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Note

How language and indexing affect meta-analyses: the vertical stratification of orchid bees (Apidae: Euglossini)

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Abstract

Vertical stratification in orchid bees is a small field, particularly suitable for an in-depth bibliometric analysis. We examined 13 publications to test the hypothesis that inclusion in databases is more important than language in the visibility and impact of publications about orchid bee stratification. Our findings matched the hypotheses: databases, rather than language, define impact. Our expert criteria suggest that a larger sample would produce the same results. Nevertheless, an ethically sound literature review should cover all relevant literature outside commercial databases: valuable contributions are also published in minor, non-indexed journals and repositories.

Additional keywords: bibliometry, citation, impact factor, scientific reports, Web of Science.

Resumen

La estratificación vertical en abejas de las orquídeas es un campo pequeño, particularmente adecuado para un análisis bibliométrico en profundidad. Examinamos 13 publicaciones para probar la hipótesis de que la inclusión en bases de datos es más importante que el idioma en la visibilidad y el impacto de las publicaciones sobre la estratificación de abejas de las orquídeas. Nuestros hallazgos coincidieron con la hipótesis: las bases de datos, más que el idioma, definen el impacto. Nuestros criterios de expertos sugieren que una muestra más grande produciría los mismos resultados. Sin embargo, una revisión de la literatura éticamente sólida debe abarcar toda la literatura relevante fuera de las bases de datos comerciales: también se encuentran contribuciones valiosas en revistas y repositorios menores no indexados.

Palabras clave: bibliometría, citación, factor de impacto, informes científicos, Web of Science

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In contrast to conventional literature reviews, which summarise the topic itself, scientometric and bibliometric techniques measure scientific production, focusing on topics, authors, institutions, and countries, and identify potential new research directions (scientometrics covers all aspects of science, while bibliometric research focuses on the publications). This type of analysis can contribute to the development of understudied topics. For example, Añino et al. (2021) explained how it was applied to the ecology of orchid bees. Here, we present a case study applied to the Euglossini tribe (orchid bees) (Hymenoptera: Apidae), an exclusively Neotropical group (Dressler 1982, Martins & de Souza 2005.); for which articles on vertical stratification have been published in different journals worldwide, our analysis concludes that—the strata have similar numbers of species, but the understory has more individuals (Añino et al. 2022, Ribeiro et al. 2022).

Meta-analysis is a useful tool that allows for analyzing studies when the volume of reports is confusing (e.g., Añino et al. 2022). Here we analyze how language might affect the origin, development, and evolution of research on this topic, which is particularly suitable for in-depth bibliometrics due to its small size. It is important to clarify that this study does not seek to generalize the potential effects of language on meta-analyses; rather, it aims to offer an opinion about the importance of conducting scientific literature searches considering language as a variable that could limit or bias analyses of a particular topic.

After reviewing the content of nearly 800 publications (on Google Scholar, Dimensions, and Web of Science) about Euglossini bees, we found only 15 articles on vertical stratification (i.e., "preference" for the understory or forest canopy) over the past three decades. We applied text mining using the "tm" package of the R statistical software to the literature listed by Añino et al. (2022) (13 articles that fit all criteria; Añino et al.´s (2022), meta-analytical study, and Ribeiro et al.´s (2022) study, both published simultaneously, are not included). We excluded non-relevant terms such as pronouns, affiliations, and author names. Text mining produces groups of similar texts, historical production graphs, and citation networks between authors (Figure 1). In the case of articles and texts about biology, it is important to note that although they are written in different languages, they share a common language when it comes to the study objects, as species are referred to by their scientific names in Latin. This could allow the construction of thematic blocks for searching and analyzing information through each article using text mining. In our study, we only focused on language structure similarities.

The languages used are English (5), Spanish (6), and Portuguese (2) (Fig. 1A). While many meta-analyses use the Web of Science (WOS) as primary source, in this case, WOS only yielded 4 results, meaning that WOS omitted 2/3 of the existing literature. This forced Añino et al. (2022) to also use Google Scholar, Dimensions, and national repositories to adjust the search equations in Spanish and Portuguese. The excluded articles from WOS belong to Panamanian journals and were all published in Spanish (5).

The only Spanish article included in WOS was conducted and published in Colombia in the journal Caldasia (Vélez & Pulido-Barrios 2005). The absence of Panamanian journals in WOS is purely related to the editorial management of the journals. However, these journals aspire to be indexed in databases such as SCOPUS and are currently undergoing processes to improve their editorial structure (Francisco Farnum, Personal Communication). As for the Portuguese articles, both were published in the Revista Brasileira de Zoologia (indexed in WOS), but they required precise search queries to be retrieved, considering the language implications.

In terms of scientific dynamics, one might expect the first study (Roubik 1993) to be the precursor to the emerging thematic line. This is not necessarily the case; in fact, Roubik only briefly mentioned the topic in an article that focused on another bee-related topic. Our opinion is that this line of research was clearly initiated by Oliveira and Campos (1996), who published their study in Portuguese (Fig. 1B). The Panamanian articles are self-cited within their working group, and these articles are the most recent on the topic (Figure 1C), making them easy to find in national repositories (Añino was aware of their existence due to his relationship with some members of the Panamanian working group). We found no evidence of scientific colonialism (studies conducted exclusively by foreign scientists).

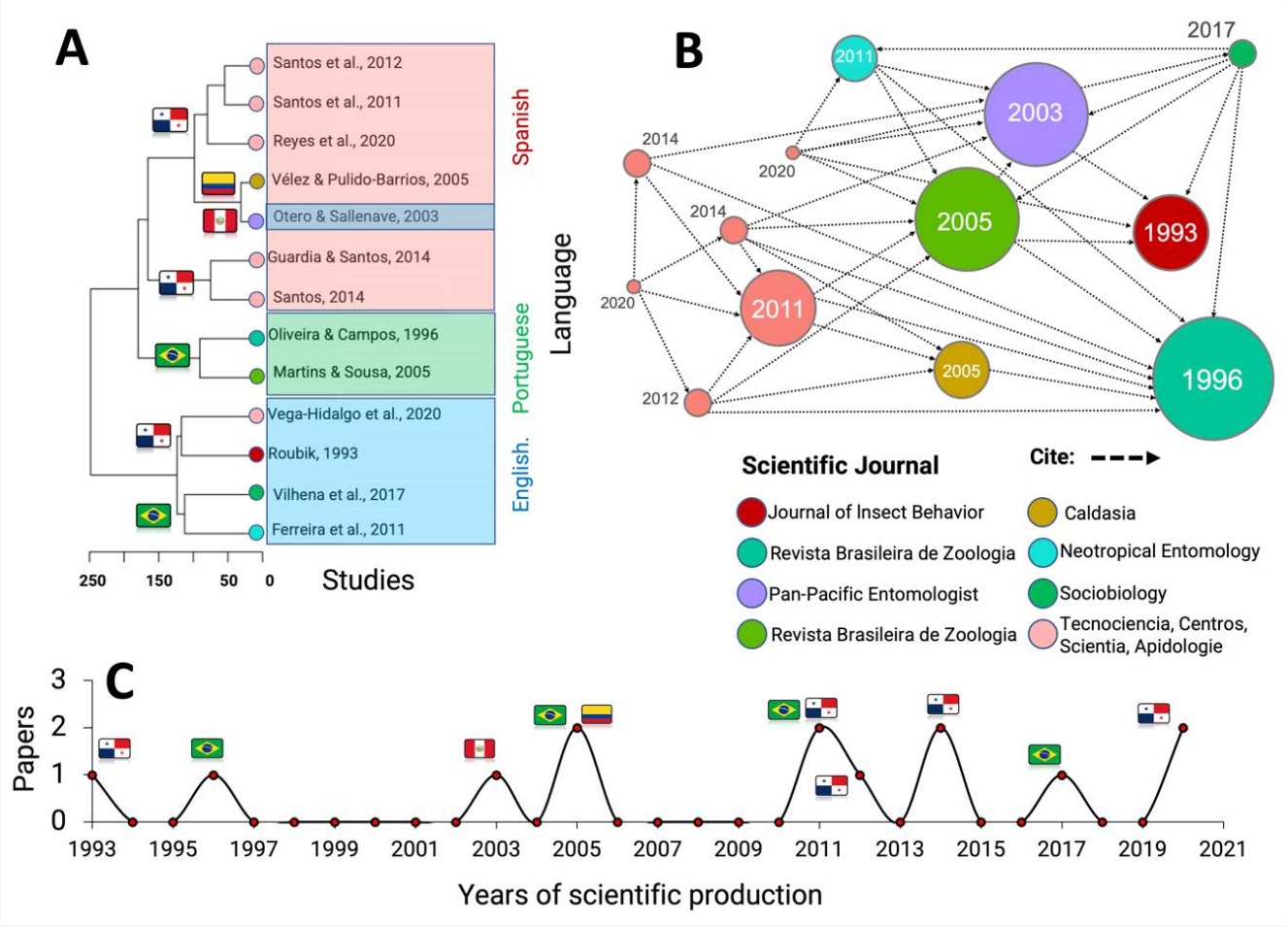

Figure 1. A) Texts grouped by language. B) Network of citations in articles on vertical stratification in Euglossini. C) Temporal evolution of publications. Note: Although cluster (A) classifies texts based on the words composing the language, these texts share scientific names in Latin, and frequency of phrases and words that can be used in classification, which is interesting since Otero & Sallenave (2003) and Vélez & Pulido-Barrios (2005) have a high similarity despite being written in different languages, not being cited, and not having the same source of origin regarding literary reference used (B). Both articles are brief communications and deal specifically with comparisons between strata, and they are also the only two studies that have not been conducted in Panama or Brazil (C).

Applying Ockham's philosophical principle, the language of the articles is strongly biased by the nationality of the researchers and, coincidentally, by the geographical distribution of the study group. Local studies are more likely to be published in local journals in the original language. Regarding journals indexed in WOS, it should be noted that they cover only a small percentage of the total number of existing journals (Añino et al. 2021). The literature on Euglossini is mainly published in Spanish, Portuguese, and English. However, most of the articles published in the first two languages are not found in WOS-indexed journals.

We suggest that a bibliographic search that only considers journals indexed in WOS and does not consider standardized searches using language as a variable may miss valuable insights on these topics or other topics in general. To prevent poor outcomes, a comprehensive bibliographic search should be based on all available databases, including local repositories.

There is no factual or ethical justification for a researcher to exclude published research with the colonialist and even racist argument that science from the tropics is not valid because it does not exist in American and

European databases such as Web of Science and Scopus, this argument lacks factual and ethical basis (Pinto et al. 2021, Strauss et al. 2023). The value of the literature itself should be judged by reading it with a critical mind, not by where it was published and certainly not by the language in which it was published.

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