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Research paper

# When the first impression is not what counts: Two striking new species of *Schuhocoris* (Rhyparochromidae: Rhyparochrominae: Antillocorini)

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## ABSTRACT

The rhyparochromid tribe Antillocorini is a cosmopolitan group of very small to minute true bugs distributed in the tropics and subtropics, extending to the temperate regions but also well represented in oceanic islands in the Pacific. In America, 19 genera are present, all with species distributed in the Neotropics. The monotypic genus *Schuhocoris* Slater, 1985 was described from Peru, Panama and Brazil. Here we expand the characters' set defining *Schuhocoris*, and describe two new species in the genus, *Schuhocoris ecuatorianus* n. sp. and *S. slateri* n. sp., both from Ecuador, that present abdominal modifications compatible with stridulatory structures, something not reported for members of the tribe so far. Dorsal and lateral habitus photographs, along with images of relevant external characters and from the pygophore and parameres of the new species are given, and the presence and morphology of stridulatory devices are discussed.

## 1. Introduction

Antillocorini includes 35 genera and 118 species (Dellapé & Henry, 2024) of very small to minute true bugs distributed in the tropics and subtropics, extending to the temperate regions but also well represented in oceanic islands in the Pacific (Schuh & Weirauch, 2020). In America, 19 genera and 51 species are present (Dellapé & Henry, 2024), all genera have species distributed in the Neotropics, of which four genera have also representatives in North America (Ashlock & Slater, 1988). Henry et al. (2015) presented a key to 17 Neotropical genera, omitting the monotypic *Caymanis* Baranowski & Brambilla 2001 from Cayman Brac Isl., West Indies, and *Pulmomerus* Cervantes & Brailovsky 2012 from Baja California Sur, Mexico. The evaluation of characters with systematic value and a tentative phylogeny of the Western Hemisphere genera presented by Slater (1980) (with the 11 genera known at that time) remains the more comprehensive attempt to hypothesized relationships among taxa. The monophyly of the tribe has been questioned because of the lack of some diagnostic characters in some of the Neotropical genera, e.g., the deeply concave apical corial margin, and the linear arrangement of the abdominal trichobothria (Henry et al., 2015; Schuh & Weirauch, 2020).

*Schuhocoris* was described by Slater (1985) based on specimens from

Peru, Panama and Brazil; to include only the type species, *S. gracilis* Slater, 1985. This genus can be distinguished from any other Neotropical Antillocorini by the elongate and slender body, the callose to subcarinate lateral pronotal margins, the slightly concave apical corial margin, the spiracle on abdominal sterna III, IV and V located below the sternal shelf, the posterior trichobothria of sternum V located close together in a dorso-ventral position and anterior to the spiracle; and the dorso-abdominal scent gland opening (in nymphs) or scar (in adult) located between terga III/IV well developed.

Here we expand the character set defining *Schuhocoris* and describe two new species based on one macropterous male, and on several brachypterous specimens that were collected in a single collecting event in Ecuador. At first glance, they appear to be quite similar and could be identified as belonging to *S. gracilis*, but a closer examination allows us to find several characters of external morphology and male genitalia that support the description of new species. We also observed that both new species present abdominal modifications compatible with stridulatory structures, something not reported for members of the tribe so far.

Dorsal and lateral habitus photographs, along with images of relevant external characters and from the pygophore and parameres of the new species are given, and the presence and morphology of stridulatory structures are discussed.

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## 2. Material and methods

Specimens examined belong to the following institutions: Museo de La Plata, Buenos Aires, Argentina (MLP); National Museum of the Czech Republic, Praha Czech Republic (NMPC).

Specimens were studied under an Olympus ZX7 stereomicroscope. The genital structures were dissected under a stereomicroscope, cleared in KOH, washed in distilled water, and preserved in vials with glycerol. Measurements were taken under a stereomicroscope and are given in millimeters, in the following format min–max, mean.

Scanning electron microscopy (SEM) images were made with a Zeiss Gemini SEM 360 at the Laboratorio de Microscopia Electrónica de Barrido of the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (MACN, Buenos Aires, Argentina).

Color images were captured using a Canon EOS Rebel T7i with a Professional Grade Raynox DCR 150 DSLR Objective Tube Lens and an Objective PLAN Achromatic LWD infinity 5×, mounted on a WeMacro’s automatic focus stacking rail. Multiple focal planes were taken with HELICON REMOTE software and merged using HELICON FOCUS software.

Plates were created and numbered in Adobe Photoshop 2023.

## 3. Results

### 3.1. *Schuhocoris slateri* n. sp.

#### 3.1.1. Description

(Macropterous male holotype, Fig. 1). Total body length 3.44. Head, pronotum and scutellum brown, posterior pronotal lobe paler; corium and clavus pale brown, apical corial margin and a stripe along cubital vein darker; scape and pedicel pale brown (basi- and distiflagellomeres missing); legs pale brown, tibiae and tarsi yellowish; abdomen brown. Body dorsally with short, erect and suberect setae; head ventrally, pleurae and abdomen with short decumbent setae (Fig. 1B). **Head**

acuminate anteriorly; eyes large, occupying most of head laterally, distant from antero-lateral pronotal margin; ocelli conspicuous, elevated, set much closer to eyes than to one another. Head length 0.51, width 0.63, interocular space 0.37, interocellar space 0.27. Labium extending between mesocoxae, first segment remote from base of head, reaching the anterior third of eye. Antenniferous tubercles with external margin rounded in dorsal view. Antennal segments length: scape 0.76, pedicel 0.88. Labial segment lengths I 0.36, II 0.58, III 0.27, IV 0.25. Gular trough elongate, nearly reaching base of head, terminating in a tapering acute point. **Thorax** (Fig. 1A). Pronotum punctate, except calli. Collar well defined, wider at middle; posterior pronotal lobe more elevated than anterior lobe, with a depression anteriorly at middle. Humeral angles rounded. Pronotal length 0.67, width across anterior lobe 0.69, width across humeri 0.87. Scutellum punctate, with a Y-shaped elevated carina, scutellar length 0.67, width 0.58. **Hemelytra**: Lateral corial margins nearly straight, apical corial margin shallowly concave at level of apex of scutellum, radial vein elevated. Punctures on hemelytra similar to those on pronotum and scutellum. Claval commissure length 0.28, midline distance apex corium–apex membrane 0.75, corial length 1.64. Metathoracic scent gland auricle curved posteriorly; evaporative area extending over mesepimeron and narrowly over the posterior margin of the mesopleura, and basal half of metaepisternum, with convexly rounded outer margin (Fig. 1C). Meso- and metasterna with a median keel. **Abdomen** (Fig. 1B). Suture between sternite III and IV strongly curved anteriorly and reaching sternal shelf. Spiracles of sternite III and IV located just below sternal shelf. Posterior pair of trichobothria of sternum V located dorso-ventrally, with the ventral trichobothria located slightly posteriorly. Posterior margin of sternite III somewhat raised and forming a stridulitrum with 7–8 rows of minute pegs (Figs. 1C and 2) and forming a triangular pointed protuberance ventrally (Fig. 2A), plectrum formed by a row of spines on inner surface of metafemur (Fig. 1D). Sternum VII with a median elongated posterior projection. Pygophore (Fig. 3A–B): Dorsal aperture situated dorso-posteriorly, anterior margin rounded, inner projections subtriangular, elongate. Paramere large and broad; inner projection elongate and thin; outer projection conspicuously produced (Fig. 3C). Aedeagus: Sperm reservoir elongate-elliptical; reservoir wings elongate tapering, slightly directed posteriorly.

#### 3.1.2. Etymology

Named after James A. Slater, a remarkable hemipterologist with an outstanding contribution to the knowledge of the Lygaeoidea.

#### 3.1.3. Studied material

Holotype male: ECUADOR, prov. Napo (9)/4.1 km W of ARCHIDONA/S 00°54'37" W 77°50'40"/670 m, 19.xi.2006, M. Fikáček & J. Skuhrovec lgt./dense secondary bushy veg./on the margin of a forest/nr. banks of muddy stream,/wet leaf litter (sifting)/(NMPC).

### 3.2. *Schuhocoris ecuatorianus* n. sp.

#### 3.2.1. Description

(Brachypterous male holotype, Fig. 4). Total body length 2.50. Head, pronotum and scutellum brown; collar, posterior pronotal lobe, and apex of scutellum paler; corium and clavus pale brown, distal region of corium and a stripe along cubital vein darker; scape, pedicel and basiflagellomere pale brown, distiflagellomere whitish; coxae pale brown, rest of legs yellowish; abdomen brown, connexiva and pygophore pale brown. Body dorsally with short, erect and suberect setae; head ventrally, pleurae, and abdomen with short decumbent setae (Fig. 4B). **Head** acuminate anteriorly; eyes large, occupying most of head laterally, distant from antero-lateral pronotal margin; set much closer to eyes than to one another. Head length 0.54, width 0.47, interocular space 0.23, interocellar space 0.20. Antenniferous tubercles divergent, external margin slightly rounded. Antennal segments length: scape 0.59, pedicel 0.74, blasiflagellomere 0.59, distiflagellomere 0.56. Labium

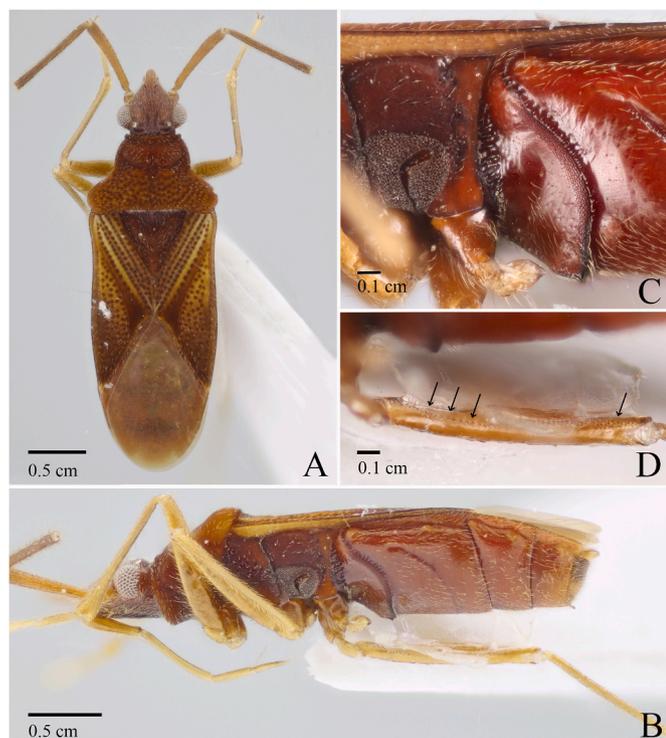


Fig. 1. *Schuhocoris slateri* n. sp. Male holotype. A. Dorsal view. B. Lateral view. C. Evaporative area and sternite III with stridulitrum. D. Row of spines on inner surface of metafemur (black arrows indicate spines).

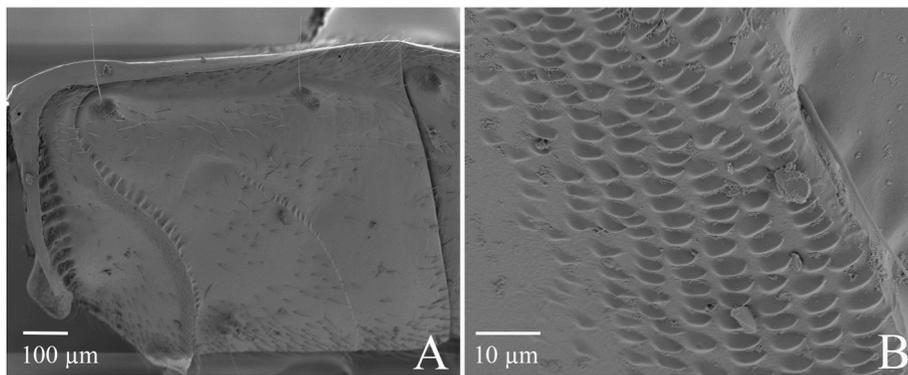


Fig. 2. *Schuhocoris slateri* n. sp. (Male Holotype, macropterous). A. Sternite III with stridulitrum. B. Detail of stridulitrum.

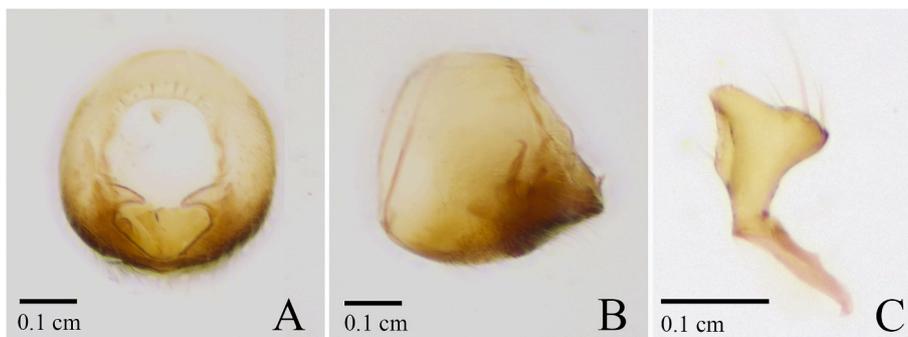


Fig. 3. *Schuhocoris slateri* n. sp. Male holotype. A. Pygophore dorsal view. B. Pygophore lateral view. C. Paramere.



Fig. 4. *Schuhocoris ecuatorianus* n. sp. Male holotype. A. Dorsal view. B. Lateral view. C. Evaporative area and sterna III and IV with stridulitrum. D. Row of spines on inner surface of metafemur (black arrows indicate spines).

extending between mesocoxae, first segment remote from base of head, reaching the anterior third of eye. Labial segments length I 0.32, II 0.42, III 0.26, IV 0.26. Gular trough absent (Fig. 5A). **Thorax** (Fig. 4A): Collar well defined and punctate, posterior pronotal lobe short and punctate; humeral angles rounded. Pronotal length 0.59, width across anterior lobe 0.63, width across humeri 0.87. Scutellum punctate with a poor developed Y-shaped carina, length 0.48, width 0.42. Hemelytra extending to posterior margin of fifth abdominal tergite; clavus and corium fused; heavily punctate; membrane reduced to a small fringe. Claval commissure length 0.20, corial length 1.20. Metathoracic scent gland auricle wide and curved posteriorly; evaporative area extending over mesepimeron and narrowly over the posterior margin of the mesopleuron, and over basal half of metaepisternum, with a straight dorsal margin (Figs. 4C and 5C–D). Meso- and metasterna with a median keel well developed, evaporative area extending over the metasternal rounded keel. **Abdomen** (Figs. 4B–C, 5B): Suture between sterna III and IV strongly curved anteriorly and not reaching dorsal margin. Spiracles of sterna IV located on sternal shelf (Fig. 5B); posterior pair of trichobothria of sternum V located dorso-ventrally, with the ventral trichobothria located slightly posteriorly. Sterna III and IV with a cross-striated area forming an arc-like stridulitrum (Fig. 4C), plectrum formed by a row of minute spines over distal half of inner surface of metafemur (Fig. 4D). Sternum VII with a median short posterior projection. Genitalia (paratype). Pygophore (Fig. 6A and B): Dorsal aperture situated dorso-posteriorly, anterior margin rounded, inner projections subtriangular. Paramere with a short blade; inner projection small; outer projection more developed and rounded (Fig. 6C). Aedeagus: Sperm reservoir oval, wings elongate, tapering and directed posteriorly.

### 3.2.2. Paratypes measurements

Male (n = 1) Total body length 2.18. Head: length 0.59; width 0.57; interocular space 0.29; intercellular space 0.23. Antenna: scape 0.54; pedicel 0.68; blasiflagellomere 0.60, distiflagellomere absent. Labium: I 0.35, II 0.39, III 0.17, IV 0.14. Pronotum: length 0.56; width across

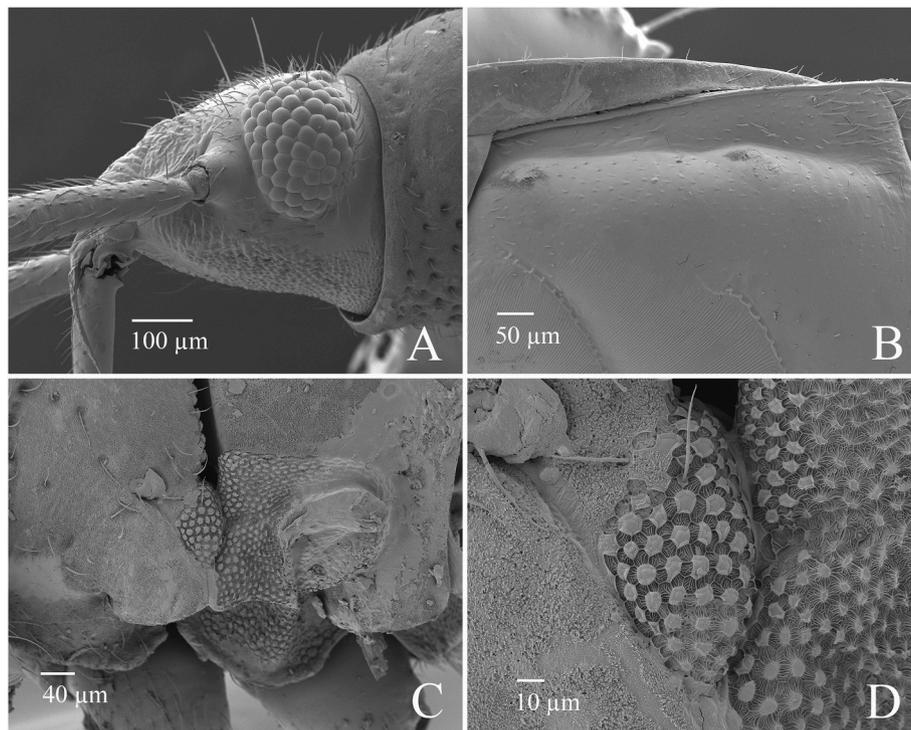


Fig. 5. *Schuhocoris ecuatorianus* n. sp. Female paratype. A. Head lateral view. B. Spiracles of sterna IV. C–D. Evaporative area.



Fig. 6. *Schuhocoris ecuatorianus* n. sp. Male paratype. A. Pygophore dorsal view. B. Pygophore lateral view. C. Paramere.

anterior lobe 0.60; width across humeri 0.86. Scutellum: length 0.42; width 0.45. Hemelytra: claval commissure length 0.33; corial length 1.02. Females (n = 3) Total body length 0.95–2.39, 2.20. Head: length 0.54–0.59, 0.56; width 0.59–0.62, 0.60; interocular space 0.26–0.32, 0.29; intercellular space 0.21–0.23, 0.22. Antenna: scape 0.60–0.62, 0.61; pedicel 0.65–0.77, 0.73; blasiflagellomere 0.60–0.62, 0.61; distiflagellomere 0.60–0.71, 0.65 Labium: I 0.39–0.41, 0.40; II 0.39–0.45, 0.43; III 0.24–0.29, 0.26; IV 0.23–0.26, 0.25. Pronotum: length 0.57–0.68, 0.61; width across anterior lobe 0.63–0.71, 0.67; width across humeri 0.93–0.99, 0.96. Scutellum: length 0.53–0.57, 0.55; width 0.47–0.50, 0.48. Hemelytra: claval commissure length 0.32–0.41, 0.36; corial length 1.22–1.40, 1.29.

### 3.2.3. Etymology

The specific epithet is a latinized adjective created from the Spanish adjective *ecuatoriano*, -a, meaning “related to Ecuador”, in reference to the country where the specimens were collected.

### 3.2.4. Studied material

Holotype male: ECUADOR, prov. Napo (9)/4.1 km W of ARCHIDONA/S 00°54'37" W 77°50'40"/670M, 19.xi.2006, M. Fikáček & J. Skuhrovec lgt./dense secondary bushy veg./on the margin of a forest/

nr. banks of muddy stream, /wet leaf litter (sifting) // (NMPC). Paratypes: one male, three females, same data as holotype (two females NMPC, one male [he-9511] and one female MLP [he-9512])

### 3.3. Key to the species of *Schuhocoris*

1- Brachypterous; gular trough almost indistinguishable; spiracle on sternite IV on the sternal shelf; abdominal stridulitrum formed by an arc-like cross-striated area on sterna III and IV ... *Schuhocoris ecuatorianus* n. sp.

1'- Macropterous; gular trough elongate, nearly reaching the base of head and ending in a tapering acute point; spiracle on sternite IV located below the sternal shelf; abdomen with or without abdominal stridulitrum, if present, located only on sternite III and formed by pegs ... 2

2- Antenniferous tubercles laterally pointed; without stridulatory devices; paramere elongate, outer projection slightly developed ... *S. gracilis* Slater

2'- Antenniferous tubercles laterally rounded; stridulitrum on posterior margin of abdominal sternite III formed by 7–8 rows of minute pegs (Figs. 1C and 2), metafemur with a row of spines on inner surface; paramere large and broad, outer projection conspicuously produced (Fig. 3C) ... *S. slateri* n. sp.

#### 4. Discussion

After the inclusion of the two new species here described, the set of characters defining the genus *Schuhocoris* must be expanded. The position of the spiracle on sternite IV is variable, being located below the sternal shelf in *S. gracilis* and *S. slateri* n. sp., but on the sternal shelf in *S. ecuatorianus* n. sp.

According to Slater (1985) the gular trough is elongate, nearly reaching the base of head and terminating in a tapering acute point; this is true for *S. slateri* n. sp., but in *S. ecuatorianus* n. sp. the gular trough is almost indistinguishable (Fig. 5A).

Among the macropterous species, *S. gracilis* and *S. slateri* n. sp., we also observed differences in the shape of the antenniferous tubercles that are laterally pointed in the type species but rounded in the new species described here.

The evaporative area extends only on ventral half of metapleuron and is convexly rounded on posterior margin; in the two new species described here we observed only differences in the shape and size of the auricle. In the particular case of *S. ecuatorianus* n. sp. the evaporative area extends over the metasternum (Fig. 5C) that is also very peculiar by the development of a large keel.

Davranoglou et al. (2023) summarized all known stridulatory mechanisms in the Heteroptera. Among the Rhyparochromidae, they listed several species in the Plinthisinae and in the Rhyparochrominae tribes Cleradini, Drymini, Myodochini, Ozophorini, and Rhyparochromini as having stridulatory structures, with an abdomen-leg stridulatory mechanism in most of cases in the latter subfamily. These authors also gave morphological key criteria for identifying stridulatory mechanisms and for establishing the links between morphology and sound production, when behavioral data are not available. Such criteria are: the presence of a series of modified and strongly sclerotized ultrastructures (such as raised ridges, spines, pegs, or tubercles) which are morphologically distinct from the surrounding cuticle; these structures are bilateral and isomorphic; are found in many (if not all specimens, either in a single sex, or both); and also, they are bipartite, that is they require friction with another structure to produce sound (Davranoglou et al., 2023)

The two species herein described are hypothesized to be stridulatory and constitute the first report of these structures in the Antillocorini. This is more probably true in *S. ecuatorianus* n. sp. where the observed abdominal stridulitrum is similar to, for example, those found in several other genera of Myodochini; otherwise, the abdominal pegs present in *S. slateri* n. sp. suggest they form a stridulitrum, although no similar structure have been reported so far in Rhyparochromidae. The row of spines on the posterior femur present on both species is compatible with a plectrum, that reinforces the hypothesis.

Slater (1999) in his revision of *Lygofuscanellus* Scudder 1962 (Ozophorini) questioned the validity of the presence or absence of an abdominal stridulitrum as a diagnostic character state to recognize genera. He based this opinion in similar conditions occurring in other genera of myodochines as an indication of several independent origins of similar stridulatory devices. On the other hand, Dellapé (2008) described the myodochine genus *Paisana* including five species, and stated that the presence of a serrated corial margin in one of them suggests a stridulitrum (although a plectrum could not be identified), he remarked the significance of including this species in the genus, since the presence of a stridulatory apparatus was usually used as a generic character for some myodochine genera.

It is clear that although useful as a systematic character source, the stridulatory apparatus had been evolved several times in the family, with different configurations but similar location and structures, and the

value as diagnostic at any taxonomic rank should be cautiously evaluated.

#### CRedit authorship contribution statement

**Dolores María Goñi:** Writing – review & editing, Writing – original draft, Visualization, Methodology. **María Cecilia Melo:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Funding acquisition. **Pablo M. Dellapé:** Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Funding acquisition, Conceptualization.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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#### Data availability

No supplementary data was used for the research described in the article.

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