Abstract

The importance of pleural characters in Scelionididae is discussed and assessed. Two new terms, peculiar to some Scelionidae, are proposed, viz. the netrion for a specialized area on sides of pronotum, and mesopleural carina for a diagonal keel on mesopleuron (mesepisternum). Netrion and mesopleural carina are considered important characters for higher classification of the Scelionidae. The proposed characters are reviewed in the suprageneric categories (tribes and subfamilies) of the Scelionidae. The tribe Tiphodytini n. stat. is reinstated and removed from the synonymy with Thoronini, partly on account of the pleural characters.

Introduction

The pleural region in Hymenoptera traditionally has received great attention from taxonomists. Numerous special terms were proposed to describe the variety of unique morphological structures. Perhaps the most elaborate pleural terminology has been applied in the superfamily Sphecoidea (digger wasps) the summary of which was presented recently by Bohart and Menke (1976). Pleural characters were also used for higher classification of various groups of Hymenoptera and became an integral part of generic keys, descriptions, differential diagnoses, etc.

In the family Scelionidae (superfamily Proctotrupoidea), however, the pleural region has been almost completely ignored and remained unexploited for higher classification. Similarly, the terms for pleural morphology successfully used in other groups of Hymenoptera were not utilized in the Scelionidae. Except for a few studies where pleural characters were partly used at species level, this aspect has been neglected virtually since the classical works of Ashmead (1893) and Kieffer (1926). Thoracic characters used by classical authors or subsequent students for either higher classification or at species level were almost exclusively derived from the dorsal part of scelionid mesosoma. Conservatism and epigonism on the part of many students including the present author, is to be blamed for this neglected state of knowledge.

The purpose of this paper is to demonstrate the importance of pleural characters for higher classification of the family Scelionidae. It may be stated that some terms proposed in pleural morphology of other groups of Hymenoptera can be used also in the classification of scelionid wasps (e.g. acetabular carina, omaulus, sternaulus, etc.). However, the rich sculptural variety of scelionid pleuron requires more than what has been so far termed. This study aims to focus mainly on new terminology. The following two new terms are necessary. Netrion (diminutive of netron, in Greek, a spindle; hereby meaning a spindlet, a small spindle). This is a specialized area (Fig. A, nt)on the flexed sides of pronotum, between the prothoracic spiracle and fore coxa, situated anteriorly of the suture dividing pronotum from mesopleuron (Fig. A, su). Being a part of the pronotum the netrion is not, strictly speaking, a pleural character although it is located on the lateral part of the mesosoma. Wherever present the netrion is always distinctly higher than wide, in its most distinct shape truly spindle-like, with both upper and lower apices pointed. The latter form is termed netrion closed (Figs. 8-11) as compared with netrion open (Figs. 4-7) in which case the anterior margin (Fig. A, am) of the netrion does not meet the promesothoracic suture above the fore coxa. The anterior margin of the netrion is most distinct when formed by a sharp keel running from the prothoracic spiracle down
FIG. A. Pleural scheme of hypothetical Scelionidae.

- **ac** — acetabular carina
- **am** — anterior margin (of netrion)
- **cx 1** — fore coxa
- **cx 2** — mid coxa
- **cx 3** — hind coxa
- **ec** — epomial carina (-ae)
- **mc** — mesopleural carina
- **md** — mesopleural depression (dotted)
- **mm** — mesepimeron
- **mn** — metanotum
- **mp** — metapleuron
- **ms** — mesepisternum
- **mt** — mesoscutum
- **no** — notaulus
- **nt** — netrion
- **pn** — pronotum
- **pp 1** — pleural pit (mesepisternum)
- **pp 2** — pleural pit (metapleuron)
- **pr** — propodeum
- **sc** — scutellum
- **sk** — skaphion
- **sp 1** — spiracle (pronotum)
- **sp 2** — spiracle (propodeum)
- **st** — sternaulus
- **su** — suture (pronotum-mesopleuron)
- **tg** — tegula

The latter form is termed **netrion carinate** (Figs. 1, 4–12, 23) compared with **netrion ecarinate** (Figs. 2, 14, 19–21, 24–26, 29, 30, 32) when the anterior keel is absent and replaced by a row of crenulae or foveolae. The keel of the carinate netrion may sometimes be flanked inwardly by a row of foveolae enhancing the impression of a “suture” (e.g. Figs. 8, 11, 12). The dissection of this part of the pronotum reveals however, no weakening of the sclerite; on the contrary a corresponding internal apodeme here probably serves as a muscle attachment. The netrion is usually distinguished from the adjacent parts of the pronotum by its markedly different sculpture (Figs. 4–7), or by being smooth compared with rougher sculpture of the pronotum (Figs. 29, 30, 32). However, the netrion may be indistinct in some groups, poorly distinguished or obscured by rough sculpture (Figs. 3, 19, 22, 27, 28), or not developed at all (Figs. 13, 15, 16). The principal shapes of the netrion appear to be constant not only at generic but often also at suprageneric levels. Therefore, the netrion is interpreted as an important character suitable for higher classification of the Scelionidae. This opinion has been already presented by Masner (1976), who, by mistake, wrongly interpreted the netrion as the prepectus. The present study is partially aimed to correct the latter error.

**Mesopleural carina** (Fig. A, **mc**) is a term proposed for a keel ascending diagonally from the middle coxa (Fig. A, **cx 2**) up towards the suture dividing the pronotum from the mesopleuron (Fig. A, **su**). Mesopleural carina only rarely attains the suture although its general course is usually directed towards the midpoint of
the suture; however, its extreme upper tip is more or less upcurved (Figs. 8, 10–12, 16, 18, 25, 26). When developed, the carina marks the anterior margin of the mesopleural depression (Fig. A, \textit{md}), a large diagonal declivity on the mesepisternum designed for reception of the middle femur. The mesopleural depression and mesopleural carina are well developed in several groups of Scelionidae. However, in other groups of Scelionidae the depression is poorly defined and so is the carina. Rarely, the mesepisternum is flat (Fig. 16) or even convex (Fig. 20); consequently, the depression is not developed at all in those cases. In some groups both depression and carina may be partly obscured by rough sculpture (Figs. 3, 17, 24, 27, 28). The posterior margin of the depression is usually marked by a row of foveolae (Figs. 2, 5, 7, 9, 14, 20, 21, 26, 30) indicating simultaneously the division between the much larger mesepisternum (Fig. A, \textit{ms}) and the usually very narrow mesepimeron (Fig. A, \textit{mm}). Compared with the netrion, the mesopleural carina (and particularly the adjacent sculpture) seems to offer more characters on the specific level and less useful characters for classification of higher categories.

The following brief review of the family Scelionidae is intended to illustrate the principal modifications of the netrion and the mesopleural carina.

\textbf{Subfamily Scelioninae}\textsuperscript{1}

17 tribes

Figs. 1–22

Both the netrion and mesopleural carina reflect the magnitude and diversity of this subfamily by displaying various degrees of development. The 17 tribes involved, however, may be distinguished to a considerable extent by peculiar developments of the two structures discussed.

1. \textbf{Tribe Nixoniini} (Fig. 1). Netrion open, broad, carinate, however, anterior margin with dense fringe of hairs, bordered by deep, almost suture-like crevice. Mesopleural depression relatively shallow, not bordered by carina, sculpturally not distinctly differentiated from lower part of mesepisternum. Mesepimeron projecting into sharp hook-like process posterodorsally (Fig. 1, arrow).

2. \textbf{Tribe Sparasionini} (Fig. 2). Netrion closed, narrow, ecarinate, its anterior margin foveolate, generally not well differentiated from the rest of pronotum. Mesopleural depression shallow, usually smooth and glabrous, i.e. distinguished sculpturally from lower part of mesepisternum. Mesopleural carina present (in almost all species of \textit{Scelionomorpha} Ashm.) or absent (\textit{Sparasion} Latr.). \textit{Archaeoteleia} Msn., originally included in this tribe (Masner 1976), represents along with one undescribed genus (also from Chile) a new tribe to be proposed elsewhere.

3. \textbf{Tribe Scelionini} (Fig. 3). Netrion usually obscured by rough sculpture; if present then open and vaguely carinate (e.g. in \textit{Acanthoscelio} Ashm.). Holarctic species of \textit{Scelio} Latr. tend to exhibit no well defined netrion, whereas the Neotropical species often with netrion better developed. Mesopleural depression usually shallow, mesopleural carina obscured by rough sculpture, usually not well defined except in \textit{Acanthoscelio}. Mesepimeron very narrow.

4. \textbf{Tribe Baryconini} (Fig. 4). Netrion well developed, broadly open and always carinate, with sculpture distinctly different from adjacent area of pronotum. Mesopleural depression usually deep, shining, and glabrous but often with ridges. Mesopleural carina not developed.

5. \textbf{Tribe Calliscelionini} (Figs. 5–8). Netrion well developed, carinate and usually distinctly open, sculpturally different from adjacent area of pronotum. Mesopleural depression distinct, smooth and glabrous, distinguished from lower part of mesepisternum by either carina (Figs. 6, 8) or zone of rougher sculpture (Figs. 5, 7). Mesepimeron well marked by row of foveolae.

6. \textbf{Tribe Psilanteridini} (Figs. 9–12). Netrion well developed, closed, more or less carinate and truly spindle-like. Mesopleural depression deep, usually marked anteriorly by mesopleural

\textsuperscript{1}Higher classification as in Masner (1976).
carina. Mesepimeron well marked by deep foveolae anteriorly. This tribe seems to be partly blurred with the Calliscelionini, with several intermediate genera. The newly employed pleural characters as well as some cephalic characters (sculpture of cheeks, shape of clypeus, etc.) would indicate that genera such as Paridris Kieff. and Anteromorpha Dodd would be better placed here. However, the final solution of this particular problem is deferred until some later time.

7. Tribe Aradophagini (Fig. 13). Netrion not differentiated. Mesopleural depression almost non-existent, mesopleural carina absent (Aradophagus Ashm.) or developed (Ladora Msn. & Hugg.). Mesepimeron relatively broad as compared with narrow mesepisternum.

8. Tribe Cremastobaeini (Fig. 14). Netrion well developed, ecarinate, foveolate anteriorly, closed or partly open. Mesopleural depression rather shallow, mesopleural carina not developed. Metapleuron distinctly glabrous.

9. Tribe Mantibarini (Fig. 15). Netrion not differentiated. Pro-mesopleural suture sinuate, displaced posteriorly. Mesopleural depression shallow, carina not developed. Spiracle on pronotum (in front of tegula) unusually large.

10. Tribe Platyscelionini. Netrion absent. Mesopleural depression not developed. Mesopleural carina replaced by a furrow.

11. Tribe Doddiellini (Fig. 16). Netrion absent. Mesopleural depression non-existent, mesopleuron flat. Mesopleural carina present but directed horizontally from mid-coxa towards fore coxa, subparallel with strong, percurrent sternaulus. Mesopleuron and metapleuron almost smooth and glabrous, with very little sculpture. Mesepimeron not well differentiated from mesepisternum.

12. Tribe Gryonini (Figs. 17, 18). Netrion not differentiated, area covered by it is usually bordered anteriorly by epomial carina (ec) forming conjointly with pro-mesopleural suture a V-shaped corner. Epomial carina not well developed in some members of the tribe (e.g. Mirotelenomus Dodd). Mesopleural depression always very shallow, mesopleural carina absent or obscured by rough sculpture (Fig. 17), rarely better defined (Fig. 18). Mesepimeron usually not well differentiated from mesepisternum.

13. Tribe Embidobiini. Netrion ecarinate, closed, indicated anteriorly by row of foveolae. Mesopleural depression present but shallow, mesopleural carina faint or incomplete.

14. Tribe Thoronini n. stat. (s. str.) (Fig. 19). Netrion ecarinate, closed, foveolate anteriorly or partly obscured by rough sculpture. Mesopleural depression shallow but present. Mesopleural carina at least partly indicated above mid coxa, or obscured by rough sculpture in lower part of mesepisternum. Tribe hereby restricted (cf. Masner 1972) to following genera with mesopleural carina developed or mesepisternum partly with rough sculpture and cheeks at least partly fan-like striate: Thoron Hal., Neothoron Msn., Microthoron Msn., and Thoronidea Msn. & Hugg. Thoronella Msn. is hereby transferred to Psilanteridini on the basis of female T7 being extruded with ovipositor.

15. Tribe Tiphodytini n. stat. (Fig. 20). Netrion ecarinate, closed, foveolate anteriorly, not obscured by rough sculpture. Mesepisternum convex, with no depression, lower part with no sculpture, smooth and glabrous, not differentiated from the upper part. Mesopleural carina completely absent. Whole pleural region remarkably smooth and glabrous (including metapleuron). Mesepimeron relatively wide, well marked anteriorly by row of deep foveolae. Tribe hereby resurrected from synonymy with the Thoronini (cf. Masner 1972) to contain following genera with convex, smooth mesepisternum, no mesopleural carina, glabrous metapleuron and cheeks without striae: Tiphodytes Bradl., Tanaodytes Msn., and Pseudanteris Fouts.

16. Tribs Baeini and Idrini (Figs. 21, 22). Netrion usually absent (Fig. 22), or at most weakly indicated anteriorly by foveolae, closed and ecarinate (Fig. 21). Mesopleural depression not developed, mesopleural carina either absent (Fig. 21) or at most incomplete (Fig. 22). Mesepimeron relatively wide, well separated from mesepisternum by deep incomplete. The two tribes exhibit no substantial differences in pleural morphology (in winged forms) and are treated here jointly.
Figs. 1–8 (pleural regions, SEM, gold-coated, 20 kv). 1, Nixoniini: *Nixonia* sp. (76×). 2, Sparasionini: *Sparasion* sp. (75×). 3, Scelionini: *Scelio* sp. (64×). 4, Baryconini: *Baryconus* sp. (92×). 5–8, Calliscelionini: 5, *Macroteleia* sp. (140×); 6, *Anteromorpha* sp. (172×); 7, *Calliscelio marlattii* (Ashm.) (140×); 8, *Holoteleia* sp. (216×).
Figs. 9-16 (pleural regions, SEM, gold coated, 20 kv). 9-12, Psilanteridini: 9, Paridris sp. (192×); 10, Anteris sp. (249×); 11, Opisthacantha mellipes Ashm. (180×); 12, Psilanteris bicolor (Kieff.) (204×). 13, Aradophagini: Aradophagus fasciatus Ashm. (280×). 14, Cremastobaeini: Cremastobaenus sp. (276×). 15, Mantibariini: Mantibaria anomala (Kby.) (160×). 16, Doddiellini: Doddiella sp. (84×).
Figs. 17-24 (pleural regions, SEM, gold-coated, 20 kv). 17-18, Gryonini: 17, "Gryon insularis" (Ashm.) (113X); 18, "Gryon floridanus" (Ashm.) (114X). 19, Thoronini: "Thoron metallicus" Hal. (136X). 20, Tiphodytini: "Tiphodytes gerriphagus" (March.) (224X). 21-22, Idrini: 21, "Idris" sp. (144X); 22, "Ceratobaeus" sp. (228X). 23-24, Teleasine: 23, "Trimorus" sp. (168X); 24, "Trisacantha americana" Ashm. (136X).
Figs. 25–32 (pleural regions, SEM, gold-coated, 20 kv). Telenominae: 25, *Trissolcus thyanta* Ashm. (220×); 26, *T. euschisti* Ashm. (164×); 27, *Archiphanurus* sp. (184×); 28, *Psix* sp. (192×); 29, *Telenomus podisi* Ashm. (228×); 30, *Telenomus* sp. (200×); 31, *Eumicrosoma* sp. (300×); 32, *Dissolcus nigricornis* Ashm. (380×).
Subfamily Teleasinae
2 tribes
Figs. 23, 24

Both the netrion and mesopleural carina show remarkably little variation in this cohesive group where the two tribes (Teleasini, Xenomerini) are hardly justified as two distinct entities. Netrion extremely narrow, almost strip-like, carinate, closed and perfectly parallel with pro-mesopleural suture (Fig. 23). Rarely netrion ecarinate, indicated by row of deep crenulae (Fig. 24). Mesopleural depression more or less developed, not particularly deep, mesopleural carina usually weakly developed, obscured by rough sculpture or absent. Mesepimeron well marked anteriorly by foveolae.

Subfamily Telenominae
1 tribe
Figs. 25-32

Both the netrion and mesopleural carina exhibit relatively less variation than in the Scelioninae. Netrion, when developed, closed, ecarinate, distinctly foveolate anteriorly, often distinguished from coarser sculpture of adjacent areas by smooth, shiny surface (Figs. 29, 30, 32). In extreme cases netrion totally obscured by specialized sculpture (Figs. 27, 28). Mesopleural depression shallow, or not well differentiated, mesopleural carina often absent (Figs. 29-32), or incomplete and almost parallel with pro-mesopleural suture (Figs. 25, 26). Mesepimeron marked by either foveolae (Figs. 25, 26, 29, 30) or by furrow (Fig. 31). Pleural pits of mesopleuron and metapleuron (pp 1, 2) usually well developed (Figs. 29, 30, 32). This subfamily comprises the nominal tribe Telenomini only.

Acknowledgments

Mr. G.A.P. Gibson (Biosystematics Research Institute, Agriculture Canada) prepared the SEM photographs and the plates, and made helpful criticisms and suggestions. The Chemistry and Biology Research Institute (Agriculture Canada) allowed me the use of the Electron Microscope Centre. Drs. A. Smetana, C.M. Yoshimoto and I. Smith (Biosystematics Research Institute) reviewed the manuscript.

References

Ashmead, W. H. 1893. A monograph of the North American Proctotrupidae. Bull. U.S. natn. Mus. 45, 472 pp.
Bohart, R. M. and A. S. Menke. 1976. Sphecid wasps of the world. A generic revision. Univ. Calif. Press. 695 pp.
Kieffer, J. J. 1926. Scelionidae. Das Tierreich 48. 885 pp.
Masner, L. 1972. The classification and interrelationships of Thoronini (Hymenoptera: Proctotrupoidea, Scelionidae). Can. Ent. 104: 833-849.
Masner, L. 1976. Revisionary notes and keys to world genera of Scelionidae (Hymenoptera: Proctotrupoidea). Mem. ent. Soc. Can. 97. 87 pp.

(Received 4 April 1979)