



## Two new genera and two new species of Oriental dictyopharid planthoppers (Hemiptera: Fulgoromorpha: Dictyopharidae) from Sri Lanka and southern India

ZHI-SHUN SONG & AI-PING LIANG<sup>1</sup>

Key Laboratory of Zoological Systematics and Evolution, Institute of Zoology, Chinese Academy of Sciences, Beijing 100101, China.

E-mail: songzs@ioz.ac.cn

<sup>1</sup>Corresponding author. E-mail: liangap@ioz.ac.cn

### Abstract

Two new Oriental dictyopharid genera are described from Sri Lanka and southern India, respectively. *Truncatomeria* **gen. nov.** is established based on a single known species from Sri Lanka. Its type species, *Dictyophora* [sic] *viridistigma* Kirby, 1891 was first described in *Dictyophara* and then assigned to *Centromeria* Stål by Distant (1906). However, it bears many different characters from other *Centromeria* species and should be transferred to a new genus. The second new genus, *Paradictyopharina* **gen. nov.** is established for two new species, *P. parallela* **sp. nov.** and *P. spina* **sp. nov.**, both from southern India. The new genus is externally similar to *Dictyopharina* Melichar, but can be distinguished from the latter by the differences of its mesonotum, fore femora, hind tibiae and aedeagus. Photographs of the adults of all species are presented. Descriptions of the two genera and their included species are provided together with structural illustrations.

**Key words:** Fulgoroidea, new genus, new species, Oriental region

### Introduction

The planthopper family Dictyopharidae is one of the largest families of 28 Fulgoromorpha families currently recognized, including nearly 760 described species in 159 genera (not 400 genera as stated by Song & Liang 2006a), widely distributed in most parts of the world, especially in the tropical regions such as South America, Oriental region and the East Indies (Metcalf 1946; Bourgoïn 2008).

While reviewing *Centromeria* Stål, 1870 species in the Oriental region (Song & Liang, in prep.), we suggested that *C. viridistigma* (Kirby 1891) was placed incorrectly in the genus. The species was first described as *Dictyophara* by Kirby (1891), and then assigned to *Centromeria* by Distant (1906). It has been considered a *Centromeria* species for more than a century by reason of the body color and the frons with median carina very strongly produced, similar to *Centromeria* species. Based on examination of type material and morphological comparative studies, the species should be transferred to a new genus because it bears many different characters from true *Centromeria* species.

The authors have redescribed the genus *Dictyopharina* Melichar, 1903 in the Oriental region and added four new species from southern China and Southeast Asia (Song & Liang 2006a, b). While examining specimens identified as *D. viridissima* Melichar, 1903 from Sri Lanka and India, we found several specimens representing two new species in a new genus.

In the present paper, two new Oriental dictyopharid genera are described from Sri Lanka and southern India, respectively. The first new genus, *Truncatomeria* **gen. nov.** is established based on a single known species, *Dictyophora* [sic] *viridistigma* Kirby from Sri Lanka. The second new genus, *Paradictyopharina* **gen. nov.** is established for two new species, *P. parallela* **sp. nov.** and *P. spina* **sp. nov.**, both from southern India.

## Material and methods

The specimens studied in the course of this work are deposited in the following institutions whose names are abbreviated in the text as follows:

AMNH	American Museum of Natural History, New York, USA
BMNH	The Natural History Museum (formerly British Museum (Natural History)), London, United Kingdom
CAS	California Academy of Sciences, San Francisco, California, USA
NCSU	Department of Entomology Insect Collection, North Carolina State University, Raleigh, North Carolina, USA
USNM	National Museum of Natural History, Washington, D.C., USA

The male genitalia were cleared in 10% KOH at room temperature for ca. 12 hours, rinsed in distilled H<sub>2</sub>O, then transferred to glycerol for examination.

Morphological characters were observed with a Zeiss (Stemi SV II) optical stereomicroscope and illustrated with the aid of a drawing tube; measurements were made with the aid of an eyepiece micrometer.

The morphological terminology and measurements used in this study follow Kramer (1950).

## Taxonomy

### Genus *Truncatomeria* gen. nov.

**Type species.** *Dictyophora* [sic] *viridistigma* Kirby, 1891, by present designation.

**Diagnosis.** Head (Figs. 1, 2, 5, 6) short, more or less truncate apically; vertex (Figs. 2, 5) with lateral margins carinate and sub-parallel at base, abruptly constricted before eyes, but more or less truncate at apex; frons (Fig. 7) with median carina robust and strongly produced, lateral carinae slightly converging posteriorly and approaching frontoclypeal suture; pronotum (Figs. 2, 5) with median carina sharp and complete, without lateral discal carinae; mesonotum (Figs. 2, 5) tricarinate on disc, with lateral carinae curving anteriorly towards median carina; forewings (Fig. 8) with stigma long with 3–4 cells; legs moderately elongate, fore femora not flattened and dilated, with a short small spine near apex; hind tibiae with 8 apical spines; aedeagus (Figs. 10, 12, 13) with a pair of short phallic processes extended dorsally from phallobasal cavity; phallobase basally sclerotized and pigmented, with apical membranous lobes.

**Description.** Head (Figs. 1, 2, 5, 6) produced in a short and slightly slender cephalic process. Vertex moderately broad, base slightly broader than transverse diameter of eyes in dorsal view (Fig. 5); lateral margins strongly ridged and sub-parallel at base, abruptly constricted before eyes, but more or less truncate at apex; posterior margin angularly concave at about 100°; median carina nearly complete, but relatively distinct and sharp on a bulge at base. Frons (Fig. 7) elongate; anterior margin arched, lateral margins carinate and nearly parallel, posterior margin slightly concave; median carina robust and strongly produced, lateral carinae obsolete developed, slightly converging posteriorly and approaching frontoclypeal suture. Postclypeus and anteclypeus (Fig. 7) convex medially, with distinct median carina. Rostrum long, reaching between hind coxae. Eyes oval and large, purplish-red. Ocelli relatively large, reddish. Antennae with very small scape; pedicel large and subglobose, with more than 50 distinct sensory plaque organs distributed over entire surface; flagellum long, setuliform.

Pronotum (Figs. 2, 5) distinctly shorter than mesonotum medially, narrow anteriorly, broad posteriorly; anterior margin centrally angularly convex, lateral marginal areas straight and sloping with two long longitudinal carinae on each side between eyes and tegulae, posterior margin angularly concave at about 110°; median carina sharp and high, with a big lateral pit on each side. Mesonotum (Figs. 2, 5) tricarinate on disc, lateral carinae curving anteriorly towards median carina. Forewings (Figs. 8) hyaline, ratio of length to width about 3:1; Sc slightly sinuated distad of Sc+R fork, stigma distinct with 3 cells. Legs slender and moderately long; fore femora not flattened and dilated, with a short small spine near apex; hind tibiae with 5 lateral and 8 black-tipped apical spines; hind tarsomeres I with about 10–11 and tarsomeres II with about 10–11 black-tipped apical spines, respectively.

**Etymology.** The new genus name is a combination of latin “truncat” plus the suffix “meria”, which means the head is more or less truncate at apex. The gender is feminine.

**Remarks.** While reviewing *Centromeria* species in the Oriental region (Song & Liang, in prep.), we find *Centromeria viridistigma* has many different morphological characters from *Centromeria* species. Based on examination of type material of *Dictyophora* [sic] *viridistigma*, *Dictyophora* [sic] *longipennis* Walker, 1851 (type species of *Centromeria*) and other *Centromeria* species in BMNH, we here transfer the species to the new genus *Truncatomeria* **gen. nov.**

The new genus can be distinguished from *Centromeria* by its relatively smaller body (9.3–11.2 mm, more than 15 mm in *Centromeria*); the head (Figs. 1, 2, 5, 6) short, more or less truncate at apex (head gradually narrowing to arrowhead in *Centromeria*); the frons (Fig. 7) with lateral carinae approaching frontoclypeal suture (only approaching middle of eyes in *Centromeria*); and the hind tibiae with 8 apical spines (6 in *Centromeria*).

It is also externally similar to *Orthopagus* Uhler, 1896, but can be distinguished from the latter by its frons with median carina robust and strongly produced; the fore femora normal, with a short small spine near apex (flattened and dilated, with a large blunt spine near apex in *Orthopagus*); and the hind tibiae with 8 apical spines (7 in *Orthopagus*).

**Distribution.** Sri Lanka.



**FIGURE 1.** *T. viridistigma*, photographed by Mr Amila Salgado at Sinharaja rain forest, Sri Lanka in Dec, 2008.

***Truncatomeria viridistigma* (Kirby, 1891) comb. nov.**

(Figs. 1, 2, 5–13)

*Dictyophora* [sic] *viridistigma* Kirby, 1891: 135.

*Centromeria viridistigma* (Kirby, 1891): Distant, 1906: 241; Melichar, 1912: 44; Metcalf, 1946: 38.

*Udugama fletcheri* Kirkaldy, 1908: 14.

*Orthopagus fletcheri* (Kirkaldy, 1908): Melichar, 1912: 59. Synonymised by Distant, 1916: 29.

**Description.** ♂, length (from apex of cephalic process to tip of forewings) 9.3–11.2 mm; length of head 1.3–1.4 mm; width (including eyes) 1.3–1.4 mm; length of forewings 7.8–8.8 mm.

General color viridescent in fresh specimens and greenish-ochraceous in dried ones, marked with bluish green and purplish-red. Head (including face) and pronotum bluish green, apex and middle disc of vertex, median carina and area between lateral carinae of frons, lateral margins and broad posterior marginal fasciae (not meeting centrally) of pronotum purplish-red. Mesonotum viridescent, broad stripe along median carina and lateral margins behind tegulae bluish green; area between lateral carinae and median carina purplish-red. Tegulae purplish-red. Forewings and hindwings hyaline, venation fuscous-brown, stigma viridescent. Thorax ventrally pale green, posterior lateral maculae of mesosternum bluish green. Legs testaceous, base of femora more or less green; tarsi piceous. Abdomen above and beneath viridescent or greenish-ochraceous in some specimens.

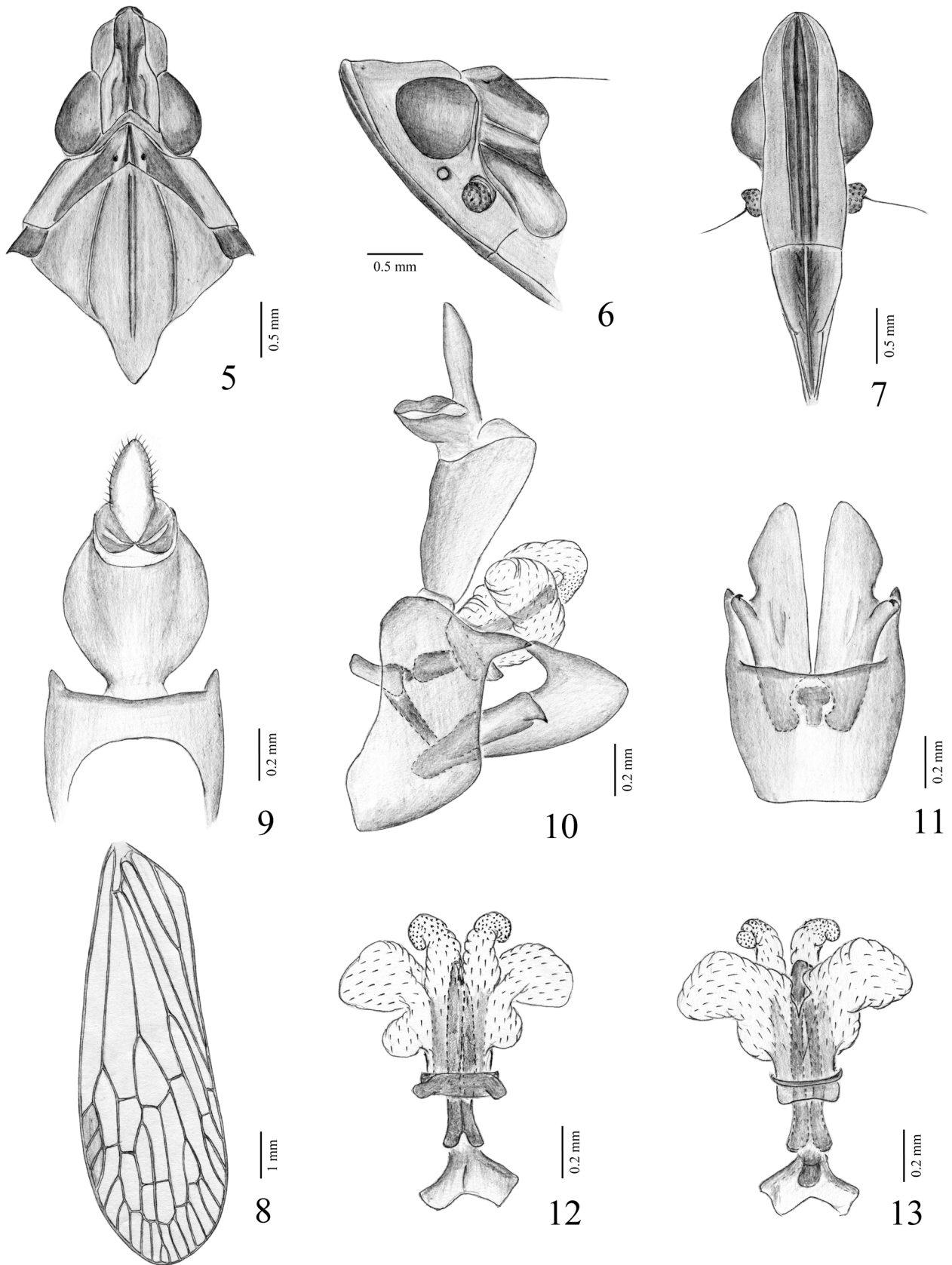
Male genitalia: pygofer relatively small, distinctly wider ventrally than dorsally (about 3.0:1), dorsal margin slightly excavated to accommodate anal tube, dorso-lateral margins angularly produced posteriorly in dorsal view (Fig. 9); posterior margin with a large, angular process, directed posteriorly, near upper middle in lateral view (Fig. 10). Anal tube very large and stout, with ratio of length to width near middle about 1.3:1 in dorsal view (Fig. 9); apical dorsal margin deeply excavated in dorsal view (Fig. 9) to accommodate anal style; anal style distinctly elongate and large. Parameres moderately large, apex strongly expanded, posterior margin nearly straight; upper margin with dorsally directed, black-tipped long process at apex; outer upper edge with a ventrally directed, hook-like process near middle in lateral view (Fig. 10). Aedeagus moderate and stout, with a pair of short phallic processes extended dorsally from phallobasal cavity, apically obtuse; base of dorsal and ventral parts of phallobase sclerotized and pigmented; remainder membranous; dorsal membranous part with two pairs of lobes, lower pair small, directed laterally near base, apical pair elongate, incurved anteriorly and covered with numerous small and short spines in dorsal view (Fig. 12); ventrolateral part with a pair of large lobes, directed laterally at apex in ventral view (Fig. 13).

**Type material examined.** Holotype ♀, [SRI LANKA]: Pundaloya, Ceylon, Dictyophora viridistigma Kb., type, Ceylon, Green Coll. 90-115, Type (BMNH).



**FIGURES 2–4.** 2. *T. viridistigma*, male; 3. *P. parallela*, male, paratype; 4. *P. spina*, male, holotype.





**FIGURES 5–13.** *T. viridistigma* 5. head, pronotum and mesonotum, dorsal view; 6. head and pronotum, lateral view; 7. head, ventral view; 8. left forewing; 9. pygofer and anal tube of male, dorsal view; 10. genitalia of male, lateral view; 11. pygofer and parameres of male, ventral view; 12. aedeagus, dorsal view; 13. same, ventral view.

**Other material examined. SRI LANKA:** 1♂, Ceylon, Kan. Dist. 4.3mi. NW Laksapana, 1000 ft. 1970.IX.25, O. S. Flint, Jr.; 1♂, Col. Dist. Tunmodera, nr. Labugama, 200 ft. 1970.IX.19, O. S. Flint, Jr. (both in USNM).

**Distribution.** Sri Lanka.

### Genus *Paradictyopharina* gen. nov.

**Type species.** *Paradictyopharina parallela* sp. nov., by present designation.

**Diagnosis.** Head (Figs. 3, 4, 14, 15, 24, 25) very short and broad, not distinctly produced in a cephalic process; vertex (Figs. 3, 4, 14, 24) broad and nearly triangular, with median carina nearly complete; frons (Figs. 16, 26) elongate, with lateral margins carinate and nearly parallel, lateral carinae slightly converging posteriorly and approaching frontoclypeal suture; pronotum (Figs. 3, 4, 14) with median carina distinct and complete, without lateral discal carinae; mesonotum (Figs. 3, 4, 14) tricarinate on disc, lateral carinae parallel; forewings (Fig. 17) with stigma long with 3–5 cells; fore femora not flattened and dilated, without spine near apex; hind tibiae with 7 apical spines; aedeagus (Figs. 21–23, 30–32) large and stout, with a pair of phallic processes extended dorsally from phallobasal cavity; phallobase basally sclerotized and pigmented, with numerous strong spines.

**Description.** General color uniformly viridescens in fresh specimens and greenish-ochraceous in dried ones. Head (Figs. 3, 4, 14, 15, 24, 25) very short and broad, not distinctly produced in a cephalic process. Vertex (Figs. 3, 4, 14, 24) broad and nearly triangular, anterior margin somewhat convex, lateral margins carinate and converging anteriorly, posterior margin slightly concave; median longitudinal carina nearly complete, lateral oblique depressions large and distinct. Frons (Figs. 16, 26) elongate; anterior margin somewhat arched, lateral margins carinate and nearly parallel, posterior margin slightly concave; median carina distinct, lateral carinae slightly converging posteriorly and approaching frontoclypeal suture. Postclypeus and anteclypeus (Figs. 16, 26) convex medially, with distinct median carina. Rostrum long, reaching between hind coxae. Eyes oval, brown. Ocelli relatively large, reddish. Antennae with very small scape; pedicel large and subglobose, with more than 50 distinct sensory plaque organs distributed over entire surface; flagellum long, setuliform.

Pronotum (Figs. 3, 4, 14) very short and wide, distinctly shorter than mesonotum medially, narrow anteriorly, broad posteriorly; anterior margin centrally convex, lateral marginal areas straight and sloping with two long longitudinal carinae on each side between eyes and tegulae, posterior margin broadly concave; median carina sharp and high, with a big lateral pit on each side. Mesonotum (Figs. 3, 4, 14) tricarinate on disc; median and lateral carinae parallel. Forewings (Figs. 3, 4, 17) hyaline, ratio of length to width about 3:1; Sc slightly sinuated distad of Sc+R fork, stigma long with 3–5 cells. Legs slender and moderately long; fore femora not flattened and dilated, without spine near apex; hind tibiae with 6 lateral and 7 black-tipped apical spines; hind tarsomeres I with about 26–28 and tarsomeres II with about 22–24 black-tipped apical spines, respectively.

Male genitalia: pygofer narrow and high, ventrally slightly broader than dorsally in lateral view (Figs. 19, 28), posterior margin excavated apically to accommodate anal tube in dorsal view (Figs. 18, 27). Anal tube large and stout, apical ventral margin truncate, protruded angularly on each side in dorsal view (Figs. 18, 27), apical dorsal margin deeply excavated to accommodate anal style in dorsal view (Figs. 18, 27); anal style distinctly elongate and large. Parameres moderately large, apex strongly expanded, upper margin with black-tipped process at apex, directed dorsally, outer upper edge with hooklike process directed ventrally, near middle in lateral aspect (Figs. 19, 28). Aedeagus (Figs. 21–23, 30–32) with a pair of large and long phallic processes extended dorsally from phallobasal cavity; phallobase sclerotized basally and pigmented, with numerous spines.

**Etymology.** The new genus name is a combination of the prefix “para” plus “*Dictyopharina*”, which means it is similar to *Dictyopharina*. The gender is feminine.

**Remarks:** The new genus is externally similar to *Dictyopharina*, but can be distinguished from the latter by its mesonotum (Figs. 3, 4, 14) with lateral carinae parallel (lateral carinae curving anteriorly towards median carina in *Dictyopharina*); the fore femora unarmed (with a short and blunt spine near apex in *Dictyopharina*); hind tibiae with 7 apical black-tipped spines (8 in *Dictyopharina*); and aedeagus (Figs. 21–23, 30–32) with numerous large strong spines (spineless or covered with numerous tiny spines in *Dictyopharina*).

The new genus is also similar to *Indrival* Fennah, 1978 (Song & Liang, 2008), but can be separated from the latter by its vertex (Figs. 3, 4, 14, 24) with median carina nearly complete (median carina slightly distinct only in

basal third in *Indrival*); and aedeagus (Figs. 21–23, 30–32) with a pair of phallic processes extended dorsally from phallobasal cavity (without paired phallic processes in *Indrival*).

**Distribution.** Southern India.

### Key to the species of genus *Paradictyopharina* gen. nov.

1. Parameres with upper process on upper margin obviously elongate and robust; aedeagus with phallic processes distinctly short, apically obtuse. . . . . *P. parallela* sp. nov.
- Parameres with upper process on upper margin relatively short and small; aedeagus with phallic processes distinctly elongate, broadened and inflated at middle, and then constricted abruptly and folded anterodorsally, apically acute . . . . *P. spina* sp. nov.

### *Paradictyopharina parallela* sp. nov.

(Figs. 3, 14–23)

**Description:** ♂, length (from apex of cephalic process to tip of forewings) 10.9–11.5 mm; length of head 0.9–1.0 mm, width (including eyes) 1.5–1.6 mm; length of forewings 9.7–9.8 mm.

General color uniformly greenish-ochraceous in dried specimens. Vertex (Figs. 3, 14) with ratio of length to width between eyes 0.9:1. Frons (Fig. 16) with ratio of length to width 2.1:1; lateral margins carinate and nearly parallel; median carina distinct, lateral carinae slightly converging posteriorly. Pronotum (Figs. 3, 14) with median carina sharp and high, with big lateral pit on each side. Mesonotum (Figs. 3, 14) more or less arched, tricarinate, lateral carinae straight, nearly parallel. Forewings as Figure 17, stigma elongate, with 5 cells. Hind tibiae with 6 lateral spines; hind tarsomeres I with about 26–28 and tarsomeres II with about 22–24 apical spines, respectively.

Male genitalia: pygofer narrow and high, ventrally slightly wider than dorsally (about 1.6:1); posterior margin with a small obtuse process near apex in lateral view (Fig. 19). Anal tube short and broad, strongly widening from base to apex in lateral view (Fig. 19), with ratio of length to width near middle about 1.3:1 in dorsal view (Fig. 18). Parameres distinctly broadening towards apex in lateral view (Fig. 19), posterior margin nearly straight, upper process obviously elongate and robust. Aedeagus short and stout, with a pair of short phallic processes extended dorsally from phallobasal cavity, apically obtuse; phallobase basally more or less sclerotized and pigmented, surrounded by several longitudinal ridges, nearly every ridge with a short spine at apex; ventral part with three membranous lobes; lateral lobes short and robust, directed dorsally, with short spine at apex in dorsal and lateral views (Figs. 21, 22); middle lobe elongate, directed posteriorly and covered with short spines from ventral base to apex in ventral view (Fig. 23).

Female unknown.

**Material examined. Holotype:** ♂, **INDIA:** S. India, Coimbatore, Anupady [?] Valley, 1952.VIII, P. S. Nathan (NCSU). **Paratype:** 1♂, **INDIA:** Mysore, Karnataka, Bannerghatta Park, 1977.X.27, K. D. Ghorpade (AMNH).

**Etymology.** This new species name is derived from the Greek “*parallēlon*”, meaning parallel. It refers to the parallel median and lateral carinae of the mesonotum.

**Remarks.** The new species is very similar to *Dictyopharina viridissima* Melichar, 1903, but can be separated from the latter by the differences of its mesonotum, fore femora, hind tibiae and aedeagus.

**Distribution.** Southern India.

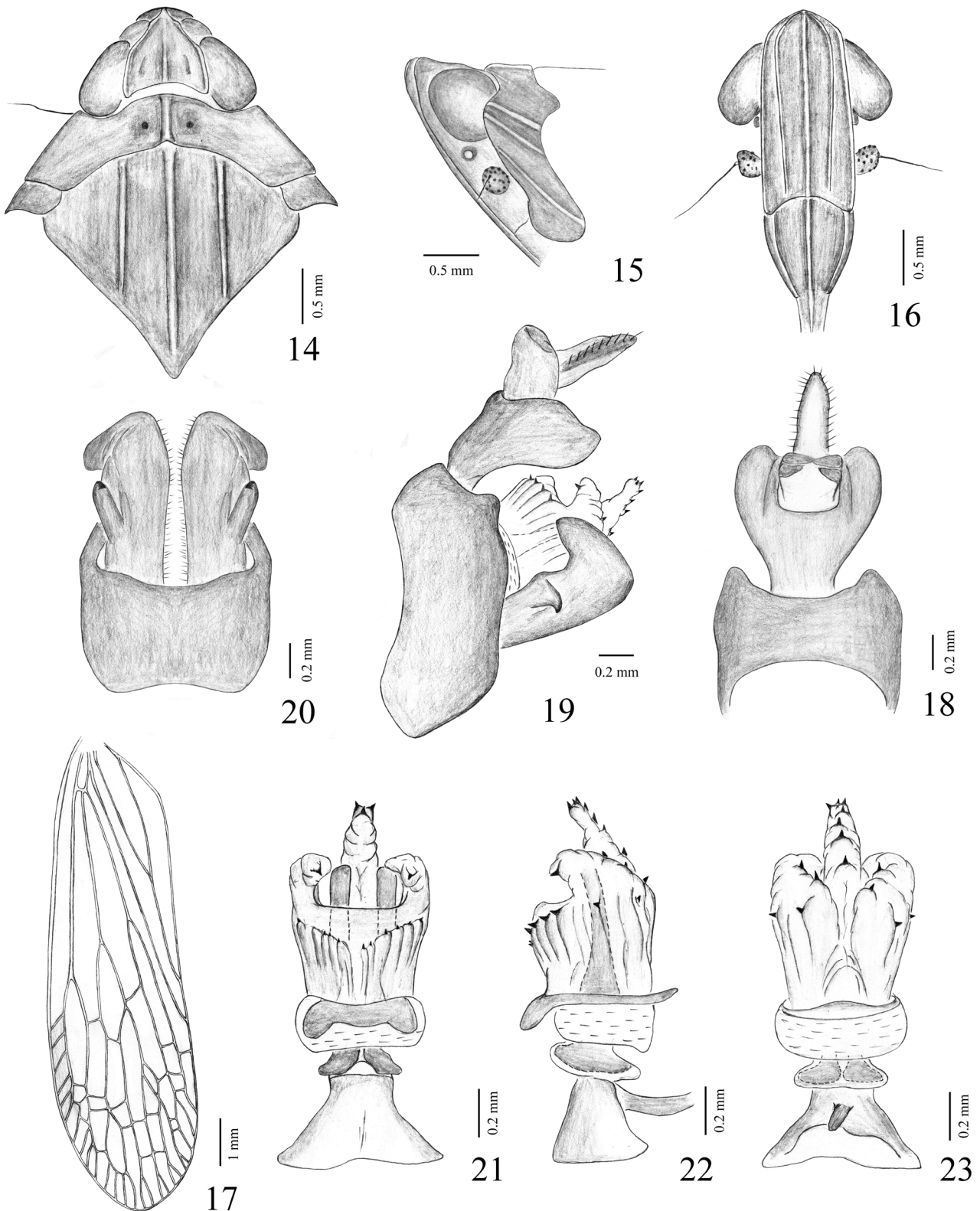
### *Paradictyopharina spina* sp. nov.

(Figs. 4, 24–32)

**Description:** ♂, length (from apex of cephalic process to tip of forewings) 8.1 mm; length of head 0.9 mm, width (including eyes) 1.3 mm; length of forewings 6.1 mm.

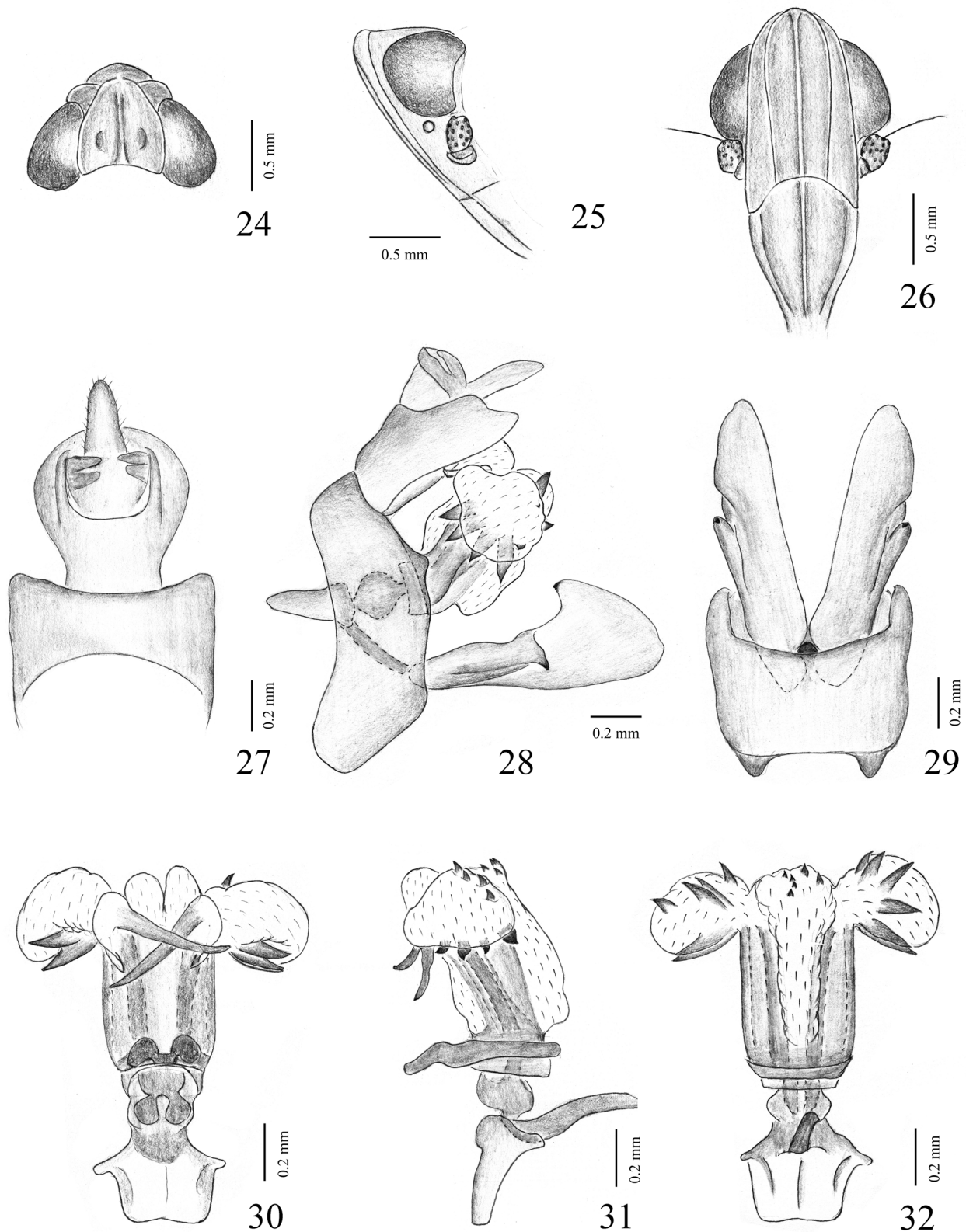
General color uniformly greenish-ochraceous. Vertex (Fig. 24) with ratio of length to width between eyes 0.9:1. Frons (Fig. 26) with ratio of length to width 1.9. Pronotum (Fig. 4) with median carina sharp and high, with big lateral pit on each side. Mesonotum broken and incomplete in holotype, tricarinate on disc, lateral carinae straight, nearly parallel. Forewings with stigma elongate, with 3 cells. Hind tibiae with 6 lateral black-tipped spines; hind tarsomeres lacking.





**FIGURES 14–23.** *P. parallela* 14. head, pronotum and mesonotum, dorsal view; 15. head and pronotum, lateral view; 16. head, ventral view; 17. left forewing; 18. pygofer and anal tube of male, dorsal view; 19. genitalia of male, lateral view; 20. pygofer and parameres of male, ventral view; 21. aedeagus, dorsal view; 22. same, lateral view; 23. same, ventral view.





**FIGURES 24–32.** *P. spina* 24. head, dorsal view; 25. same, lateral view; 26. same, ventral view; 27. pygofer and anal tube of male, dorsal view; 28. genitalia of male, lateral view; 29. pygofer and parameres of male, ventral view; 30. aedeagus, dorsal view; 31. same, lateral view; 32. same, ventral view.

Male genitalia: pygofer distinctly narrow and high, ventrally distinctly wider than dorsally (about 2.1:1); posterior margin with very small obtuse process near middle in lateral view (Fig. 28). Anal tube short and broad, gradually widening from base to apex in lateral view (Fig. 28), with ratio of length to width near middle about 1.1:1 in dorsal view (Fig. 27). Parameres narrow and elongate, moderately broadening towards apex in lateral view (Fig. 28), posterior margin arched, upper process robust with small black tip. Aedeagus large and elongate, with a pair of long phallic processes extended from phallobasal cavity and incurved anterodorsally, medially inflated and constricted abruptly, apically acute in dorsal view (Fig. 30); lateral parts of phallobase sclerotized and pigmented; remainder membranous; dorsal membranous part with pair of small lobes at apex between phallic processes, without spines in dorsal view (Fig. 30); ventrolateral part with a pair of large rounded lobes, directed laterally, covered with some large strong spines at base in ventral and lateral views (Figs. 31, 32); ventral part inflated longitudinally, with some relatively small spines at apex in ventral view (Fig. 32).

Female unknown.

**Material examined. Holotype:** ♂, **INDIA:** South India, Madras State, Coimbatore, 426 m, 1957.VII.11, P. S. Nathan, B. P. Bliven (CAS).

**Etymology.** This new species name is derived from the Latin “*spina*”, meaning spine. It refers to the large strong spines of the phallobase.

**Remarks.** The new species is externally similar to *P. parallela* **sp. nov.**, but can be distinguished from the latter by its particular male genitalia.

**Distribution.** Southern India.

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