Phylogenetic concentration and provenance of host data for parasitic wasps of the superfamily Platygastroidea (Hymenoptera).



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Introduction

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The superfamily Platygastroidea, with over 5,000 described species and 200 genera, is one of the major groups of parasitoid Hymenoptera.



their Information on host relationships is derived from the published literature as well as label data associated with individual **specimens.** Ideally, these two sources of data would be linked through voucher specimens, but this is not always true.

Phylogenetic Distribution of Host Records



Platygastroids are thought to have begun as egg parasitoids of Orthoptera, from which host shifts have occurred, sometimes on multiple occasions, to attack Coleoptera, Mantodea, Lepidoptera, Hemiptera, Embiidina, Odonata, Diptera, Neuroptera and spiders.



Echthrodesis

We ask the following questions:

1) What is our "knowledge" based on?

2) Are the records adequately distributed so as to justify generalizations across more than 125 million years of evolution?

Topology simplified from RAxML analysis of 210 taxa, 8 partitions, degen coding of 4 markers (18S, 28S, EF1-alpha, CO1).

The blue bars arising from the terminals on the cladogram depict the total number of host records, with maximum values (off scale) truncated.

Records of Host – Parasitoid Associations



Bv Host Order

Diptera



The number of records is not simply a function of species richness within a taxon. The subfamily **Telenominae** is overrepresented (*left*), with an average total number of records 16.4% greater than the other four subfamilies combined.

That bias is also reflected in records by host order (*above*), as **Telenominae** are known to attach many Hemiptera and Lepidoptera insect pests.

Total Records per Genus of Parasitoid



Conclusions

5.000

The distribution of host records indicates that our understanding of the host relationships in the Platygastroidea is not well distributed and strongly skewed. What are the underlying reasons for this sampling bias? Possibilities include:

- Host apparency: are host eggs found in more exposed areas (e.g., on the surface of plant leaves, stems) OR in cryptic habitats (in the soil, underwater, within plant tissues)?
- Host egg numbers: are host eggs laid singly, and therefore difficult to identify, in small groups, or in large masses? In egg masses at least some hosts may emerge, thus making identification feasible.
- Host economic importance: considerably more attention is paid to the bionomical studies of pest species, thus increasing the likelihood of rearing parasitoids and correctly associating them with a host species.

These factors are not mutually exclusive. Gall flies (Cecidomyiidae, hosts of Platygastrinae), often lay their eggs in small clusters within plant tissues. Many ground beetles (Carabidae, hosts of Teleasinae) lay eggs singly and underground. Many of the known hosts of telenomines deposit their eggs in masses exposed on the surface of plant tissues, and they are often important pests of agriculture and forestry. The combination of these three factors likely contributes to the relative surfeit of data for this taxon.

Methodology – brief summary.

Data from Publications

1,026 references (1833-1980) from hard copy card files.



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Data from Specimens:

Over the last 10 years we have been databasing Platygastroidea specimen records. Our database includes data from 108 collections around the world.

Frequency of host-parasitoid associations recorded in both the literature and in specimen labels (above) is skewed towards the same five genera: *Telenomus, Trissolcus, Scelio, Platygaster, and Gryon*.

- Review of Applied Entomology. Series A (Agriculture). Electronic version. Open Access. Volumes 2-10. 1914-1922.
- Review of Applied Entomology. Series A (Agriculture). Hard copy. Volumes 11-20. 1923-1932. (used Scanning and OCR technology to speed up process.) Cross-references.

For this study, host records were gathered from a Darwin Core Archive export of all of the Platygastridae within the database. Records were opened within MS Excel and evaluated using PivotTables.

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