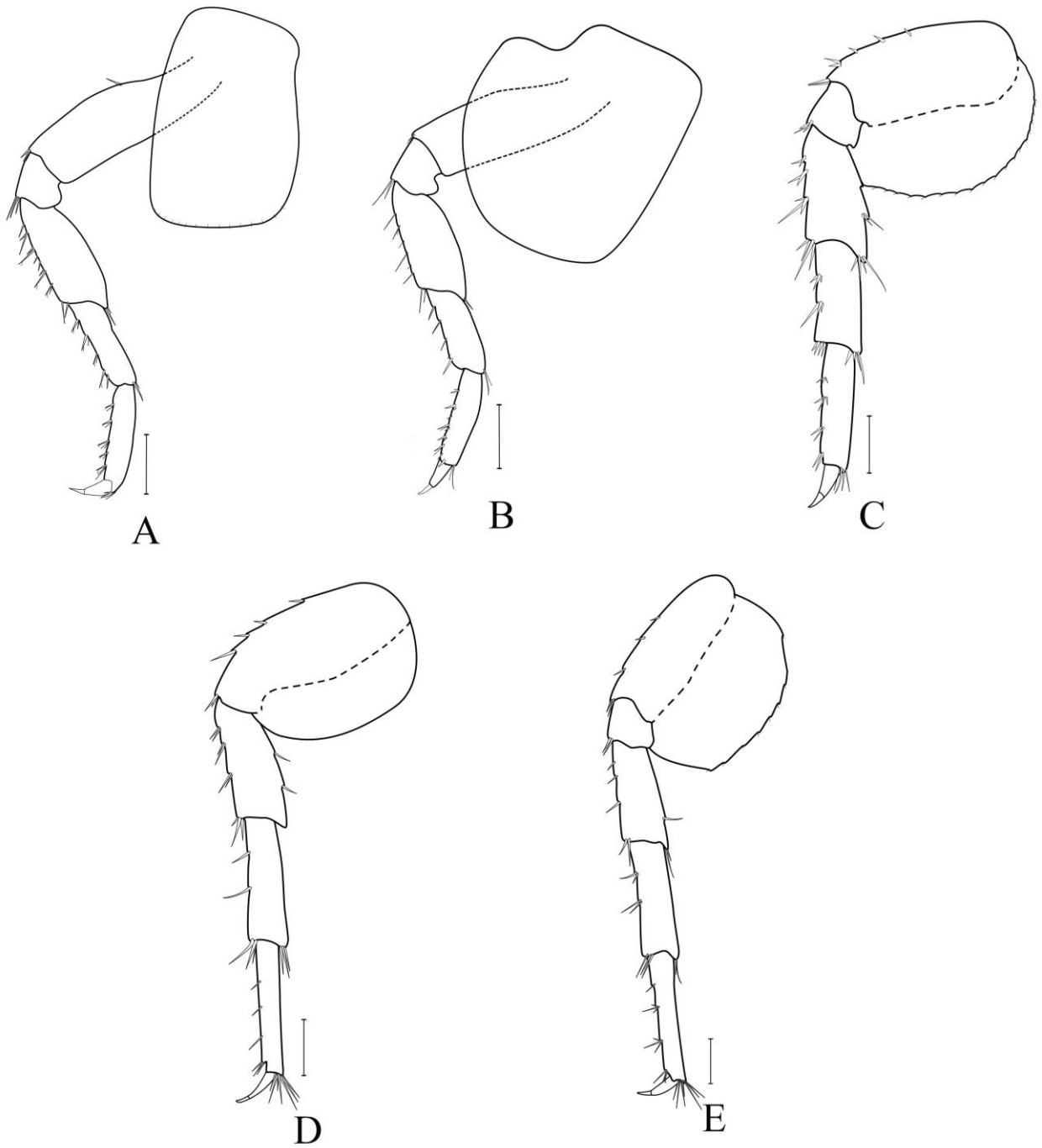


FIGURE 6. *Hyalella* sp. n. Rangel & Castiglioni, Cachoeira Grande, Monumento Natural Municipal da Lagoa do Peri, municipality of Florianópolis, state of Santa Catarina, Brazil. Male. (A) peraeopod 3; (B) peraeopod 4; (C) peraeopod 5; (D) peraeopod 6; (E) peraeopod 7; Scales: 0.2 mm.

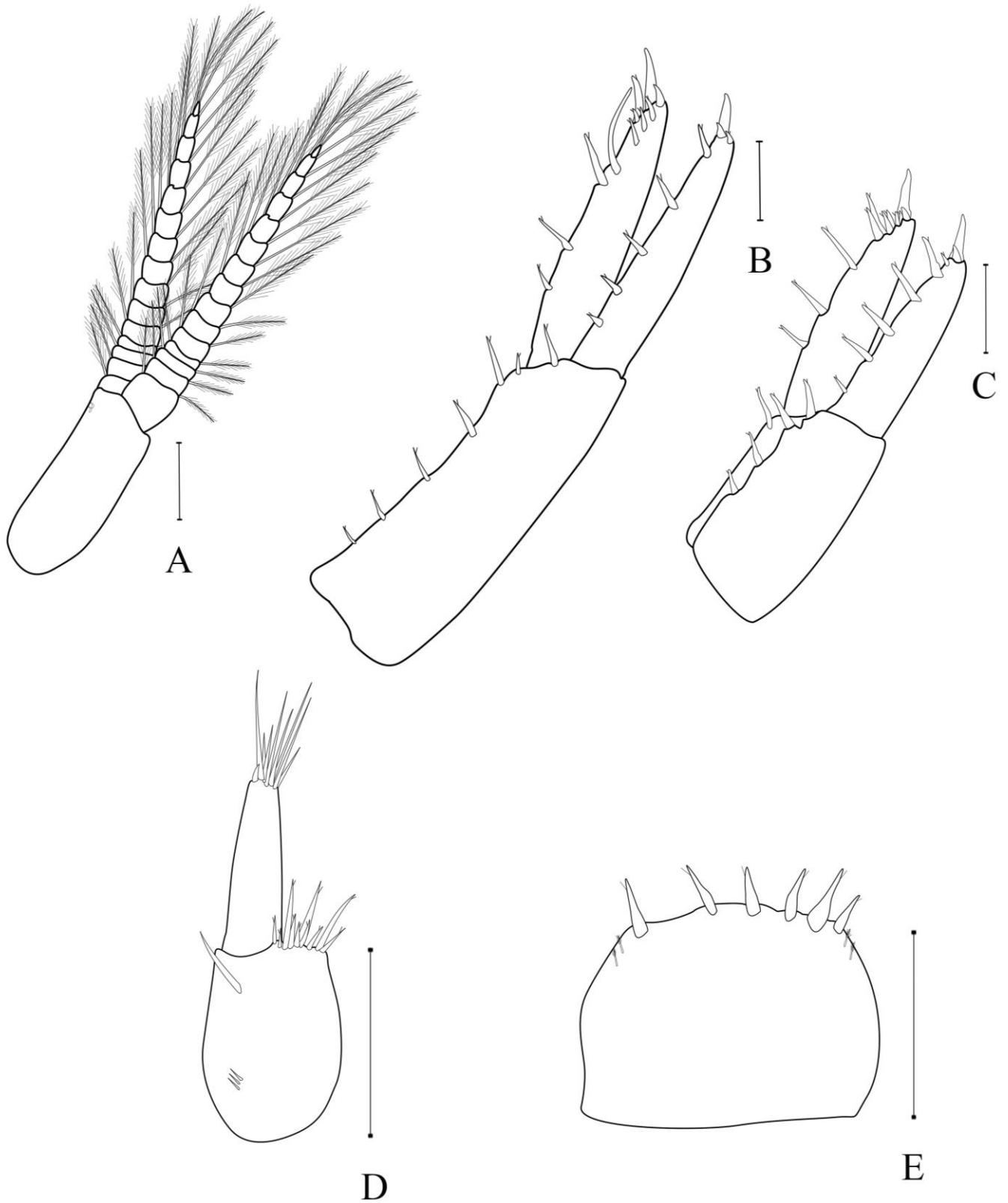


FIGURE 7. *Hyalella* sp. n. Rangel & Castiglioni, Cachoeira Grande, Monumento Natural Municipal da Lagoa do Peri, municipality of Florianópolis, state of Santa Catarina, Brazil. Male. (A) pleopod; (B) uropod 1; (C) uropod 2; (D) uropod 3; (E) telson. Scales: 0.2 mm.

Description of paratypes females (Figure 3B): Mean body length: 4.60 ± 0.036 (N = 10), minimum body length = 4.23 mm, maximum body length = 5.17 mm; mean head length: $0.49 \text{ mm} \pm 0.04 \text{ mm}$ (N = 10), minimum head length = 0.45 mm, maximum head length = 0.55 mm. Antenna 1 shorter than Antenna 2. Antenna 1 flagellum with nine to ten articles. Antenna 2 similar in shape to male, flagellum with eleven to twelve articles.

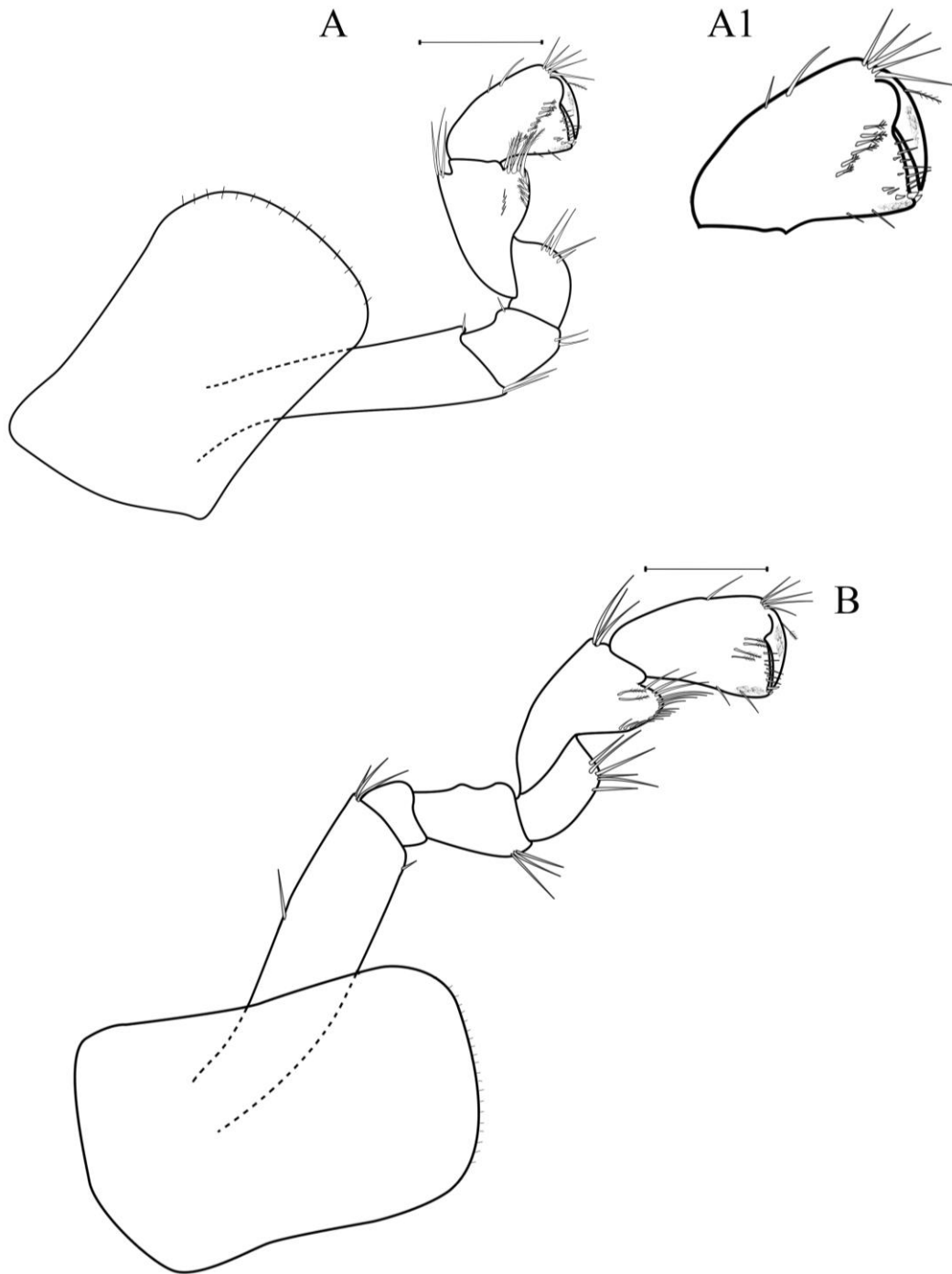


FIGURE 8. *Hyalella* sp. n. Rangel & Castiglioni, Cachoeira Grande, Monumento Natural Municipal da Lagoa do Peri, municipality of Florianópolis, state of Santa Catarina, Brazil. Female. (A) gnathopod 1; (B) gnathopod 2. Scales: 0.2 mm.

Gnathopod 1 greater than gnathopod 2; similar to male gnathopod 1 in size and shape; basis, ischium and merus without comb-scales; carpus with pectinate lobe with comb-scales and several serrate setae, four serrate setae on ventral face; propodus inner face with seven serrate setae, simple setae on the inner margin, disto-anterior border with comb-scales, disto-posterior border without comb-scales but with a cluster of simple setae; dactylus claw-like with one plumose setae and with comb-scales (Fig. 8A).

Gnathopod 2 different from male gnathopod 2 in shape and size; gnathopod 2 slightly slender than gnathopod 1; basis, ischium and merus without comb-scales; carpus with pectinate lobe with comb-scales and two serrate setae on ventral face; propodus length about 1.5 times maximum width, four serrate setae on ventral (inner) face, antero-distal margin with comb-scales and two simple setae, disto-posterior margin without comb-scales and with cluster of simple setae; dactylus claw-like with comb-scales and one plumose setae (Fig. 8B).

Habitat. Freshwater, epigeal. The stretch of the stream where the *Hyalella* sp. n. was found is characterized as a second order stream located in the Cachoeira Grande watershed (48°32'22"W - 27°43'55.00"S). In this stretch, there is primary riparian vegetation with about 90% of vegetation cover, abundant diversity of habitats with stony substrate and accumulation of allochthonous organic matter in stretches of rapids and backwaters. The Cachoeira Grande watershed, from the source to the outfall, is inserted in the Monumento Natural Municipal da Lagoa do Peri, whose vegetation is in a primary stage of conservation. The stretch has an average width of 2.95 m and 0.22 m deep, with good oxygenation (8.62 mg/l), low electrical conductivity (60.26 µS/cm) and hydrogen potential close to neutrality (7.45). The holotype was collected in organic material deposited in backwater.

Some individuals of *Hyalella* sp. n. were also sampled in a stretch of a third-order stream (48°32'03"W - 27°44'08"S) located in the Ribeirão Grande watershed. This stretch of the stream presents an intermediate stage of conservation of the riparian vegetation with 60% of vegetation cover, however with at least 30 m of riparian vegetation width along the sampled section. This stream is characterized by pools and riffles stretches with the benthic substrate composed mainly of sand and coarse organic matter. The stretch presents average values of 2.61 m in width and 0.24 m in depth with running water (0.16 m/s), good oxygenation (8.41 mg/l), low electrical conductivity (53.8 µS/cm) and hydrogen potential close to neutrality (7.21).

The main environmental impacts that can interfere with the local biodiversity of The Cachoeira Grande watershed are related to the urban occupation around the MNLP. On the other hand, around the main rivers and streams of the Ribeirão Grande watershed, there is a development of subsistence agriculture by traditional families (that already occupied the area before the implementation of the UC) with small plantations of banana, beans, cassava, corn and others, plus small livestock (Schmitt *et al.* 2019). However, it is noteworthy that the streams sampled have riparian vegetation along its entire extension.

Remarks. A remarkable feature of *Hyaella* sp. n. is the presence of curved setae in the inner ramus of uropod 1 of males, a characteristic that is found in almost all species of the genus that occur in the Southern region of Brazil and some species in the Southeast region (*H. veredae* Cardoso & Bueno, 2014, *H. xakriaba*, *H. carstica*, *H. epikarstica* Rodrigues, Bueno & Ferreira, 2014). The new species has similarities with the other species from Santa Catarina, *H. catarinensis*, *H. rioantensis*, *H. sambaqui* and *H. lagoana*, in the following characters: the absence of flanges in the pleon, the location of the sternal gills from the 2nd to the 7th thoracic segment and the presence of curved setae in the inner ramus of uropod 1 of males. However, it is noticed that *Hyaella* sp. n. differs from these species in some other remarkable features.

When comparing *Hyaella* sp. n. with *H. catarinensis* (Table 1), it was noticed that both have morphological differences in the maxilla 2: *Hyaella* sp. n. has two papposerrate setae (one smaller) and *H. catarinensis* has only one papposerrate setae; both species differ in the number of setae in the uropods 1, 2 and 3; in the morphology and number of setae in the inner face of male gnathopods 1 (*Hyaella* sp. n. has seven serrate setae on the ventral surface and *H. catarinensis* has none); and in the morphology and number of setae of telson (*Hyaella* sp. n. presents wider than long telson with six cuspidate setae and two plumose setae in each side and *H. catarinensis* presents longer than wide with three setae without laterally setae (Table 1).

In the comparison between *Hyaella* sp. n. and *H. rioantensis*, it was observed that both have similarity in the morphology of the maxilliped, which has pappose setae in the inner margin of the inner ramus. However, both species differs in relation to the morphology of the maxilla 2 (*Hyaella* sp. n. with two papposerrate setae and *H. rioantensis* with twenty three); type and number of setae in the male gnathopod 1 (*H. rioantensis* has several simple setae on the inner face of the propodus and *Hyaella* sp. n. has seven serrate setae, five short simple setae and some triangular setae); number of setae on uropods 1, 2 and 3 and the shape and number of setae on telson (*H. rioantensis* has apically rounded telson with four cuspidate setae, without lateral setae).

The other species occurring in the state of Santa Catarina, *H. sambaqui* and *H. lagoana*, resembles *Hyaella* sp. n. in the location of the sternal gills, absence of flanges in the pleon, in the morphology of the maxilliped, the presence of the curved setae in the inner ramus of male uropod 1

and the number of setae in the inner margin of maxilla 2 (two papposerrate setae, one bigger than the other) (Table 1). However, the new species differs from *H. sambaqui* and *H. lagoana* in the number of serrate setae in the inner face of male gnathopod 1, number of setae in the uropods 1, 2 and 3 and shape and number of setae on telson (Table 1).

The species of *Hyaella* from the neighboring state of Paraná, *H. formosa* and *H. brasiliensis*, also present the curved setae in the inner ramus of male uropod 1, absence of flanges in the pleon and the same location of the sternal gills. Although, both species of Paraná differs considerably from *Hyaella* sp. n. in other features, mostly *H. formosa*, which is a subterranean species, has eyes reduced or absent (Cardoso *et al.* 2014). The number and shape of setae of the gnathopods, uropods and telson of Paraná species also are different from *Hyaella* sp. n (Table 1). In comparison, the number of articles of the antenna 1 of *H. brasiliensis* (14 articles) are similar to *Hyaella* sp. n., but the antenna 2 is longer (19 articles) than antenna 2 of the new species (14-15 articles). Thus, both species differs from *H. formosa*, which has antenna 1 (11-13 articles) longer than antenna 2 (8-10 articles) (Table 1).

When comparing morphologically *Hyaella* sp. n. with the species of the state of Rio Grande do Sul, it was observed that the new species differs in relation to the body surface smooth only from *H. kaingang* (flanges on pleonites 1 and 2), *H. pleoacuta* (flanges on pereion 7 and pleonites 1, 2 and 3) and *H. pseudoazteca* (flanges on pereion 7 and pleonites 1 and 2) (Table 1). The only species that resembles *Hyaella* sp. n. when comparing the type and number of setae of telson is *H. gauchensis* (with six cuspidate setae) (Table 1). A remarkable feature of males of *Hyaella* in the state of Rio Grande do Sul is the presence of the curved setae in the inner ramus of uropod 1, which is also present in the males of the species from Santa Catarina and Paraná state. However, in the state of Rio Grande do Sul, two species doesn't share this feature, *H. pseudoazteca* and *H. longipropodus* (Table 1).

Discussion

The description of *Hyaella* sp. n. in the present study contributes to improve the knowledge on the diversity of *Hyaella* in Brazil and in Santa Catarina state, so far little known. The species *Hyaella* sp. n. is the fourth described for the state of Santa Catarina and the Brazil's first island species.

Furthermore, *Hyaella* sp. n. was sampled in two micro-basins in the Atlantic Forest, one of the most threatened biomes in the country (Rezende *et al.* 2018). It is estimated that 11 to 16% of the original Atlantic Forest vegetation cover is preserved, but most of it is fragmented (Rezende *et al.* 2018). The fact that *Hyaella* sp. n. was found in an environmental protection area is important since aquatic macroinvertebrates are frequently used for freshwater biomonitoring, allowing to evaluate the water quality and possible damages to preserved environments (Kuhlmann *et al.* 2014).

In Brazil, the most threats for freshwater environments are pollution, eutrophication, siltation, the introduction of species, deforestation and agriculture (mostly in the Southern region) (Agostinho *et al.* 2005). All these factors impose a strong negative impact on the aquatic biodiversity of these ecosystems, which is already little known. The survey of species of aquatic organisms in protected areas is important as a subsidy for the conservation of biodiversity (Agostinho *et al.* 2005).

Although in Brazil, *Hyaella* sp. n. being the first insular species described, other species of the genus were recorded on islands in other countries, such as, Argentina and Chile. *Hyaella patagonica* Cunningham, 1871 was found in a stream on the Navarino Island, located in the extreme South of Chile (Escalante & Mansilla 2016) and *Hyaella pampeana* was found on the Martín García Island in the Rio de La Plata, Argentina (Colla & César 2019). Other species (*Hyaella curvispina*, *Hyaella neonoma* Stock & Platvoet, 1991, *Hyaella falklandensis* Bousfield, 1996 and *Hyaella araucana* Grosso & Peralta, 1999 have part of their distribution on the Falkland Islands (Santos *et al.* 2008), an archipelago in the South Atlantic Ocean on the Patagonia Shelf.

Some studies discuss the dispersal processes of small freshwater invertebrate organisms, aiming to explain their colonization in isolated aquatic environments (Figuerola & Green 2002; Banha & Anastácio 2012; Schwentner *et al.* 2012). In these studies, passive dispersal is considered a mechanism that can explain long-distance dispersal between disconnected aquatic habitats, pointing to waterbirds as an important vector (Figuerola & Green 2002). Waterbirds can transport small organisms internally (in their guts) or externally, with the animals attached to their body (Darwin 1859; Figuerola & Green 2002).

In the case of *Hyaella*, passive dispersal by waterbirds could explain the current distribution of species, especially species that occur on Islands, such as *Hyaella* sp. n. However, most evidence of this mechanism of dispersal is anecdotal (Figuerola & Green 2002) and there are no studies that investigate this process of dispersion for *Hyaella* species.

It is expected that this work contributes to future taxonomic research and serve as a subsidy for the conservation of freshwater environments, essential for the occurrence of *Hyaella* and many other species that are dependent on these habitats. Future studies that include molecular analysis could serve for a broader understanding and comparison of the new species, *Hyaella* sp. n., with the other Brazilian species. In addition, studies that explore the dispersal mechanisms of these organisms could contribute to understand the current distribution of the genus and highlight the possible role of passive dispersal of *Hyaella* to Islands by waterbirds or other possible mechanisms of dispersal.

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TABLE 1. Main morphological differences and similarities between *Hyalella* sp. n. and *Hyalella* species recorded for the states of Paraná, Santa Catarina and Rio Grande do Sul, southern Brazil. U1= uropod 1; U3 = uropod 3.

Species	Body surface	Inner margin of maxilla 2	Articles of flagellum of antenna 1/antenna 2	Inner face of propodus of gnathopod 1	Setae on peduncle of U3	Set of setae on inner margin of inner ramus of U1	Telson	Sternal gills	Type locality
<i>Hyalella</i> sp. n.	Smooth	2 papposerrate setae, being one bigger than other; 10 pappose setae and several simple setae apically	11-12/14-15	7 serrate setae	9-10 cuspidate setae	3 dorsal cuspidate setae with accessory setae, curved setae, 5 apical cuspidate setae with accessory setae, and 2 strong cuspidate setae apically	Wider than long, apically rounded with 6 cuspidate setae with accessory setae, and 4 plumose setae laterally	2-7	Municipality of Florianópolis, state of Santa Catarina
<i>H. brasiliensis</i> Bousfield 1996	Smooth	1 strong and 1 shorter plumose seta	14/19	5 serrate setae	5-6 strong setae	2 dorsal setae, curved seta, and 1 seta apically	Wider than long, apically rounded, with 5-6 apical cuspidate setae	2-7	Municipality of Prudentópolis, state of Paraná
<i>H. bonariensis</i> Bond-Buckup, Araujo & Santos 2008	Smooth	2 pappose setae, several simple setae and serrate setae	9-12/12-15	5 serrate setae	6 cuspidate setae	3 dorsal cuspidate setae, curved seta, and 7 cuspidate setae apically	Quadrangular, with 2-3 cuspidate setae apically, sometimes with plumose setae	2-7	Municipality of Salto, Province of Buenos Aires, Argentina
<i>H. castroi</i> González, Bond- Buckup & Araujo 2006	Smooth	1 strong pappose seta	10-17/14-18	More than 7 pappose setae	7 strong setae	3 dorsal setae, curved seta, and 4 distal setae (2 of them longer)	Wider than long, apically rounded, with 8 long and short simple setae, without plumose setae laterally	2-7	Municipality of São José dos Ausentes, state of Rio Grande do Sul
<i>H. catarinensis</i> Reis & Bueno 2020	Smooth	1 papposerrate seta, 10 pappose	14/14	4 pappose setae, and few simple	6 cuspidate setae (only 2	2 dorsal cuspidate setae with accessory setae,	Longer than wide, apically rounded, with	2-7	Municipality of Palmeira, state of

		setae and several simple setae		setae	with accessory setae)	curved seta, and 4 cuspidate setae apically (only one with accessory seta)	3 cuspidate setae with accessory setae, without setae laterally		Santa Catarina
<i>H. curvispina</i> Shoemaker 1942	Smooth	2 plumose setae	11/13	5-7 serrate setae	3 cuspidate setae	2 setae, curved seta, and 3-4 apical setae	Wider than long, with 3 simple spines	3-7	Municipality of Tramandai, state of Rio Grande do Sul.
<i>H. formosa</i> Cardoso & Araujo 2014	Smooth	2 papposerrate setae, 9 serrulate and several simple setae	11-13/8-10	5 serrate setae	1 distal cuspidate seta	4 apical cuspidate setae and curved seta	Longer than wide, with 2 long simple setae and 3 short simple setae laterally	2-7	Municipality of Ponta Grossa, state of Paraná.
<i>H. gauchensis</i> Streck & Castiglioni 2017	Smooth	2 papposerrate setae (1 shorter), several simple setae and 10 serrulate setae	11/15	9-10 serrate setae	6 cuspidate setae	3 dorsal cuspidate setae, curved seta, followed by 3 small cuspidate setae, and 4 cuspidate setae apically (2 of them longer than others)	As long as wide, apically rounded, with 6 cuspidate setae apically distributed in 3 clusters of 2 setae each, and 6 plumose setae laterally	2-7	Municipality of Palmeira das Missões, state of Rio Grande do Sul.
<i>H. georginae</i> Streck & Castiglioni 2017	Smooth	2 robust papposerrate setae, 9-10 serrulate setae and several simple setae	15/16	9 serrate setae	9 cuspidate setae	4 dorsal cuspidate setae with accessory setae, curved seta, followed by 4 small cuspidate setae with accessory setae, and 4 cuspidate setae apically (1 of them with accessory seta)	As long as wide, with 7 apical cuspidate setae with an accessory seta distributed in 2 clusters (2 setae and other side 5 setae), and 4 plumose setae laterally	2-7	Municipality of Palmeira das Missões, state of Rio Grande do Sul.
<i>H. imbya</i> Rodrigues & Bueno 2012	Smooth	2 long papposerrate setae, 8 serrulate	18-23/14-16	7 serrate setae	1 cuspidate seta	2 dorsal cuspidate setae, curved seta, and 5 cuspidate setae apically	Wider than long, with 2 long simple apical setae, and 6 plumose	3-7	Municipality of Roque Gonzales, state of Rio Grande do Sul.

		setae and several simple setae					setae laterally		
<i>H. kaingang</i> Araujo & Cardoso 2013	With flanges on pleonites 1-2	2 papposerrate setae (1 smaller), 12 serrulate setae and several simple setae	17-18/18-24	2 rows of serrate setae	6 cuspidate setae	3 dorsal cuspidate setae, curved setae, and 3-4 cuspidate seta apically and 2 distal cuspidate setae	Wider than long, rounded, with 6-7 cuspidate setae with accessory setae, and 4 plumose setae	2-7	Municipality of São Francisco de Paula, state of Rio Grande do Sul.
<i>H. lagoana</i> Talhaferro & Bueno 2021	Smooth	2 papposerrate setae, 1 shorter	13/14-15	4 serrate setae	5 cuspidate setae and 1 simple seta	4 cuspidate setae with accessory setae on the outer side of the ramus, curved seta, followed by 3 cuspidate setae arranged in a row with decreasing size, and 2 robust cuspidate setae apically	Longer than wide, rounded, with 6 cuspidate setae and 2 simple setae	2-7	Municipality of Osório, state of Rio Grande do Sul.
<i>H. longipropodus</i> Limberger, Graichen & Castiglioni 2021	Smooth	2 papposerrate setae, 1 shorter	11-12/19-20	7 serrate setae	7 cuspidate setae	3 cuspidate setae with accessory setae, 6 apical cuspidate setae (4 with accessory setae), without curved seta	Wider than long, apically rounded, with 2 long simple setae and 2 small cuspidate setae with accessory setae, and 3 small plumose setae laterally	2-7	Municipality of Palmeira das Missões, state of Rio Grande do Sul.
<i>H. minuana</i> Talhaferro & Bueno 2021	Smooth	2 papposerrate setae, 1 shorter	13/15	9 serrate setae	4 cuspidate setae and 1 simple seta	4 cuspidate setae with accessory setae in the outer side of the ramus, curved seta, and 3 smaller setae arranged in a row, and 2	Longer than wide, with 2 cuspidate setae and 3 simple setae	2-7	Municipality of São José do Norte, state of Rio Grande do Sul.

<i>H. montenegrinae</i> Bond-Buckup & Araujo 1998	Smooth	1 strong pappose setae	14-16/14-19	9-10 plumose setae	4-5 setae	cuspidate setae apically 2 dorsal setae, curved setae, and 8 setae apically	Wider than long, with 7 to 9 cuspidate setae with accessory setae, and 6 plumose setae laterally	3-7	Municipality of São José dos Ausentes, state of Rio Grande do Sul.
<i>H. palmeirensis</i> Streck-Marx & Castiglioni 2020	Smooth	1 strong papposerrate seta, several simple and serrate setae	11-12/10-11	5 serrate setae	3 cuspidate setae	2 dorsal cuspidate setae with accessory setae, curved setae, followed by a row of 5 small cuspidate setae with accessory setae, and 2 cuspidate setae	Longer than wide, with two apical simple setae, and 3 plumose setae close to each simple seta	3-7	Municipality of Palmeira das Missões, state of Rio Grande do Sul.
<i>H. pampeana</i> Cavaliere 1968	Smooth	2 bipectinata setae	11-12/up to 18	5-6 serrate setae	5-7 setae	2 cuspidate setae and curved setae	As wide as long, apically rounded, with 2-5 spines	2-7	Buenos Aires, Argentina
<i>H. pleoacuta</i> González, Bond- Buckup & Araujo 2006	With flanges on pereion 7 and on pleonites 1, 2 and 3	2 strong pappose setae	14/15	9 pappose setae	4 strong setae	3 dorsal setae, curved setae, and 5 setae apically	As wide as long, apically rounded, with 2 strong setae, and 1 or 2 shorter setae laterally	2-7	Municipality of São José dos Ausentes, state of Rio Grande do Sul.
<i>H. pseudoazteca</i> González & Watling 2003	With flanges on pereion 7 and on pleonites 1 and 2	1 strong pappose seta	10/8-9	1-3 pappose setae	2 setae	1 dorsal seta and 5 distal setae, without curved setae	As wide as long, with 2 long simple setae	3-7	Reserva Ecológica do Taim, state of Rio Grande do Sul.
<i>H. rioantensis</i>	Smooth	Several papposerrate setae	11-14/14-18	Several simple setae	6 cuspidate setae with	3 dorsal cuspidate setae, curved setae, and 5	Longer than wide, apically rounded, with	2-7	Municipality of Rio das Antas, state of

Penoni & Bueno 2020		and few simple setae			accessory setae	cuspidate setae apically	4 cuspidate setae with accessory setae, without setae laterally		Santa Catarina.
<i>H. sambaqui</i> Talhaferro & Bueno 2021	Smooth	2 papposerrate setae, 1 shorter	9/13	5 serrate setae	3 cuspidate setae, with a group of simple setae on basis	2 dorsal cuspidate setae with accessory setae, curved seta, 4 distal cuspidate setae with accessory setae (one long), and 2 cuspidate setae apically	Wider than long, with 3 cuspidate setae with accessory setae and and 2 small plumose setae on both margin sides	2-7	Municipality of Passo de Torres, state of Santa Catarina.
