



## The genus *Neuroscelio* Dodd (Hymenoptera: Platygasteridae s.l.) reviewed: new species, distributional update, and discussion of relationships

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### Abstract

The genus *Neuroscelio* Dodd is revised and two new species are described: *N. lagunai* n. sp. (Australia) and *N. orientalis* n. sp. (Vietnam). An update to the identification key for *Neuroscelio* species is presented. The male of *N. doddi* Galloway, Masner & Austin is described, the first record of this sex for the genus. The geographic distribution of *Neuroscelio* is expanded to include South Australia and New South Wales in Australia, and the Oriental region. The relationships of *Neuroscelio* are discussed: the genus is removed from the tribe Gryonini. It does not appear to be closely related to any extant genera but is similar in several morphological aspects to the Eocene genus *Brachyscelio* Brues and the Cretaceous genus *Cenomanoscelio* Schlüter.

**Key words:** Hymenoptera, key, egg-parasitoid, phylogeny

### Introduction

The genus *Neuroscelio* (Hymenoptera: Platygasteridae s.l.) was described by Dodd (1913) on the basis of a single female specimen swept from forest in North Queensland (modern-day Gordonvale, previously known as “Nelson” at the time of collecting by A.A. Girault in 1913). To date, the genus has only been recorded from Australia. It was not treated in Masner’s (1976) synopsis of world genera of Scelionidae, but Galloway & Austin (1984) included it in their key to Australian genera and presented a brief diagnosis. They reported that the condition of the holotype of the only described species, *N. nervalis* Dodd, was too poor for them to offer any comment on its taxonomic placement. Subsequently, Galloway *et al.* (1992) redescribed the genus by correlating freshly collected female specimens of several species with the type. They reported that the genus was widely distributed in Queensland, extended its known range to include southwestern Western Australia, and described four new species.

Galloway *et al.* (1992) placed *Neuroscelio* within the tribe Gryonini on the basis of the “stocky form of the body and the structure of the metasoma, viz. large T1 and T2; T3–T6 narrow; T7 in female external, well-sclerotized, with distinct cerci, articulating with T6, and not extruded with the ovipositor.” As additional evidence for this placement, they also noted the similarity with other gryonine genera in the robustness of the ovipositor system, in particular the size of the proximal arms, the reduction in number of palpal segments, and the presence of a distal brush of sensilla on the gonopods. However, Murphy *et al.* (2007), using molecular

markers (18S rDNA, 28S rDNA, COI), consistently placed *Neuroscelio* near the base of the Platygastroidea tree, grouping with *Archaeoteleia* Masner and, in some analyses also with *Sparasion* Latreille, as the sister-group of all other platygastroids. Despite the relatively low support values for many of the deeper nodes, *Neuroscelio* was never resolved close to *Gryon*; the latter always coming out as sister to the Telenominae. These results strongly suggested that *Neuroscelio* is likely to be misplaced within the Gryonini.

Our objectives in this paper are to describe two new species for the genus with more material at hand, and to describe for the first time the male sex. Additionally, we discuss the greatly extended distribution and relationships for the genus, and review its placement within the Platygastroidea.

## Material and methods

The following collections provided specimens for this study: American Museum of Natural History, New York, NY, U.S.A. (AMNH)<sup>1</sup>; Australian Museum, Sydney, Australia (AMS)<sup>2</sup>; Canadian National Collection of Insects, Ottawa, Canada (CNCI)<sup>3</sup>; Museum of Comparative Zoology, Cambridge, MA, USA (MCZC)<sup>4</sup>; C.A. Triplehorn Insect Collection, Columbus, OH, USA (OSUC)<sup>5</sup>; Waite Insect & Nematode Collection, Adelaide, Australia (WINC)<sup>6</sup>.

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Morphological terminology generally follows Mikó *et al.* (2007). Nomenclature for wing venation generally follows Masner *et al.* (2007); the correspondence of wing venation terminology used currently in reference to the one used in Galloway *et al.* (1992) is as follows: Fore wing: basal = Rs+M, cubital = M, discoidal+subdiscoidal = Cu, intercubital = 1Rs, marginal = C+R, medial = M+Cu, radial = 2Rs, stigmal = r-rs, submarginal = R. Hind wing: marginal = R, submarginal = Sc+R.

Images were taken with a JVC 3 CCD camera (model KY-575U) attached to a Leica Z16 APO with a Planapo 1.0x objective and a Nikon DXM 1200 digital camera attached to a Leica MZ16 stereomicroscope. Specimens were illuminated with a 4 channel LED dome light from Advanced Illumination. Figures were produced using Auto-Montage Pro versions 4.02 and 5.1 and post-processed with Adobe Photoshop.

Specimen measurements were performed using a micrometer in a Weiss stereomicroscope with 10x oculars and a maximum magnification of 80x, or a Wild Heerbrugg stereomicroscope with 10x oculars and a maximum magnification of 50x. Specimens were oriented parallel to the optical field of the stereomicroscope and the measurements taken at the maximum magnification. Measurements in the text are in millimeters and recorded to two decimal places.

Descriptions were generated using a database application, vSysLab ([purl.oclc.org/NET/hymenoptera/vsyslab](http://purl.oclc.org/NET/hymenoptera/vsyslab)), designed to facilitate the production of a taxon by character data matrix, and to integrate this with the existing taxonomic and specimen-level database. In the Material Examined sections, the locality data reported for holotypes are not literal transcriptions of the labels: abbreviations are expanded; additional data from the collectors are also included. Holotypes are unambiguously identifiable by means of both the unique identifier and the red holotype label. The numbers prefixed with “OSUC” are unique identifiers for the

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1. <http://biocol.org/urn:lsid:biocol.org:col:32972>
  2. <http://biocol.org/urn:lsid:biocol.org:col:32975>
  3. <http://biocol.org/urn:lsid:biocol.org:col:1012>
  4. <http://biocol.org/urn:lsid:biocol.org:col:33791>
  5. <http://biocol.org/urn:lsid:biocol.org:col:1014>
  6. <http://biocol.org/urn:lsid:biocol.org:col:1014>

individual specimens. Details on the data associated with these specimens may be accessed at the following link, [purl.oclc.org/NET/hymenoptera/hol](http://purl.oclc.org/NET/hymenoptera/hol), and entering the identifier (e.g., OSUC 231234) in the form. This server is also used for the creation of dynamically created maps reported on the descriptions section under the legend “Link to Distribution Map”. The authorship of the new taxa reflects the contribution of each individual.

The contributions of the individual authors are: A.A. Valerio: character definition, species concept development; key development, imaging, capture of specimen data; L. Masner: development of the CNCI collection, species concept development, key development; A.D. Austin: species concept development, manuscript preparation; N.F. Johnson: treatment of fossil genera, manuscript preparation.

### Key to the world *Neuroscelio* species:

- 1 T2 with costae developed at least basally (Figs. 3, 4, 10, 16, 22); body size variable ..... 2
- T2 entirely smooth, with no longitudinal costae; body length less than 1.6 mm ..... 6
- 2 Vertex, mesoscutum and mesoscutellum finely coriaceous, with no punctures (Fig. 24); body length less than 1.4 mm; metascutellum unarmed, large ..... *N. orientalis* Masner & Valerio n.sp.
- Vertex, mesoscutum and mesoscutellum punctate, punctures variable in size (Figs. 1, 2, 18); body length greater than 1.9 mm; metascutellum always armed with medial subtriangular projection ..... 3
- 3 T2 with costate sculpture longest medially and shortest at sides, lateral margins of tergite smooth; mesoscutum and mesoscutellum mainly smooth except for fine scattered punctures ..... *N. stirlingsis* Galloway, Austin & Masner
- T2 with costate sculpture shortest medially and longest at sides (Fig. 3), or, all costae subequally long (Fig. 16); mesoscutum and mesoscutellum never with sculpture as described above, if punctures present then large and very clearly defined ..... 4
- 4 Vertex predominantly smooth (Fig. 2); T2 with longitudinal costae of about the same length but sometimes costae weaker at meson (Fig. 4) ..... *N. noyesi* Galloway, Austin & Masner
- Vertex with coriaceous and scattered punctulate sculpture throughout or with large, dense punctures (Fig. 1); length of longitudinal costate sculpture on T2 variable ..... 5
- 5 T2 costae shortest medially, longest at sides, leaving large, smooth area posteromedially (Fig. 3); vertex, mesoscutum and mesoscutellum with large, dense punctures (Fig. 1) ..... *N. doddi* Galloway, Austin & Masner
- T2 costae equally long, reaching almost to posterior margin of tergite, leaving only narrow smooth strip (Fig. 16); vertex, mesoscutum and lateral portions of mesoscutellum with fine coriaceous sculpture and fine scattered punctures (Fig. 18) ..... *N. lagunai* Valerio & Austin n.sp.
- 6 Propodeum with small but distinct medial tooth; posterodorsal part of mesosoma subhorizontal so that metanotum is clearly visible in dorsal view; antennal club entirely brown ..... *N. nervalis* Dodd
- Propodeum without medial tooth; posterior margin of mesoscutellum virtually hides metanotum in dorsal view; two apical antennomeres yellow white, remainder brown ..... *N. storeyi* Galloway, Austin & Masner

### Species descriptions

#### *Neuroscelio doddi* Galloway, Austin & Masner

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urn:lsid:biosci.ohio-state.edu:osuc\_concepts:4938

Figs. 1, 3, 5, 7–12, 26–29; Morphbank<sup>7</sup>

*Neuroscelio doddi* Galloway, Austin & Masner, 1992: 533, 537 (original description, female, keyed).

**Description of male.** Body length: 2.26–2.44 mm.

Head massive, relatively wider than in female (length: 0.36–0.44 mm; width: 0.80–0.86 mm; height: 0.60–0.63 mm); antennal scrobe very well impressed, short with transversely costate sculpture; antenna short, of 12 segments, not clavate, A6–A11 subquadrate, A12 more elongate; frons setose, lower half with dense,

7. <http://www.morphbank.net/?id=465312>

weak, rugulose sculpture, otherwise covered with dense colliculate sculpture as well as clypeus and lower gena, areas next to compound eyes mixed with rugulose sculpture; mandible very wide, with 3 wide teeth, very setose at basal half; clypeus wider, longer, more concave than in female, with conspicuous punctation; gena and occiput smooth, enlarged, gena wider (1.50–1.80 mm) than height of eye (0.24–0.33 mm).

Metapleuron with less transversely lineate sculpture than in female, smooth areas clearly evident.

Metasoma longer (0.94–1.13 mm) than wide (0.68–0.71 mm); T1 wider (0.51–0.57 mm) than long (0.30–0.35 mm); T2 wider (0.68–0.71 mm) than long (0.46–0.48 mm); most of T1 with longitudinal costate sculpture, fewer and more interrupted than in female; T2 with most of median area smooth, this area increasing in width posteriorly, otherwise with fine longitudinal costae, sculpture less clearly defined than in female, more sinuate, almost rugulose.

**Material examined.** AUSTRALIA: New South Wales, Styx River State Forest, 2.3 km SE Brushwood Road, 29 km SE Wollomombi, 960 m, 19.I–2.II.1994, K. MacGregor, rainforest, flight intercept trap, female (OSUC 147241); West End Thru Road, 24 km SE Wollomombi, 980 m, 15.XII.1993–2.I.1994, 3 females (OSUC 147243–147245); Cedar Pit Flora Reserve, 42 km SE Wollomombi, 935 m, 2.I.1994, female (OSUC 147242) (CNCI).

Queensland, Brisbane Forest Park off Mt. Nebo Road, 27°24.05'S 152°48.11'E, 13–19.XII.2002, *Eucalyptus* forest, Malaise trap, J. George, J. Munro, A. Owen, female, male (OSUC 147260, 147261); Queensland, Mt. Glorious, 27°19'54"S 152°45'29"E, 5–12.XII.1998, N. Power, Malaise trap, female, male (OSUC 147240, 147259); 8.XI.1998, female (OSUC 147238); 30.XII.1998, female (OSUC 147239); 7–13.II.1998, 7 females (OSUC 147251–147255, 147257, 147258); 29.XI–5.XII.1997, T. Hiller, female (OSUC 147246); 24–30.XI.1997, T. Hiller, 4 females (OSUC 147247–147250) (CNCI). Kirrama Range, Douglas Creek Road, 800 m, 15.XII.1986–11.I.1987, Monteith, Thompson & Hamlet, flight intercept trap, female (ANIC Database 32 020714) (ANIC).

South Australia, Urrbrae, Waite Campus Arboretum, 34°58'05"S, 138°37'52"E, 22.XII.1994–4.I.1995, J. Jennings, 2 females (OSUC 263647, 263648) (WINC).

#### Link to Distribution Map.<sup>8</sup>

**Comments.** The two specimens from southeast Queensland are the first males of *Neuroscelio* to be discovered (Deposited at CNCI). They differ strikingly from the female in the setation and sculpture of the face, the enormous mandibles, and the enlarged head. These features may be specific to *N. doddi* and not characteristic for males of other species of the genus. Additionally, we report two specimens from South Australia, and several specimens from New South Wales, which extend considerably the distribution of *Neuroscelio* in Australia. Further, the South Australian specimens indicate that the genus also inhabits seasonally dry Mediterranean habitats compared with the wetter habitats of eastern Australia from where most specimens are recorded.

*Neuroscelio doddi* is the only species represented by any significant number of specimens. Among these, we observed differences in the extent of the longitudinal costae on T2 and the size of the posteromedial smooth area. The specimens from New South Wales have the longitudinal costae appreciably longer medially than other specimens, so that the smooth field is rather small in area. Additionally, the Styx River specimens have the submedian carinae on T1 higher and more clearly differentiated from the flanking longitudinal costae.

With respect to metasomal morphology, the males (as do females) possess a set of very long setae on the cerci (Fig. 29 vs. Fig. 28), which also occur in *N. orientalis* n. sp., even though the latter species shows a very different morphology compared with the Australian taxa (i.e. antenna and mandibles) (Fig. 30).

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8. <http://hol.osu.edu/map-large.html?id=4938>

***Neuroscelio lagunai* Valerio & Austin, new species**

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urn:lsid:biosci.ohio-state.edu:osuc\_concepts:245136

Figure 13–18; Morphbank<sup>9</sup>

**Description.** Female: Body length: 2.85 mm. Body color: head and mesosoma black; legs, fore and mid coxae, A1, A2 light yellow; metasoma, A3–A12, hind coxae dark brownish yellow; mandibular teeth brownish yellow, mandible otherwise yellow.

Head wider (0.72 mm) than long (0.34 mm); clypeus (0.18 mm) slightly smaller than distance between outer rim of toruli (0.20 mm); antennal scrobe with transverse, v-shaped, sinuate costae; clypeus, malar space, areas surrounding scrobe coriaceous, setose; eyes with IOS:EH = 0.46:0.40, LOL:POL:OOL = 0.04:0.09:0.18; OD = 0.07; frons, vertex and upper third of gena coriaceous throughout; upper mid half of gena with scattered faint sinuate impressions, remainder of gena smooth except for few scattered setigerous punctures; occipital carina simple dorsally, without sculpture, laterally with small dense crenulation; postgena smooth except for sparse punctate sculpture associated with golden setae; mandible tridentate, broad basally, with setigerous punctures at mid longitudinal area, dorsal tooth very small, round, remaining teeth well defined, acute; radicle short; A1 when antenna flexed reaching top of vertex but not surpassing it; antennal clava elongate, thick; antennal segments in the following proportion of length to width, A1 = 0.50:0.12, A2 = 0.18:0.09, A3 = 0.11:0.09, A4 = 0.07:0.10, A5 = 0.07:0.12, A6 = 0.12:0.13, A7 = 0.09:0.15, A8 = 0.10:0.15, A9 = 0.09:0.15, A10 = 0.08:0.13, A11 = 0.10:0.13, A12 = 0.15:0.10.

Mesosoma longer (1.03 mm) than wide (0.84 mm); pronotum, cervical pronotal area, posterior half of lateral pronotal areas weakly coriaceous, remainder of pronotal lateral areas mostly smooth except for sparse weak longitudinal costae; pronotal shoulders coriaceous; mesoscutum wider (0.78 mm) than long (0.50 mm), covered with golden semi-erect setae and coriaceous sculpture throughout, ratio of length of anterior to posterior margin of median lobe 0.46:0.22; notaulus straight, very narrow, with few transverse ridges that do not reach upper edge at mid third of its length, otherwise without crenulations; transscutal articulation with large, well demarked foveae delineating anterior edge of mesoscutellum with series of semi-round notches; mesoscutellum wider (0.57 mm) than long (0.43 mm), without broad teeth at mid anterior area, posterior edge with dense, deep crenulations, scattered setigerous punctures at anterior and lateral edges mixed with very faint coarse sculpture, mid area smooth except for sparse shallow punctate sculpture; metanotum and metascutellum with large foveae throughout; metascutellum not conspicuously projecting backwards medially; propodeum dorsally with longitudinal rugulae which sometimes do not reach posterior propodeal edge, lateral area with weak rugose sculpture; posterolateral corners not conspicuously prominent, slightly rounded, nucha well developed; upper mesopleural depression with coarse transverse costate sculpture, otherwise smooth, mesepisternum below femoral depression weakly rugulose; dorsal metapleural area weakly rugulose, ventral metapleural area separated by longitudinal carina, foveate.

Fore wing slightly infusate throughout, similar to *N. nervalis*, but the pigmented untracheated veins 2Rs, M, and Cu nearly reaching distal margin of fore wing; all veins nebulous and infusate except for R, C+R, r-rs; r-rs not as darkly infusate as other veins; M arising from base of wing. Hind wing: slightly infusate, not as dark as fore wing, venation as in *N. storeyi*.

Metasoma longer (1.12 mm) than wide (0.87 mm); T1 wider (0.78 mm) than long (0.32 mm), with dense setae laterally, mid anterior half with smooth longitudinal depression, remainder of tergite with well-developed cristate sculpture; T2 wider (0.54 mm) than long (0.78 mm), with well-developed longitudinal costae of approximately the same length throughout anterior three-fourths of its length, sculpture becoming finer posteriorly, lateral areas setose, posterior one-third with few setae at mid-lateral areas; T3–T6 strongly transverse, combined length (0.37 mm) less than length of T2 (0.54 mm); T3 sparsely setose, with two rows of setigerous punctures; T4–T6 with progressively denser, shorter setae towards T6; T7 subtriangular, with 2

9. <http://www.morphbank.net/?id=474169>

long setae at anterior lateral areas that reach anteriorly to mid length of T4; S1 with few well-developed longitudinal carinae; S2 with longitudinal costate sculpture which becomes less cristate towards lateral and posterior areas of sternite, longitudinal sculpture extending through four-fifths of length of sternite, anterior edge with pronounced punctures; remainder of metasomal sterna with dense setigerous punctures, without longitudinal carinae.

Male: unknown.

**Diagnosis.** This is the only species with the combination of longitudinal costae on T2 that are equal in length (Fig. 16) and the vertex, mesoscutum and mesoscutellum with fine coriaceous sculpture and fine scattered punctures (Fig. 18). This species is very similar to *N. doddi* but can be distinguished from it by the equally long costae on T2, the sparse punctate sculpture on the vertex, the lack of sculpture at the upper mid section of the occipital carina, as well as the lack of coarse punctures on the mesoscutum. Similarly, *N. lagunai* may be distinguished from *N. noyesi* in that the vertex and frons are predominantly smooth (Fig. 2), whereas in *N. lagunai* the vertex is coarsely sculptured.

**Etymology:** This species is dedicated to the memory of Reinaldo José Laguna Miranda, a close friend of AAV and Jessica Antonia Díaz: “¡vamos pa’la alegría!”

**Link to Distribution Map.**<sup>10</sup>

**Comments:** The holotype was collected while sweeping next to the edge of closed wet forest facing the arboretum at the Crommellin Biological Station, Pearl Beach, NSW. This area comprised low vegetation and fallen branches. We also have a second female specimen (OSUC 261686, deposited in CNCI), collected at Garradunga in Far North Queensland, a distance of over 2000 km from the type locality. The T2 sculpture is very similar in the two specimens, with extensive long subequal longitudinal costae and a narrow smooth transverse strip. However, the two differ in the structure of the propodeum, the distance between the lateral and median ocelli, the shape of the metascutellum, and the sculpture of the mesoscutellum. In view of these differences, the great distance between the two collecting localities, and the minimal number of specimens available we prefer not to formally assign the Queensland specimen to any species until more material is available to assess intra and/or interspecific differences.

**Material Examined.** Holotype female: **AUSTRALIA:** New South Wales, Pearl Beach, 50 km N Sydney, Crommellin Biological Field Station, 18–24.II.2008, at edge of forest, 33.5511°S 151.2978°E, A. Austin, S. Thompson, A. Valerio (OSUC 239227). Deposited at AMS.

### ***Neuroscelio orientalis* Masner & Valerio, new species**

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urn:lsid:biosci.ohio-state.edu:osuc\_concepts:245135

Figures 19–25, 30; Morphbank<sup>11</sup>

**Description.** Female: Body length: 1.37 mm. Body color: head, mesosoma (except mesoscutellum) dark brown; mesoscutellum, metasoma generally lighter brown, T6–T7 conspicuously more yellowish, anterior edges of T1 and S1 as dark as mesosoma; coxae honey yellow, remainder of legs light yellow; A1–A5 yellow, A6–A12 slightly darker.

Head wider (0.44 mm) than long (0.28 mm); width of clypeus subequal to distance between outer margins of toruli (0.11:0.12); head coriaceous, except scrobe with transverse fine costae which bend towards malar space laterally; central keel very weakly developed; IOS:EH = 0.29:0.19; LOL:POL:OOL = 0.04:0.10:0.08; OD = 0.05; vertex without large setigerous punctures; gena weakly coriaceous; occipital carina crenulate medially; mandible bidentate, teeth elongate, acute, lower tooth clearly longer than upper; antennal clava (Figs. 19, 25) massive, thick, not much elongated; radicle short; A1 when antenna flexed surpassing vertex; antennal

10. <http://hol.osu.edu/map-large.html?id=244588>

11. <http://www.morphbank.net/?id=465309>

segments in the following proportions of length to width, A1 = 0.28:0.05, A2 = 0.11:0.40, A3 = 0.06:0.40, A4 = 0.04:0.40, A5 = 0.05:0.50, A6 = 0.06:0.09, A7 = 0.05:0.10, A8 = 0.05:0.10, A9 = 0.04:0.09, A10 = 0.04:0.09, A11=0.06:0.08, A12=0.05:0.05.

Mesosoma as long (0.44 mm) as wide (0.44 mm); pronotum coriaceous throughout, sculpture less well defined, denser at pronotal shoulders; mesoscutum wider (0.38 mm) than long (0.25 mm); mesoscutum and mesoscutellum densely coriaceous, no large setigerous punctures visible; notauli present in posterior one-third of mesoscutum, wide, with conspicuous ridges across its length; mesoscutellum wider (0.24 mm) than long (0.13 mm); transscutal articulation with dense well-marked subrectangular foveae which delineate anterior edge of mesoscutellum; metascutellum semicircular, large, posterior edge unarmed, convex; propodeum with short medial anterior triangular spine, in lateral view spine extends posteriorly well into propodeal nucha as median longitudinal carina, posterior edge of propodeum with two submedial depressions, posterolateral corners not conspicuously prominent, nucha short, remainder of propodeum longitudinally costate; upper mesopleuron with few fine longitudinal costae, anterodorsal one-third with few elongated drop-shaped foveae, mesopleural depression smooth, anteroventral half of mesopleuron rugulose, remainder of mesopleuron smooth; metapleuron with weak, coarse foveae, sculpture finer, sparser medially.

Fore wing similar to *N. nervalis*, except for more acute angle at union of M and 1Rs, M+Cu vein upcurved medially; R, R1, r-rs, Rs+M and M+Cu infusate, Rs+M slightly darker; 2Rs, M not reaching distal wing margin, very slightly infusate. Hind wing similar to *N. storeyi* except that the wing is narrower; veins Sc+R and R well infusate, vein 1Rs slightly infusate.

Metasoma length greater than width (0.60:0.43); T1 wider than long (0.64:0.30), with well-developed longitudinal costae, posterior margin smooth, median longitudinal area with costae sparser than laterally; T2 wider than long (0.43:0.27), with short, fine costae not exceeding basal fourth of length of tergite, otherwise smooth; T3–T6 strongly transverse, combined length (0.20 mm) slightly less than T2 length (0.27 mm); T3 sparsely setose, with one row of setigerous punctures; T4–T5 each with one row of setae across its width; T6–T7 smooth, with sparse setation at posterior margin; T7 subrectangular, with 2 long setae that curve anteriorly to reach mid length of T4 (Fig. 30, s); S1–S2 with few, well-developed, short longitudinal carinae anteriorly, otherwise smooth; S3 with short and thick ridges at anterior margin, anterior one-third with fine, very weak longitudinal costae, otherwise smooth except for extensive felt fields.

Male: unknown.

**Diagnosis.** This species is distinguished by the combination of the equally long costae on T2 (Fig. 22) and the coriaceous, but unpunctured vertex, mesoscutum and mesoscutellum (Fig. 24). It exhibits a mix of the characters that Galloway *et al.* (1992) used to distinguish their two unnamed species groups. The unarmed metascutellum, massive clava (Fig. 25 vs. Figs. 13, 26), bidentate mandible with acute, elongate teeth (Fig. 23) and small body size further characterize this species. Additionally, in *N. orientalis* the mesopleural sculpture and shape differs greatly from the observed sculpture in *N. noyesi*, *N. doddi* and *N. lagunai* n.sp. (Figs. 5, 6, 15 vs. Fig. 21).

**Etymology.** The epithet refers to the Oriental zoogeographical region from which it was collected.

**Material Examined.** Holotype female: **VIETNAM:** Hà Tĩnh, Hương Sơn, 600 m 18°22'N 105°13'E, 7–14.IV.1998, L. Herman, Malaise trap (OSUC 147263). Deposited in AMNH.

**Link to Distribution Map.**<sup>12</sup>

**Comments.** The discovery of *N. orientalis* in Vietnam is the first record for the genus outside of Australia and expands the known distribution of *Neuroscelio* into the Oriental region.

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12. <http://hol.osu.edu/map-large.html?id=195035>

## Discussion

Among the taxa known from fossils (Johnson *et al.*, 2008), *Neuroscelio* is similar to the Baltic (Eocene) amber genus *Brachyscelio* Brues (1940) which is known from two species; *B. cephalotes* Brues (Figs. 31, 32), the type species of the genus, and *B. dubius* Brues (Figs. 33, 34). These similarities include their general habitus, stout appendages, the medially narrowed pronotum, and the structure of the notauli. Unfortunately, many critical characters are not visible in the available fossils, such as the malar sulcus, tibial spur formula and the propodeum. Thus we are unable to properly document and assess the relationship between the two genera. The Cretaceous genus *Cenomanoscelio* Schlüter (1978) has a similar stout and robust habitus, with the lateral ocelli distinctly separated from the inner orbits (similar to Figs. 32, 34). However, we have not yet been able to obtain and study this unique fossil specimen, so any assertion of relationship would be speculative.

In *Neuroscelio*, *Brachyscelio* (see Dangerfield *et al.* 2001) and *Cenomanoscelio* the fore wing venation is relatively well developed, although the pattern is quite different in *Neuroscelio* which possesses a nebulous Rs+M and the medial part of Cu is interrupted. However, it is often difficult or impossible to distinguish tracheate from nebulous veins in amber fossils. A large number of extant scelionid species exhibit traces of 2Rs, M, Cu, and Rs+M in the form of nebulous veins, but no phylogenetically important pattern in reduction of these veins has yet been recognized.

*Neuroscelio* possesses a number of significant character states that are likely plesiomorphic for the superfamily as a whole: the 1-2-2 tibial spur formula, the lack of a malar sulcus (Figs. 11, 23), the undivided clypeus (Figs. 11, 23), and the unflexed anterior margin of the mesoscutum (Figs. 1, 2, 12, 18, 24). The keeled S1 may also be plesiomorphic, and is shared with other plesiomorphic genera, *viz.* *Sparasion* Latreille, *Sceliomorpha* Ashmead, *Listron* Musetti & Johnson, *Mexon* Masner & Johnson, *Plaumannion* Masner & Johnson, and *Huddlestonium* Polaszek & Johnson. On the basis of such morphological characters, none of which are shared with *Gryon*, as well as the molecular analysis of Murphy *et al.* (2007), we conclude that *Neuroscelio* is not closely related to the tribe Gryonini. In fact, it bears little similarity to any extant platygastroids, and we cannot place it within any of the tribes currently recognized.

The new material of *Neuroscelio* reported here expands the distribution of the genus into southeastern Australia. Further, the discovery of *N. orientalis* in Vietnam further expands this distribution into the Oriental region. This species was collected in tropical moist broadleaf forest (Olson *et al.* 2001). While *N. orientalis* is different in size and morphology from the Australian species in terms of its antennal clava, metascutellum, and mandible, we believe that they are clearly congeneric. The intervening region between Australia and Vietnam is still poorly sampled. The relative paucity of specimens from the much better-collected eastern Australia suggests that these species, or their hosts, are rare and, not surprisingly, the host of *Neuroscelio* remains unknown.

## Acknowledgments

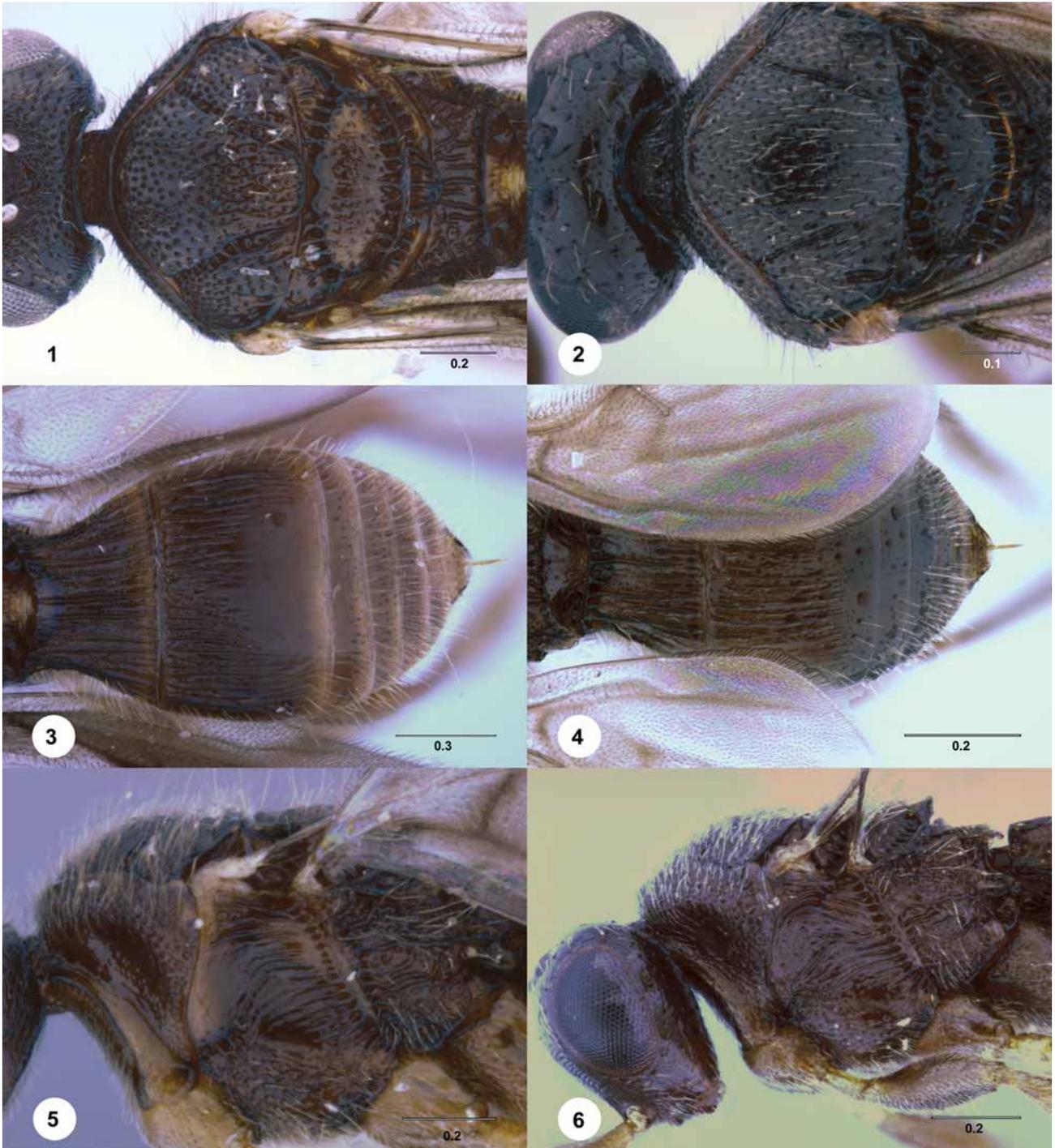
We thank Dr. Luciana Musetti for comments on the manuscript and Joseph Cora for technical assistance. This material is based upon work supported by the National Science Foundation under grant No. DEB-0614764 to N.F. Johnson and A.D. Austin, DEB-0344034 to N.F. Johnson, and the Australian Biological Resources Study to A.D. Austin.

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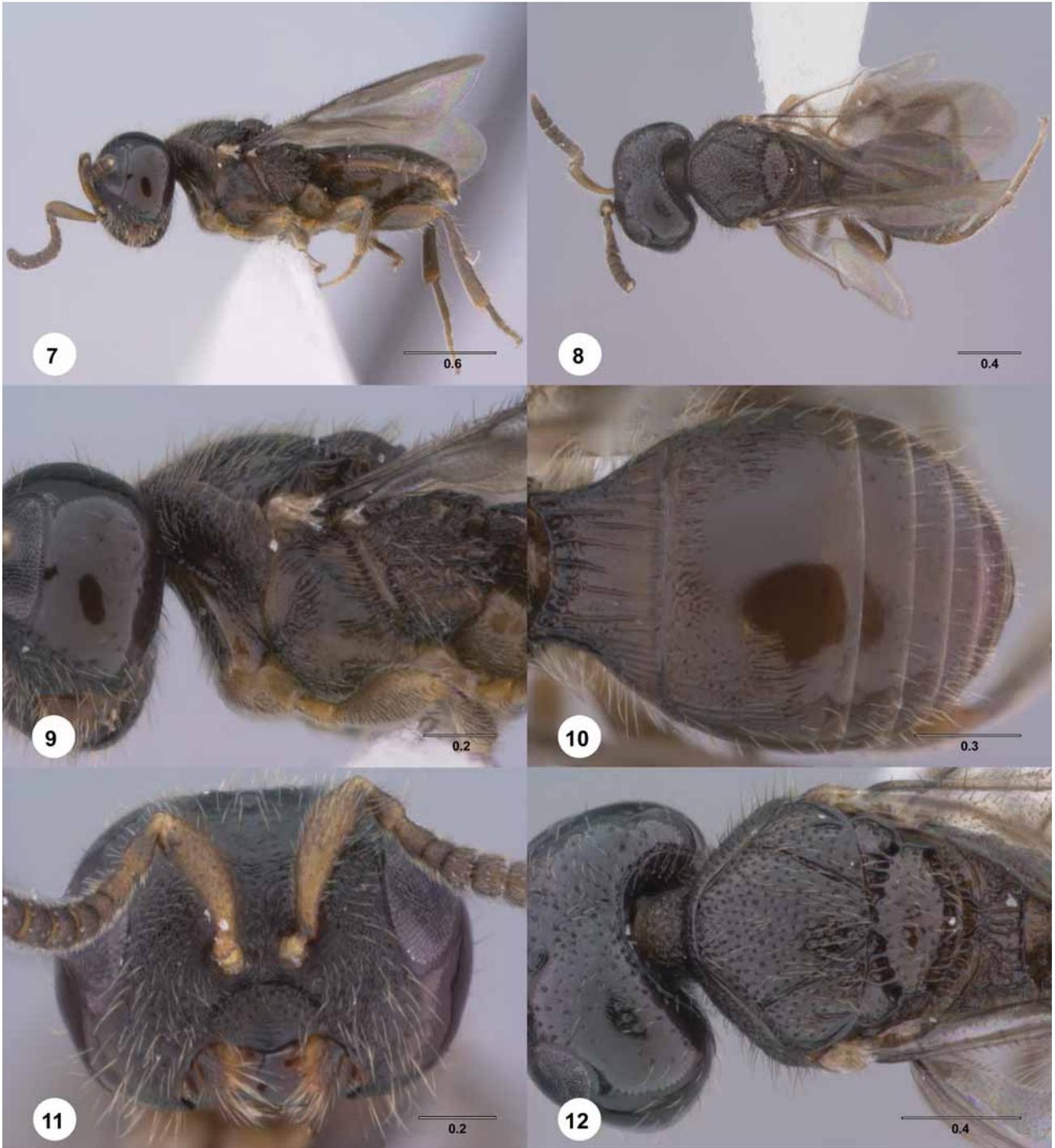
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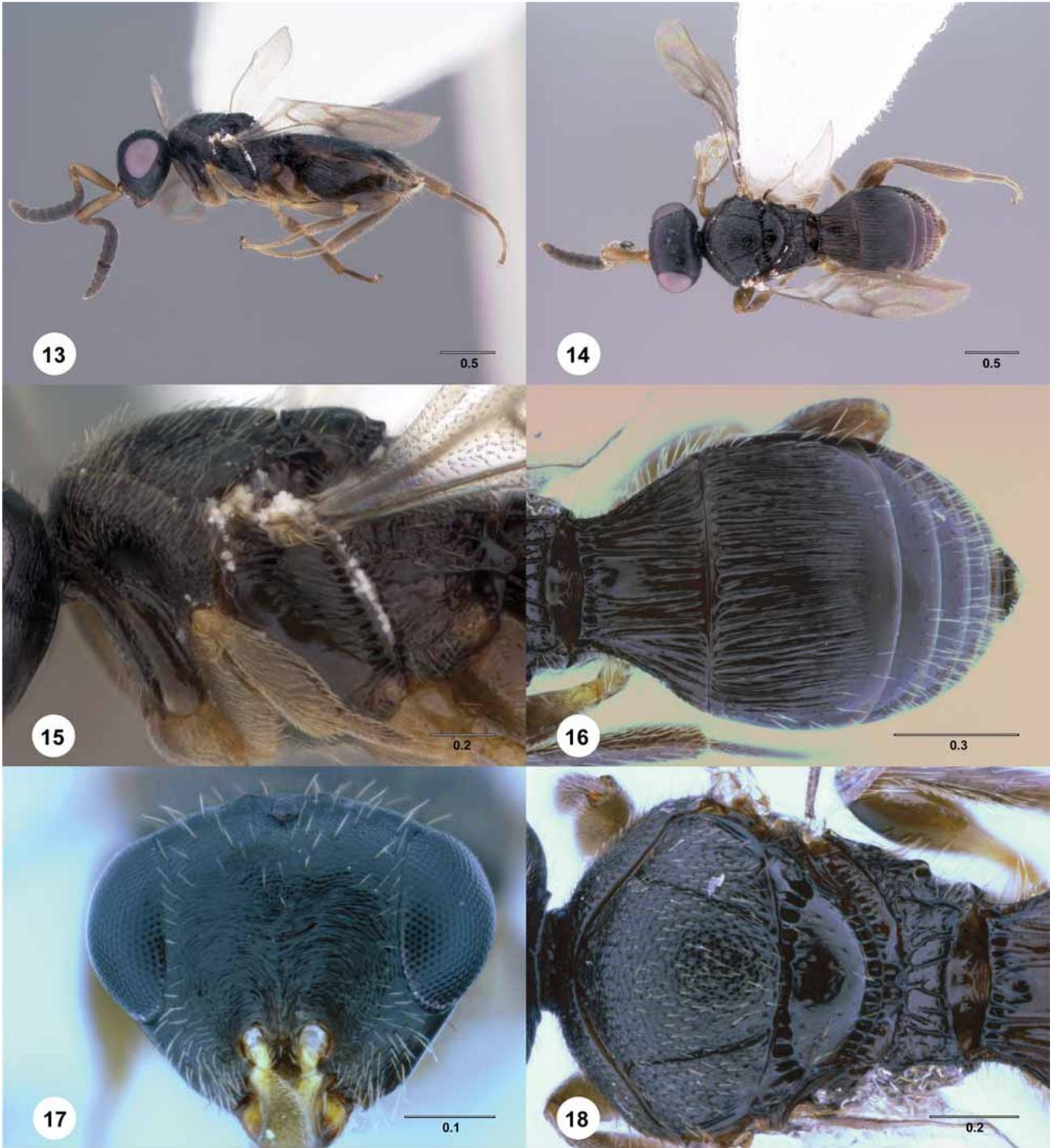
**FIGURES 1, 3, 5.** *Neuroscelio doddi*, paratype female (OSUC 239229). **1**, mesosoma, dorsal view; **3**, metasoma, dorsal view; **5**, mesosoma, lateral view. **FIGURES 2, 4, 6.** *Neuroscelio noyesi*, female (OSUC 239228). **2**, mesosoma, dorsal view; **4**, metasoma, dorsal view; **6**, mesosoma, lateral view. Scale bars in millimeters. Morphbank<sup>24</sup>

24. <http://www.morphbank.net/?id=465318>



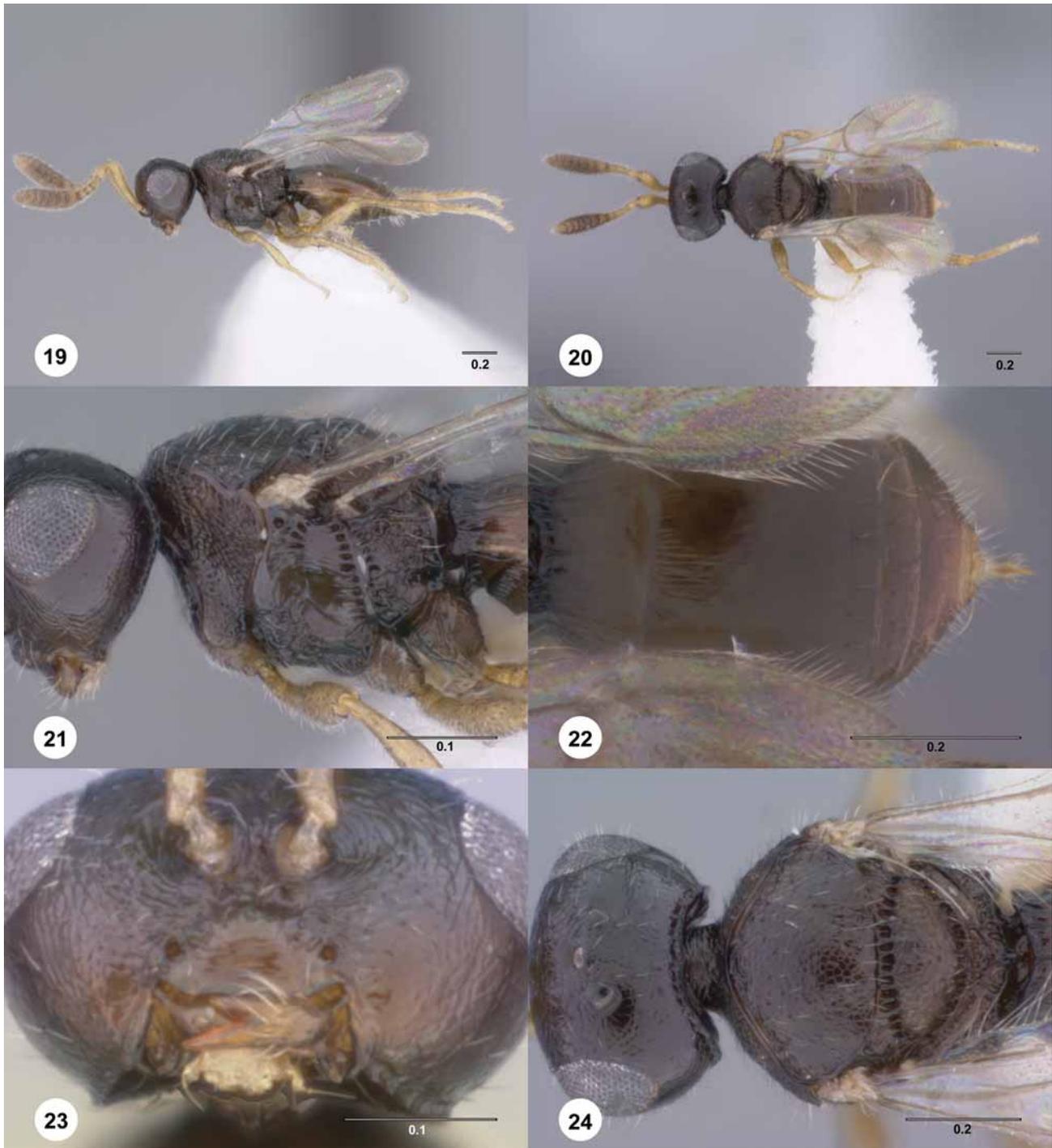
**FIGURES 7–12.** *Neuroscelio doddi*, male (OSUC 147261). **7**, lateral habitus; **8**, dorsal habitus; **9**, mesosoma, lateral view; **10**, metasoma, dorsal view; **11**, head, anterior view; **12**, mesosoma, dorsal view. Scale bars in millimeters. Morphbank<sup>25</sup>

25. <http://www.morphbank.net/?id=465319>



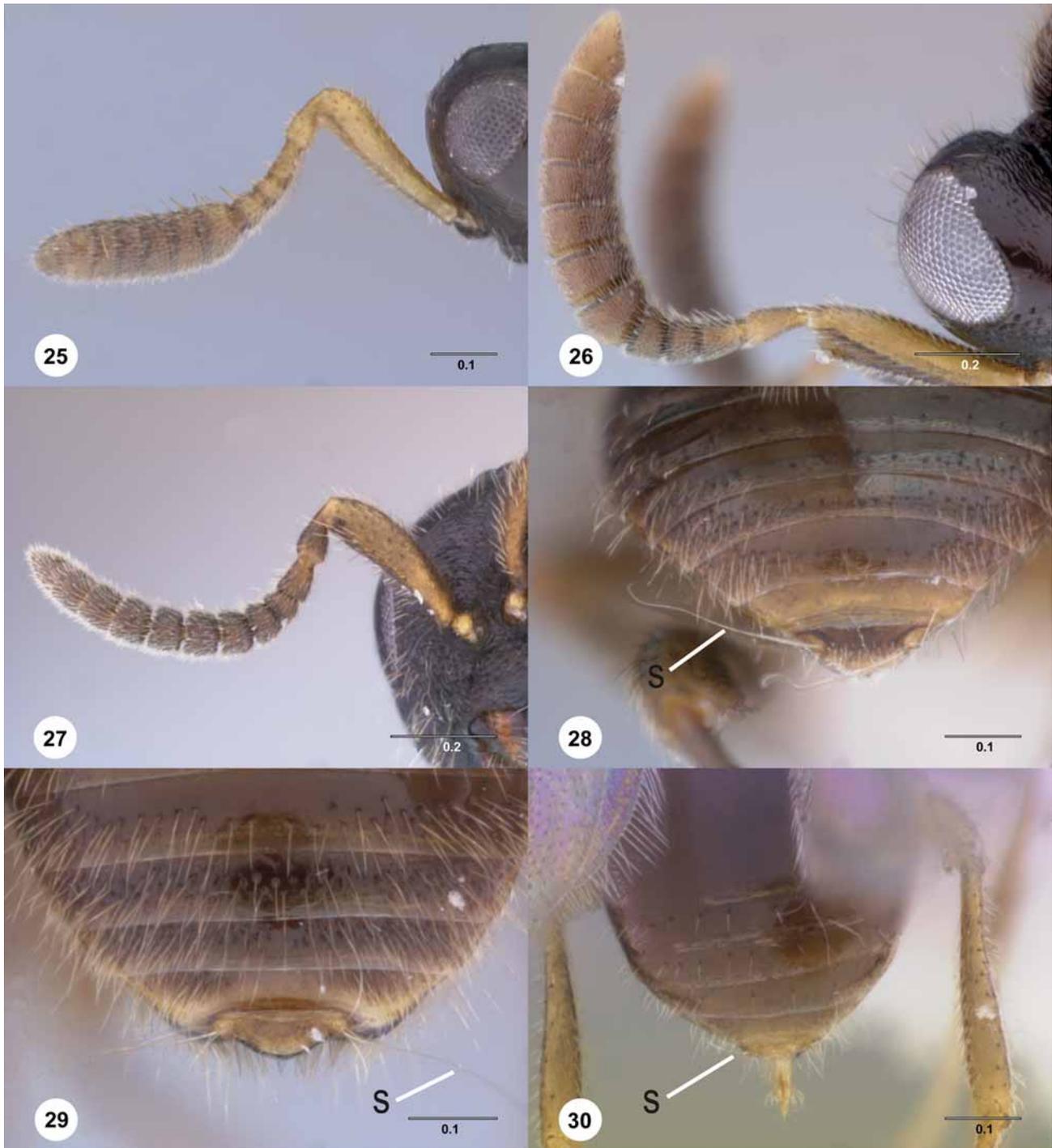
**FIGURES 13–18.** *Neuroscelio lagunai*, n. sp., holotype female (OSUC 239227). **13**, lateral habitus; **14**, dorsal habitus; **15**, mesopleuron, lateral view; **16**, metasoma, dorsal view; **17**, head, anterior view; **18**, mesosoma, dorsal view. Scale bars in millimeters. Morphbank<sup>26</sup>

26. <http://www.morphbank.net/?id=465316>



**FIGURES 19–24.** *Neuroscelio orientalis* n. sp., holotype female (OSUC 147263). **19**, lateral habitus; **20**, dorsal habitus; **21**, mesosoma, lateral view; **22**, metasoma, dorsal view; **23**, head, ventral view; **24**, head, mesosoma, dorsal view. Scale bars in millimeters. Morphbank<sup>27</sup>

27. <http://www.morphbank.net/?id=465317>



**FIGURES 25–30.** Details of *Neuroscelio* spp. **25**, *Neuroscelio orientalis*, n. sp., holotype female (OSUC 147263), antenna, lateral view; **26**, *N. doddi*, female (OSUC 58480), antenna, lateral view; **27**, *N. doddi*, male (OSUC 147261), antenna, mesal view; **28**, *N. doddi*, male (OSUC 147261), apex of metasoma, dorsal view; **29**, *N. doddi*, female (OSUC 58480), apex of metasoma, dorsal view; **30**, *N. orientalis*, n. sp., holotype female (OSUC 147263), apex of metasoma, dorsal view. *s*, elongate setae arising from cercus. Scale bars in millimeters. Morphbank<sup>28</sup>

28. <http://www.morphbank.net/?id=465320>



**FIGURES 31–32.** *Brachyscelio cephalotes* Brues, holotype female. **31**, dorsal habitus; **32**, head and mesosoma, dorsal view. **33–34.** *Brachyscelio dubius* Brues, holotype female. **33**, dorsal habitus; **34**, head and mesosoma, dorsal view. Scale bars in millimeters. Morphbank<sup>29</sup>

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29. <http://www.morphbank.net/?id=474173>