

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

N.F. Johnson, L. Musetti, V. Zeinner, S.E. Hemly & J. Cora

EEOB, Arts & Sciences, The Ohio State University, Columbus, OH

Introduction

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



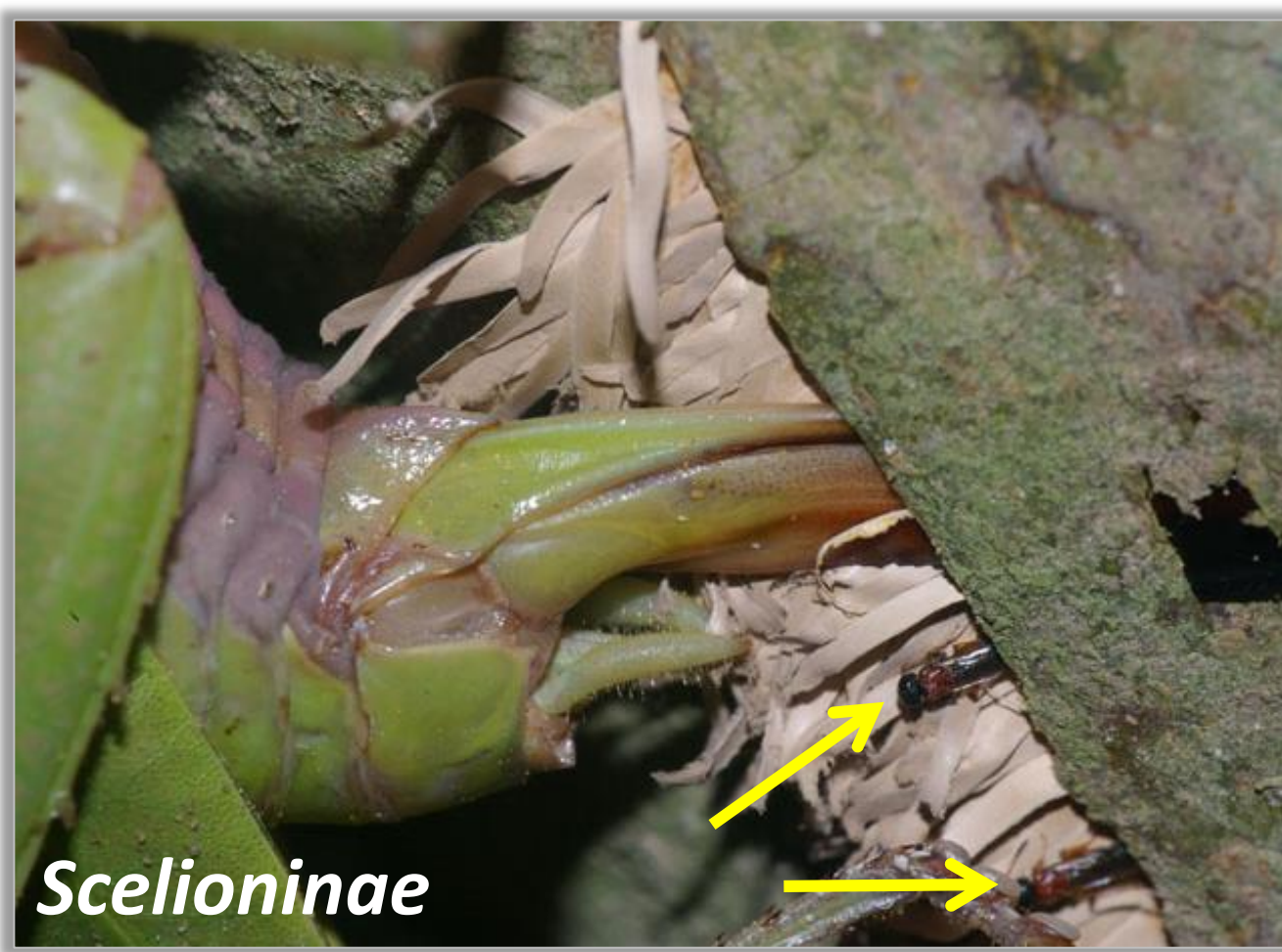
Information on their host relationships is derived from the **published literature** as well as **label data associated with individual specimens**. Ideally, these two sources of data would be linked through voucher specimens, but this is not always true.



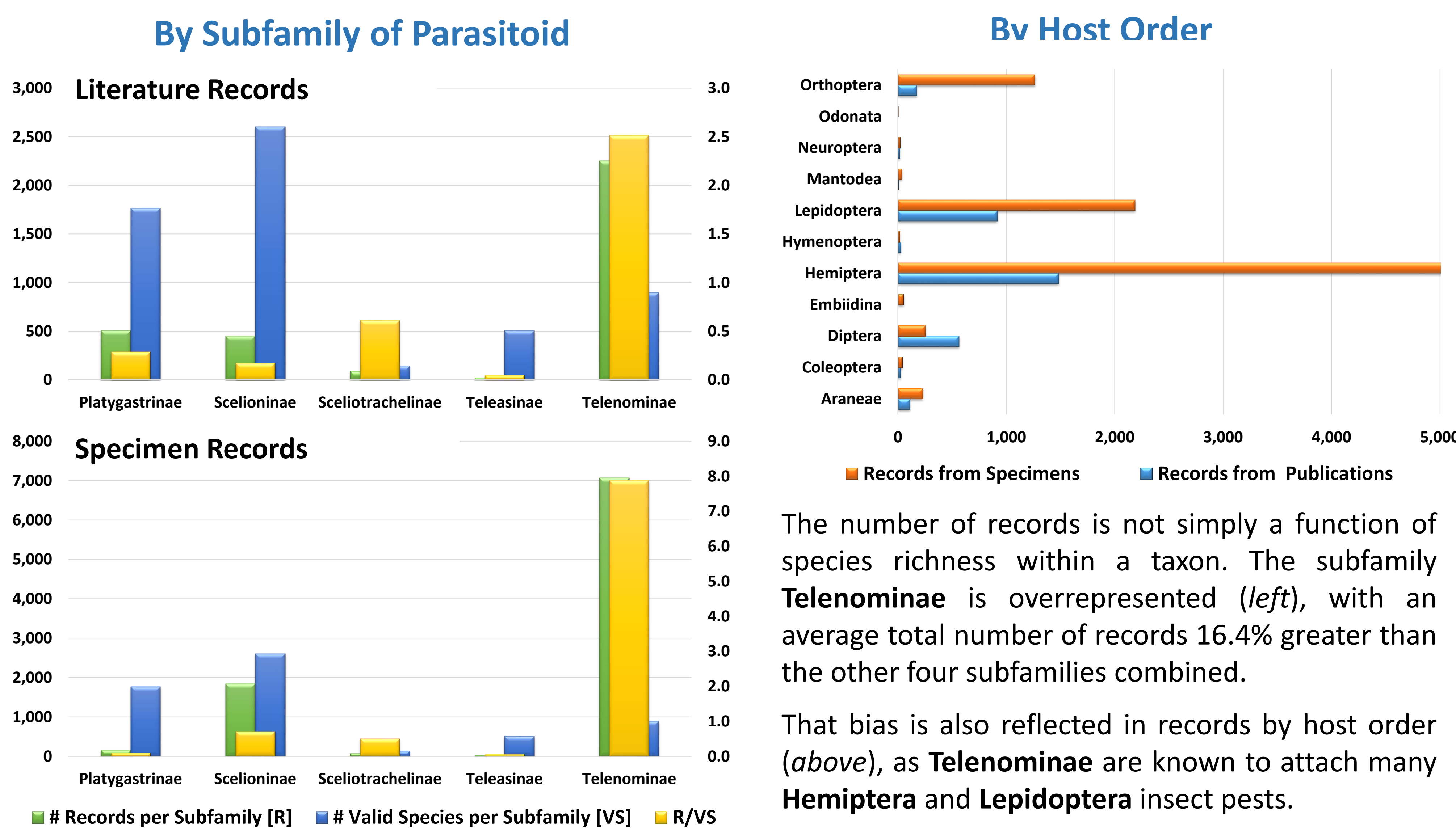
We ask the following questions:

- 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?

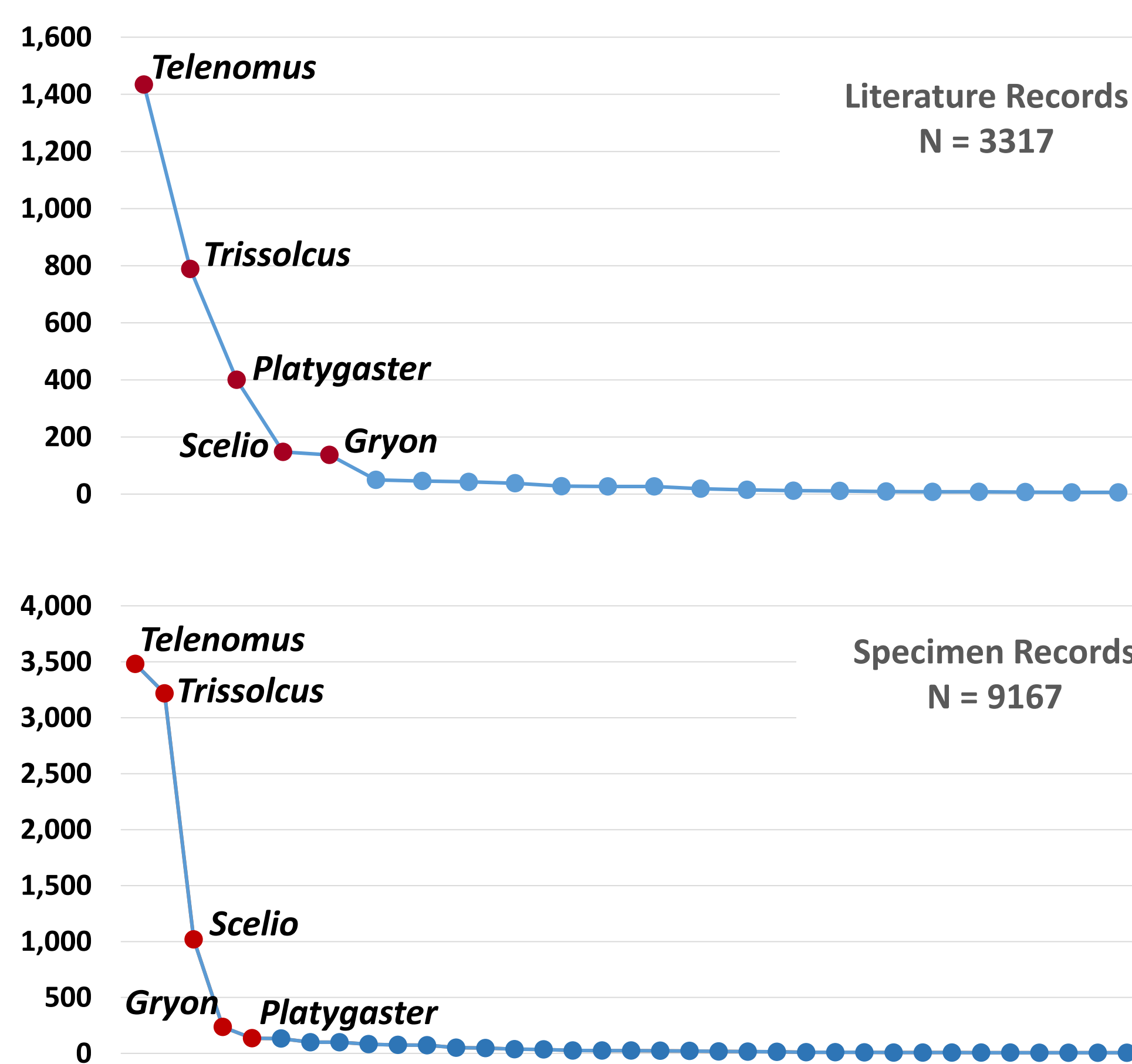
Platygastroids are thought to have begun as egg parasitoids of Orthoptera, from which host shifts have occurred, sometimes on multiple occasions, to attack Coleoptera, Mantodea, Lepidoptera, Hemiptera, Embiidina, Odonata, Diptera, Neuroptera and spiders.



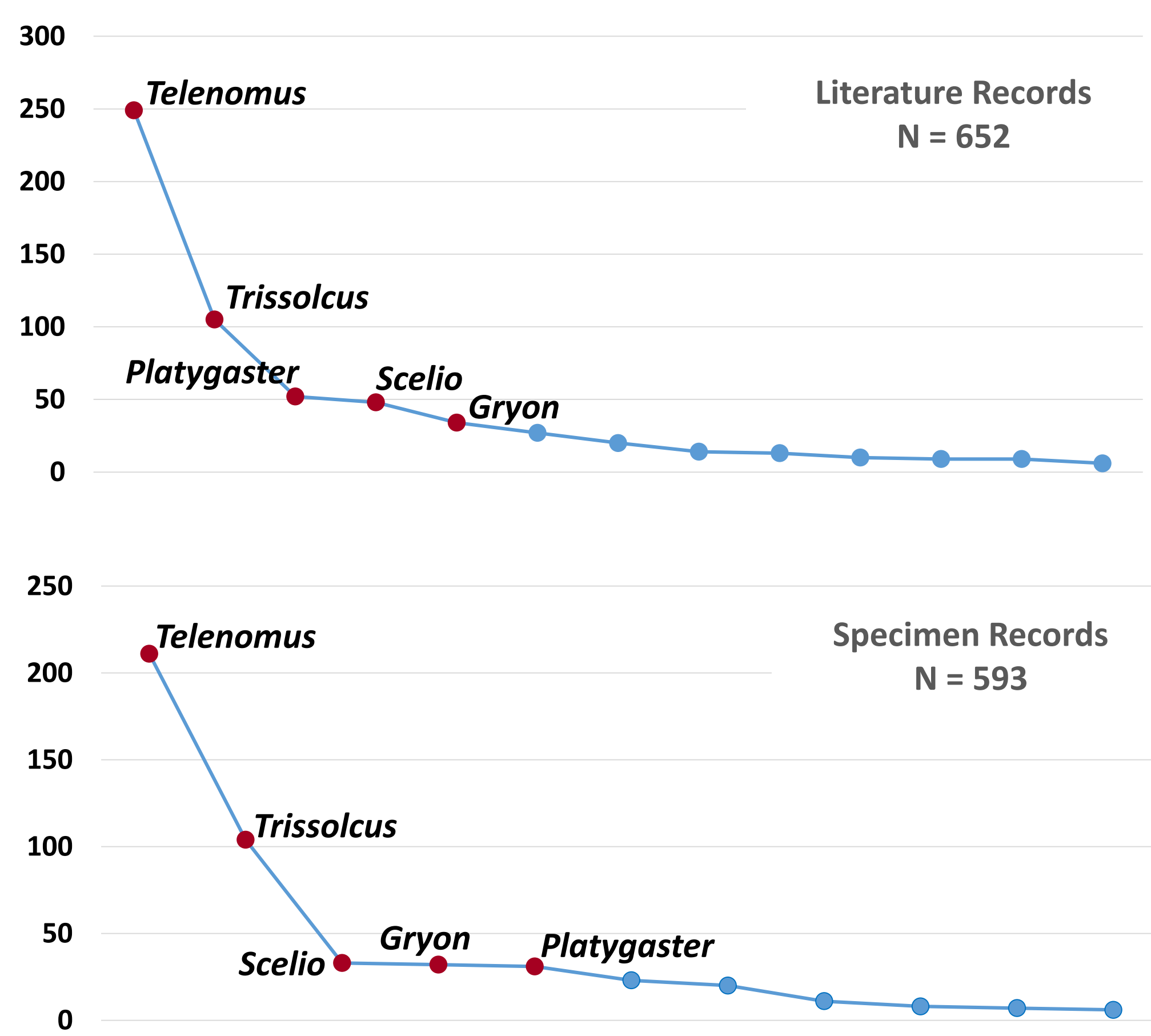
Records of Host – Parasitoid Associations



Total Records per Genus of Parasitoid

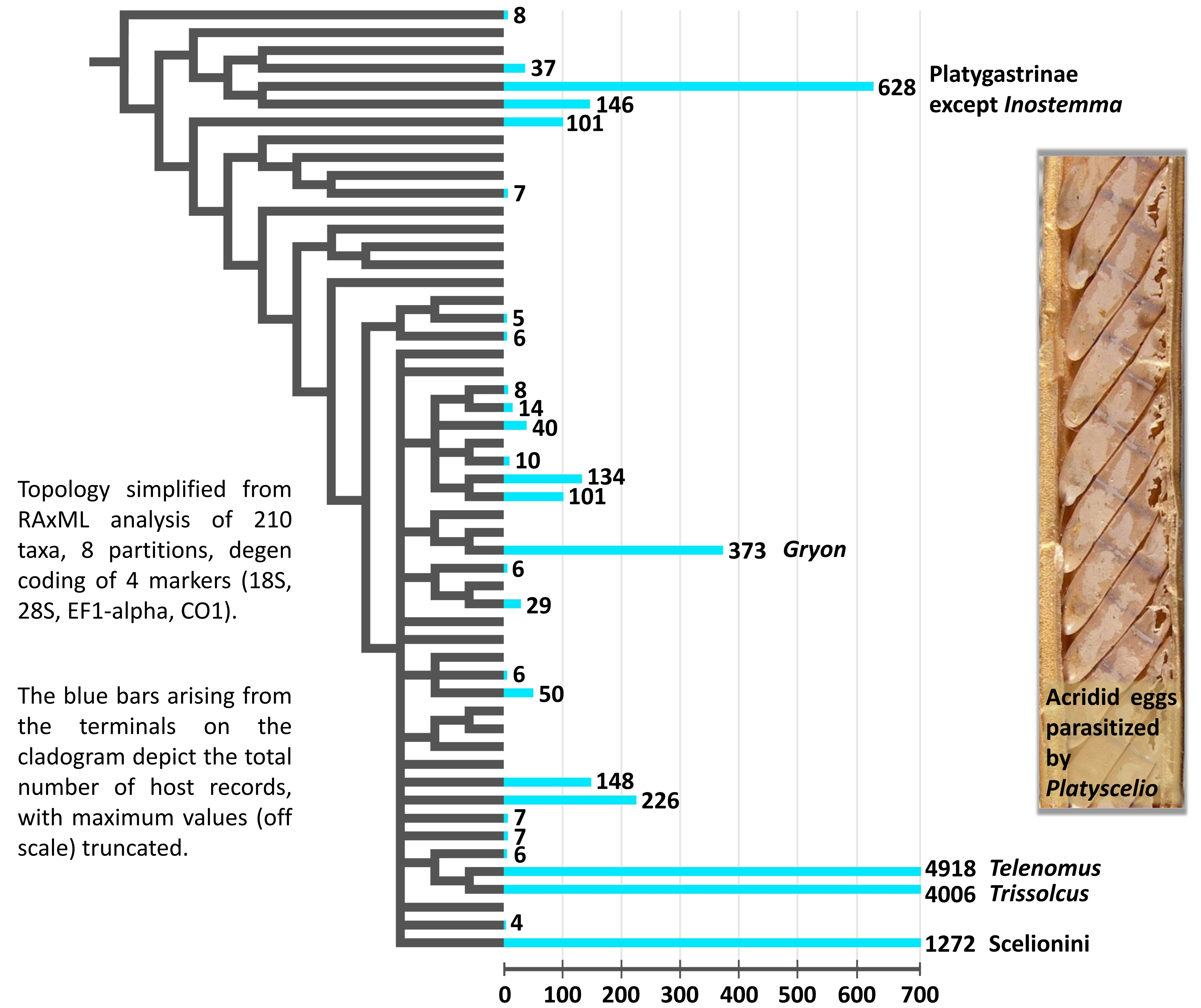


Distinct Host Genera per Genus of Parasitoid



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*.

Phylogenetic Distribution of Host Records



Conclusions

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 Platygastriinae), 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.
- 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.



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.

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

Our gratitude to Zach Hurley, Zach Hunt, Carina Thiemann, Miriam Gibbs, Riley Gott, and Jessica Albright, for help with publication scanning and OCR, and for being such a great team to work with. Thanks to Elizabeth Alvarez for the image of the cladogram.

