Taxonomic bias: a persistent issue in ecology and evolution

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Abstract

Scientific hyperfocus on certain organisms slows innovation and hinders the generality of ecological and evolutionary inference. Yet, the extent of taxonomic bias in this field and its potential changes over time remain poorly quantified. By assessing 1,383,803 papers and 612 journals, we show that ecology and evolution research is strongly taxonomically biased. We found that studies on vertebrates, relative to those on invertebrates, (1) became more frequent over time, (2) were more prevalent in higher impact journals, and (3) received a greater number of citations and mentions in the media. However, classifying animals into more specific groups led to context-dependent temporal and attention patterns. We propose a series of urgent affirmative actions to ameliorate taxonomic imbalances in ecology and evolution.

Key-words: knowledge imbalance, journal citation indicator, journal impact factor, research bias, research impact, taxonomic chauvinism, taxonomic specialisation.

Introduction

More than 1.5 million animal species have been described to date [1], with many more yet to be discovered [2,3]. Despite this enormous diversity, analyses of awarded grants [4], biodiversity databases [5,6], conservation or reintroduction projects [7–10], scientific articles [4,11–20], and textbooks [21] have identified that certain taxa receive disproportionate attention in the field of ecology and evolution relative to their diversity. For example, vertebrates, especially birds and mammals, often concentrate conservation [7–10] and research [12,16,18–20] efforts even though they represent only a minute portion of existing animals [1]. This inequity, called taxonomic bias or taxonomic chauvinism [11], can stifle innovation in medicine and engineering by limiting biomimetics [22,23] and curb scientific advancement by impeding theoretical generality [11,24]. However, it is unclear whether taxonomic patterns in the ecology and evolution literature are universal as previous studies on taxonomic bias relied on small samples constrained by manual taxonomic identification and limited journal [13,16] or topic [12,14] coverage. Most importantly, whether these patterns changed since taxonomic bias was first discussed by researchers in the early 2000s [11,13] remains unknown.

Here, we explored several facets of taxonomic bias in the entire literature of ecology and evolution (612 journals and 1,383,803 papers), primarily focusing on animals. We aimed to quantify the extent of taxonomic bias and assess whether and how it has changed over time. To do so, we first assessed patterns related to journal taxonomic specialisation. Second, we investigated the proportion of papers on distinct taxonomic groups over time. Third, we evaluated the relationship between journals' impact metrics and the proportion of papers they published on each animal group. Fourth, we examined how the attention given to individual papers within journals varied with the animal group studied. We hypothesised that taxonomic patterns have not changed over time, and that papers on vertebrates, especially birds and mammals, are not only more prevalent in journals with higher impact metrics but also receive more attention than papers on other animals within the same journal and year. If these hypotheses are true, it would mean that researchers are limiting our understanding of the world and stifling potential innovation, possibly to pursue metrics that maximise their own research exposure.

Material and methods

Preregistration

Some of our methodology was described in our preregistration [25]. However, we greatly expanded our original plan, which culminated in two separate projects: the present study describing patterns of taxonomic bias in the literature of ecology and evolution, and another study exploring the potential drivers of taxonomic bias from data collected *via* a survey with behavioural ecologists [26]. Changes from our preregistration are summarised as follows. First, we initially planned to examine taxonomic bias in papers published in 10 behaviour journals, but later expanded the range of our study to a much broader selection of journals related to ecology and evolution (see details below). Second, we originally planned to include non-animal organisms when classifying papers' taxonomic focus. Nonetheless, distinguishing the use of non-animal organisms as research objects from their use as animals' environment, substrate, or food proved to be difficult. Therefore, we opted to only identify animal taxa in our study. Third, we originally planned to improve the algorithm using up to 500 papers, but used many more instead to ensure the reliability of the taxonomic classification algorithm (see details below). Fourth, many analyses in the present study, such as those involving data from Altmetric, were not initially planned in our preregistration.

Journal selection and classification

PP selected all journals that were classified as “behavioral sciences”, “biodiversity conservation”, “ecology”, “entomology”, “evolutionary biology”, “marine & freshwater biology”, “ornithology” or “zoology” by Clarivate’s Journal Citation Records (JCR), tallying 696 journals. PP then retained only journals (1) whose Clarivate’s journal impact factor (2024) was available and (2) were also indexed by Scimago Journal Rank as “agricultural and biological sciences” or “environmental sciences”, which resulted in the selection of 612 journals (Fig. S1). Afterwards, PP collated the scope of each journal (available in their respective website) and used this information to determine journals’ taxonomic focus. Note that some journals that vaguely described their taxonomic criteria (e.g. laboratory animals) or that only inadvertently excluded certain organisms because of the subject they specialised on (e.g. soil ecology journals probably do not publish research on fish but have no such explicit restrictions) were still considered taxonomically unrestricted. Moreover, journals on entomology or insect science were deemed to include all arthropods unless they explicitly mentioned focusing on a particular insect group (e.g. lepidopterans, orthopterans).

Journal impact metrics

PP used two journal impact metrics in the present study: the journal citation indicator (JCI) and the journal impact factor (JIF). Both metrics are calculated by JCR and were thus extracted during the journal selection process (see subsection above). The year in which these metrics are calculated by Clarivate is referred to as the JCR year, which was 2024 for the present study. Both JCI and JIF quantify citation performance but differ in key aspects. The JCI is normalised for field, document age, and document type; it uses citations from the JCR year plus previous three years (i.e. 2024-2021) for articles and reviews (but not other document types, e.g. letters or editorials) published in the previous three years (i.e. 2023-2021). By contrast, JIF is an absolute metric based on citations received in the JCR year (i.e. 2024) to all documents published in the previous two years (i.e. 2023-2022).

Literature searches

On 29 December 2025, PP retrieved information from 1,695,614 documents by searching the International Standard Serial Number (ISSN) of the 612 journals aforementioned on Scopus (accessed through the University of New South Wales). 1,389,068 documents from 606 journals remained in the dataset after PP excluded documents that were (1) officially published in 2026, (2) duplicated, or (3) had missing information (DOI, journal name, abstract, title, and/or author names). PP further excluded documents that were classified by Scopus as “book” (n = 9), “book chapter” (n = 13), “editorial” (n = 870), “erratum” (n = 4,159), and “retracted” (n = 214) as these do not represent valid standard research outputs. Conversely, other documents (hereby *papers*) classified by Scopus as “article” (n = 1,305,271), “conference paper” (n = 17,448), “data paper” (n = 290), “letter” (n = 2,627), “note” (n = 4,104), “review” (n = 52,165), or “short survey” (n = 1,898) remained in the dataset, tallying 1,383,803 papers from 606 journals.

Altmetric data

On 20 January 2026, PP used the Altmetric API ("Counts Only" version) to gather all available metrics of attention indexed by Altmetric related to the papers retrieved. However, note that only 44.4% (613,768 out of 1,383,803) of the papers in our dataset were found in the Altmetric database. We specifically used three metrics of attention collected by Altmetric in our analyses (see details below): mentions in online documents (e.g. blogs, news outlets, patents, policies, social media, Wikipedia), readers in Mendeley, and Altmetric score (i.e. a weighted estimate of several attention metrics).

Taxonomic classification

PP selected ten animal groups to identify papers' taxonomic focus from their title, abstract, and author keywords: (1) amphibians, (2) arachnids, (3) birds, (4) crustaceans (i.e. non-hexapod pancrustaceans), (5) fish (i.e. non-tetrapod vertebrates), (6) insects, (7) mammals, (8) molluscs, (9) (non-avian) reptiles, and (10) other (unnamed invertebrates). MMK and PP independently evaluated the taxonomic focus of 100 papers, resulting in eight conflicts that were resolved after discussion and that generated clear criteria to evaluate papers' taxonomic focus, as follows. First, humans (i.e. any species of the genus *Homo*) were treated as non-animal organisms for classification purposes. Second, papers could focus on distinct animal groups by exploring interactions (e.g. predator-prey, host-parasite) between species of different groups or simply by using or collecting data related to multiple taxa. However, animal groups were only identified as being the focus of a paper when they were directly or indirectly (e.g. byproducts, images) involved in the research presented (regardless of whether the research was empirical, theoretical, or a review), but not when they were simply mentioned as references (see Table S1 for examples). Third, papers needed to specify taxonomic information to the level of our taxonomic classification, meaning that vague or high-level terms (e.g. shellfish, vertebrates, zooplankton) were ignored if no specific taxonomic terms were given. Applying these criteria, PP manually identified the animal taxa examined in 6,749 papers, which were used to train and test an algorithm that automates this process (see below).

In order to automate the classification of papers' taxonomic focus, PP compiled a set of words associated with different taxa (hereby *taxonomic keywords*), which included part of the GBIF Backbone Taxonomy [27] (Supplementary file S2) and a customised set of keywords (Supplementary file S3). PP then developed a simple algorithm to identify papers' taxonomic focus based on taxonomic keywords detected in papers' title, abstract, and author keywords. PP used 4,934 papers that he inspected as a training set to manually add and adjust taxonomic keywords, improving the algorithm. The algorithm was also able to identify some combinations of keywords that would generate incorrect labels if left unchecked. For instance, spider monkey is a mammal, but the terms "spider" and "monkey" are taxonomic keywords that the algorithm uses to identify studies focusing on arachnids and mammals, respectively. PP thus added a step in the algorithm that corrects for these occurrences.

PP evaluated the efficacy of the algorithm mentioned above in three ways. First, PP compared the manually identified taxonomic focus of the remaining 1,815 papers he inspected with the equivalent labels generated by the algorithm. PP found that the algorithm had, for each taxonomic group (Table S2), at least 97.2% accuracy (i.e. proportion of correct predictions [28]), 84.4% precision (i.e. proportion of predicted positives that are truly positive [29]), 95.4% sensitivity (i.e. true positive rate, also called recall [29,30]), 96.9% specificity (i.e., true negative rate [30]), and 91.2% F1-score (i.e. harmonic mean of precision and sensitivity [31]). Note that the training and the test sets each contained at least three papers from each of the 605 journals in the dataset (one other journal had only one paper in the dataset, which was used in the training set), ensuring a reliable comparison. Second, PP verified the proportion of papers from taxonomically specialised journals receiving impossible taxonomic labels, such as studies published in the Journal of Mammalogy identified by the algorithm as involving only animals other than mammals. He detected these gross errors in only 0.06% of all such papers (see also Figs. S5 and S6). Third, PP compared the taxonomic labels generated by the algorithm with the dataset from Stahlshmidt [12], who manually identified a single animal taxon focused by 82 papers present in our dataset. PP found that the algorithm's taxonomic classifications matched Stahlshmidt's, except for a paper on humans (classified by Stahlshmidt as mammal). However, the algorithm also identified additional animal groups for 14 of these papers besides those identified by Stahlshmidt.

Statistical analyses

PP fitted several models to analyse taxonomic patterns of journals and papers. He first conducted a linear regression with journal impact factor as the response variable and journal taxonomic scope as the predictor variable. He then performed three Dirichlet regressions, all with the same response variable (proportions of papers involving zero, one, or two or more animal groups) and random effect (journal identity), but each with a different predictor variable (year of publication, journal impact factor, or journal citation index).

To conduct all other analyses, i.e. those involving single-animal-group papers published in taxonomically unrestricted journals, PP used two complementary approaches. He analysed papers from all journals combined to characterise overall taxonomic patterns in the ecology and evolution literature, but also assessed how taxonomic patterns varied across this field by examining papers within one of five journal sets: aquatic (journals classified by JCR as “marine or freshwater biology”; N = 76), behaviour (journals classified as “behavioral sciences”; N = 16), conservation (journals classified as “biodiversity conservation” but not included in the aquatic set; N = 62), general ecology and evolution (remaining journals classified as “ecology” or “evolutionary biology”; N = 142), and zoology (all remaining journals, mostly classified as “zoology” but some as “entomology”; N = 79). Within each of these approaches, two different taxonomic levels were analysed: binary (vertebrates *vs.* invertebrates) and specific (10 animal groups previously mentioned).

Under the scenarios described above, PP performed logistic regressions (binary taxa) or Dirichlet regressions (specific taxa), with journal identity as a random effect and a single predictor variable (year of publication, journal impact factor, or journal citation index). PP made sensitive analyses of these models by excluding journals with impact factor greater than 6 and citation indicator greater than 2, considering the relationship between a journal impact metric and the prevalence of papers on an animal group as different from zero when both model versions yielded the same qualitative results.

Lastly, PP fitted several generalised linear mixed models (GLMMs) with a negative binomial error distribution to explore the attention given to single-animal-group papers depending on the taxon they focused on. In these GLMMs, the response variable could be one of four attention metrics: the number of (1) citations by other papers according to Scopus, (2) mentions in online documents, (3) readers in Mendeley, or (4) (rounded) Altmetric score. In these models, journal identity, year of publication, and their interaction were random factors and either binary or specific animal groups was the predictor variable.

Analyses involved papers published over a certain timespan: 2001-2025 for most models, but 1976-2025 to assess temporal patterns regarding number of taxa covered, and 2021-2025 to assess the association between journal impact metrics and focused animal group. Continuous variables in all models fitted were scaled by subtracting the mean from each value and then dividing the result by the standard deviation.

PP conducted all analyses using R v. 4.5.1 [32]. PP fitted GLMMs using the package *glmmTMB* v. 1.1.12 [33,34] and performed pairwise comparisons for these models using the packages *emmeans* v. 1.11.2.8 [35], *multcomp* v. 1.4.28 [36], and *multcompView* v. 0.1.10 [37]. PP conducted logistic and Dirichlet regressions using the package *brms* v. 2.23.0 [38–40] and the package *cmdstanr* v. 0.9.0 [41]. For these regressions, PP ran three chains, each with 5,000 iterations plus another 5,000 burn-in iterations, adopting Stan's standard uninformative priors and setting the adaptive delta to 0.9. PP then computed the predictions and trends of such regressions using the package *marginaleffects* v. 0.31.0 [42].

Results

Taxonomic patterns across journals

Almost 40% (235 out of 612) of journals had explicit taxonomic restrictions, and 42.1% of these taxonomically specialised journals (99 out of 235) focused exclusively on all or some arthropods (Fig. 1A). Only journals specialised on birds had, on average, a lower impact factor than taxonomically unrestricted journals or those specialised in humans or non-animal organisms (Fig. 1B). However, the small number of journals specialised in other animal groups (e.g. arachnids, molluscs) may have limited our ability to detect statistical differences between their average impact factor and that of taxonomically unrestricted journals.

Following Clarivate's Journal Citation Report (hereby *JCR*; Fig. S1) classification system, we found that, unsurprisingly, most journals assigned to taxonomically driven JCR categories (i.e. entomology and ornithology) were taxonomically specialised (Fig. 1C). Meanwhile, taxonomically unrestricted journals dominated other JCR categories (Fig. 1C).

Taxonomic patterns across papers

We found that most papers in the field of ecology and evolution mention a single animal group (hereby *single-animal-group papers*) from the 10 categories we used for taxonomic classification (Fig. S2A). However, the prevalence of single-animal-group papers in the literature has slightly decreased over the last five decades (Fig. S2A; Supplementary file S1). We also observed that journals with higher impact factor and higher journal citation indicator were more likely to publish papers that did not specifically mention animals (e.g. conceptual or theoretical studies, empirical studies on humans, non-animal organisms, or the environment; Fig. S2B, C; Supplementary file S1). Although the distribution of both journal impact factor and journal citation indicator was right-skewed (Fig. S2D, E), the patterns we found related to these metrics persisted when high-impact journals were excluded from our analyses (Supplementary file S1).

We gathered 991,894 ecology and evolution papers involving animals, the oldest of them published in 1877. 457,064 (46.1%) of these papers involved only invertebrates, 447,800 (45.1%) only vertebrates, and 8,730 (8.8%) both invertebrates and vertebrates. When partitioning animals into the 10 aforementioned groups, we observed that insects, mammals, and fish were the most popular animals in this literature (Fig. 2A). Still, insects were the least investigated animal group in relation to its diversity, while mammals and fish were the most overrepresented by the same standard (Fig. 2B).

Studies predominantly investigated each animal group in isolation, but the number of animal groups examined varied depending on the animals involved (Fig. 2A). For instance, while 81.4% of papers involving insects focused solely on them, almost half (47.7%) of papers on arachnids concomitantly involved other animals (Fig. 2A). This pattern could be even stronger when considering particular animals, such as ticks, a group of obligate parasites that represents 0.08% of all living arachnids [43] but is mentioned by 20.1% of papers involving arachnids alongside other animals.

Nearly half of all single-animal-group papers on insects and arachnids were published in taxonomically specialised journals (Fig. 2C). Single-animal-group papers on other animals were mostly published in taxonomically unrestricted journals, although some more than others (Fig. 2C).

We hereon focus on single-animal-group papers (N = 560,364) published in taxonomically unrestricted journals (N = 375). Most of these papers focused on vertebrates overall (Fig. 3A). However, when animals were divided into more specific groups, insects emerged as the single most frequently studied group, followed closely by fish, mammals, and birds. Furthermore, when separating journals into five distinct sets (largely based on JCR categories), we noted that taxonomic patterns were not uniform across the literature of ecology and evolution. For instance, in 2025, approximately half of the papers published in aquatic-related journals focused on fish, while most of the remaining papers examined invertebrates other than arachnids and insects (Fig. 3B). By contrast, mammals and birds were particularly popular in journals focusing on behaviour, conservation, and general ecology and evolution (Fig. 3C-E), while zoology journals published mainly papers on invertebrates by 2025, primarily due to the high prevalence of papers on insects (Fig. 3F). We additionally found that many taxonomically unrestricted journals showed extreme bias towards a single group of animals (Fig. S3).

In relation to time

The prevalence of papers on vertebrates remained the same over the last 25 years in the literature as a whole (Fig. 3A) and in conservation journals (Fig. 3D), yet the same could not be said for other journal sets. For instance, we observed that vertebrates became proportionally more studied than invertebrates in aquatic, behaviour, and general ecology and evolution journals (Fig. 3B, C, E). By contrast, vertebrates became proportionally less studied than invertebrates in zoology journals (Fig. 3F).

Changes over time were more frequently observed when classifying animals into specific categories, as the prevalence of papers on 8 (out of 10) animal groups changed in the literature as a whole over the last 25 years (Fig. 3A). However, these trends were small in magnitude: the strongest absolute change was the increase of 3.7% of papers on fish (Fig. 3A). Temporal trends regarding taxa also occurred across various subfields, but often in distinct directions. For example, the proportion of papers on mammals increased in behaviour journals as well as in general ecology and evolution journals (Fig. 3C, E) but remained constant in aquatic journals (Fig. 3B) and decreased in conservation and zoology journals (Fig. 3D, F). Importantly, some changes in taxonomic patterns over time within journal sets were enormous: fish accounted for 35.8% of papers published in aquatic journals in 2001 but 49.7% in 2025 (Fig. 3B), while insects increased from 21.5% in 2001 to 41.3% in 2025 in zoology journals (Fig. 3F).

In relation to journal impact metrics

Papers published in journals with greater impact factor and citation indicator were more likely to focus on vertebrates (Fig. 4). However, there were exceptions for this pattern: general ecology and evolution journals showed either a negative or an absent relationship between their impact metrics and prevalence of papers on vertebrates (Fig. 4E, K), and behaviour journals strangely showed a positive trend between vertebrate pervasiveness in relation to journal citation indicator (Fig. 4I) but a negative one for journal impact factor (Fig. 4C). Despite these trends, the prevalence of more specific animal groups in papers was rarely associated with journal impact metrics (Fig. 4; Supplementary file S1). For example, birds were as likely to be the focus of papers in high-impact journals as in lower-impact journals, regardless of journal set (Supplementary file S1). We observed, however, a few trends related to taxon prevalence and journal impact metrics. For instance, the proportion of papers on insects across the entire literature was not associated with journal impact factor but increased with journal citation indicator (Fig. 4A, B). The prevalence of papers on crustaceans, both in the literature as a whole and across aquatic journals, decreased with journal impact factor but not with journal citation indicator (Fig. 4C-F). Meanwhile, taxonomic trends regarding journal impact factor and journal citation indicator were congruent for fish and invertebrates other than arachnids, crustaceans, insects, and molluscs in aquatic journals (positive and negative relationship, respectively; Fig. 4G-J), and for mammals in journals of general ecology and evolution (negative relationship; Fig. 4K, L).

In relation to individual attention received

Compared with papers on invertebrates, papers on vertebrates in the ecology and evolution literature as a whole received, on average, 10.6% more citations, accumulated 44.3% more online mentions, attracted 24.2% more readers in Mendeley, and achieved 46.5% higher Altmetric scores (Fig. 5). The same qualitative pattern occurred within journal sets, except for the number of citations in conservation journals, for which no difference was detected between papers on vertebrates *vs*. invertebrates (Fig. S5C). Meanwhile, the attention received by papers on different animal groups varied substantially across metrics and journal sets (Fig. 5, S5). For example, birds and mammals attracted the greatest online attention in most cases (Fig. 5B; Fig. S4F–J), but this pattern was not always reflected in citation counts (Fig. 5A; Fig. S4A–E).

Discussion

Our results show that ecology and evolution research is profoundly taxonomically unbalanced as certain animal groups are consistently neglected, both in representation (relative to diversity) in the literature and in the attention they receive. Although this imbalance has occurred for a long time, it has remained largely stable over the last 25 years. Below, we discuss these patterns in detail, consider their implications for the study of ecology and evolution, and propose actions to ameliorate this issue.

We found that vertebrates are greatly overrepresented in the literature of ecology and evolution: they appear in 53.9% of all papers in this field mentioning animals despite representing only 4.3% of animal biodiversity [1]. In fact, the attention given to some invertebrates (e.g. ticks and other parasites) only occurs because of their association with vertebrates, a pattern that had already been noted by others [44]. We thus corroborate and expand previous findings from specific pockets of ecology and evolution [11–13,16], revealing that taxonomic bias is a problem pertaining to the entire field and confirming an "institutional vertebratism" (*sensu* [45]). Nonetheless, we found substantial variation in taxonomic patterns across the ecology and evolution literature when animals were classified in more specific groups. For instance, research published in aquatic journals often involved fish, crustaceans, molluscs, and other non-arthropod invertebrates, while behaviour journals more commonly published research on mammals and birds. This variability indicates that there is not a single popular animal group across ecology and evolution. Furthermore, our discovery that species-rich invertebrate groups (e.g. arachnids, insects) are often relegated to taxonomically specialised journals, which probably reach a narrower audience, suggests that the existing hyperfocus on vertebrates may be even more pronounced from the perspective of an average researcher.

The intense taxonomic bias favouring vertebrates in ecology and evolution has shown no signs of improvement since taxonomic bias was first discussed in the early 2000s. More specifically, we observed that the overrepresentation of vertebrates across the literature of ecology and evolution as a whole has remained stable or even increased in certain pockets of this field over the last 25 years. The only temporal increase in invertebrate-focused studies during this period occurred in zoology journals, likely because these outlets concentrate much of (if not all) the existing research on systematics. This includes the revision of taxa and the description of new species, which are predominantly invertebrates precisely because of their immense and still largely undocumented diversity, thus naturally inflating their representation within this journal set. Temporal trends regarding specific animal groups also varied across subdisciplines of ecology and evolution, suggesting that efforts to mitigate taxonomic bias will need to be tailored to the norms and priorities of each subfield. However, increasing research on invertebrates is undoubtedly critical to all subpockets of ecology and evolution.

We hypothesised that vertebrates, especially birds and mammals, would receive more attention than invertebrates across and within ecology and evolution journals. Indeed, compared with invertebrates, vertebrates were more likely to be the focus of papers published in journals with higher impact metrics. Likewise, papers on vertebrates acquired more citations, online coverage, Mendeley readers, and greater Altmetric scores than papers on invertebrates. These results are congruent with existing research on the attention given to distinct animal groups within and beyond academia. For instance, Rosenthal et al. [16] found that studies on vertebrates were cited more frequently than those on arthropods. Moreover, vertebrates have been shown to receive more attention than invertebrates on social media (e.g. Instagram [46]) and online knowledge platforms (e.g. Wikipedia [47]). Nonetheless, using finer animal classifications showed more nuanced attention patterns. While journal impact metrics were rarely associated with the likelihood of publication for a specific animal group, the attention given to each animal group within a journal varied within and across subdisciplines and metrics.

It is possible that the attention patterns we identified within and across journals stem from researchers behaving differently depending on the organisms they study. For instance, ecologists and evolutionary biologists working on invertebrates may be more likely to submit their research manuscripts to taxonomically specialised or lower-impact journals than those working with vertebrates. Researchers focusing on invertebrates may also struggle to contextualise their research into the existing theory, lowering their chances of publishing in impactful journals and receiving attention overall. However, studies on invertebrates were previously found to cite vertebrates more often than studies on birds and mammals cited other taxa [48], which suggests the opposite pattern (i.e. studies on vertebrates are less broadly contextualised than those on invertebrates). Thus, the taxonomic bias we identified in the ecology and evolution literature (and its persistence over time) probably occurs because of a more pervasive process—the idea that certain taxa are more valuable than others.

The perception that vertebrates are "better" or more important than invertebrates, a view widespread in society [49,50], likely influences scientists' choice of research organisms [26]. This skewed valuation system, which is potentially used by gatekeepers (e.g. committees, journal editors, reviewers) to ascertain research appeal, may then result in taxonomically biased decisions. We argue that conducting science as a congeniality contest slows innovation [22,23], curbs the generality of ecological and evolutionary knowledge [11,24], underexposes society to animals that are ubiquitous in nature [45], and inhibits the formation of academics exploring such animals (e.g. insect taxonomists [4,51]), further contributing to the problem in a vicious cycle.

While several actions needed to reduce taxonomic bias involve the society at large [26], we focus on possible interventions within academia to ameliorate this issue as they may be readily implemented. First, we urge publishers, journals, and scientific societies to be more transparent about their decisions regarding publications and funding. This includes systematically collecting and publicly reporting information on the taxa investigated in submitted and accepted manuscripts, as well as in funded projects. This would be a relatively simple task by journals and funding institutions as authors or applicants can populate this information on submission. Second, taxonomic diversity should be explicitly incorporated into the guidelines for awards, grants, hiring, and publication decisions, mitigating implicit biases among decision-makers. Third, targeted financial and publishing incentives should be established to support researchers working on understudied taxa. Fourth, fomenting descriptive and fundamental research, such as taxonomy [4,51] and natural history [52,53], is paramount to strengthen hypothesis-driven and applied research, as one cannot test or apply undescribed organisms, processes, and patterns. Although these propositions may be ambitious or even unrealistic, similar criticisms were once directed at affirmative action policies aimed at increasing the participation of underrepresented groups in academia. Many journals now state their commitment to diversity, equity, and inclusion, yet none of those we examined explicitly promote research on neglected taxa. We hope that institutions will consider implementing our recommendations to foster a more taxonomically inclusive scientific community.

Code and data accessibility

All data and code used in this study are available at https://zenodo.org/records/19451113.

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Author contributions

PP: conceptualisation, methodology, formal analysis, investigation, data curation, writing - original draft, writing - review & editing, visualisation, project administration.

MK: conceptualisation, writing - review & editing.

Competing interests

The authors declare no conflicts of interest.

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Figures

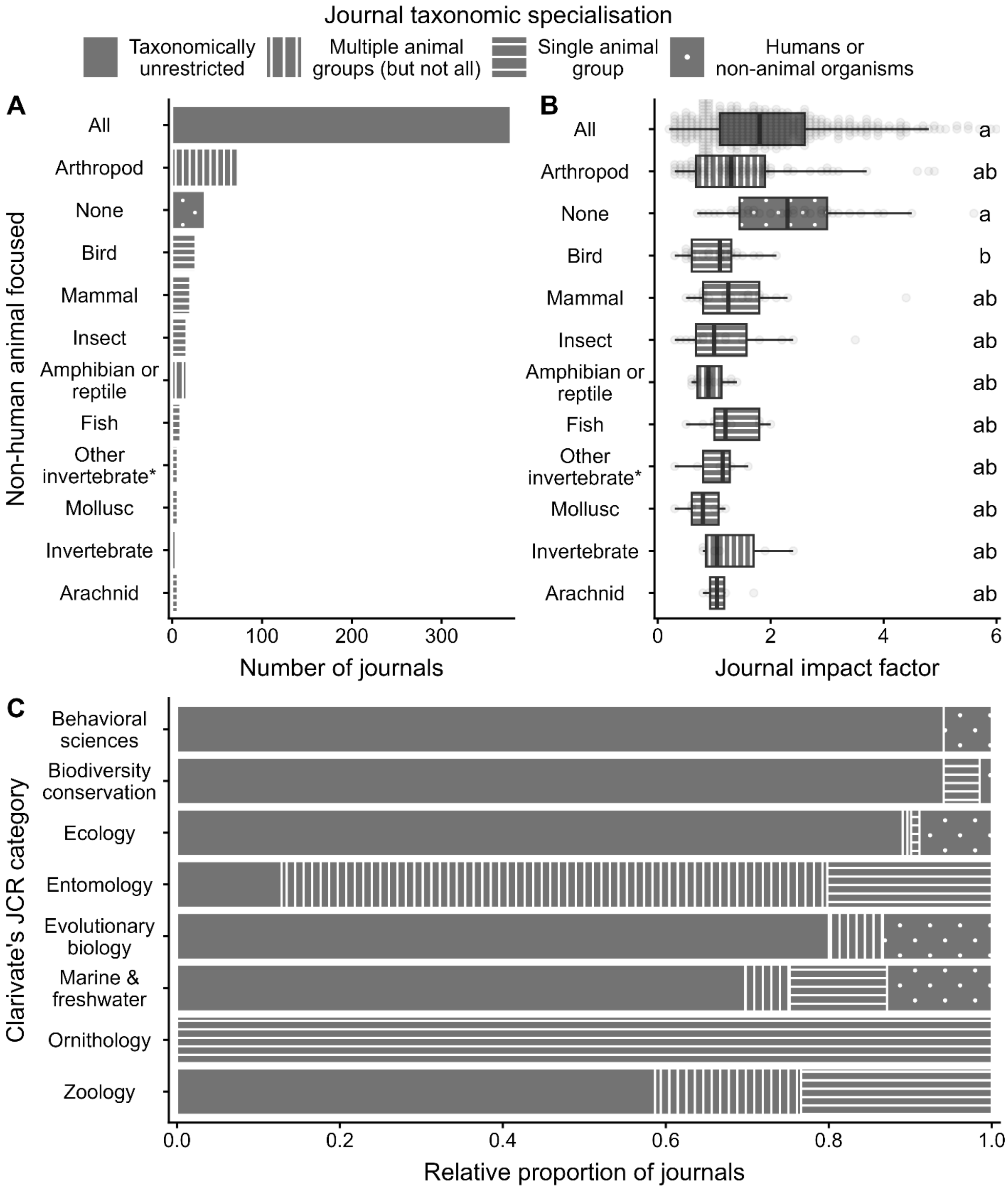


Figure 1. Taxonomic specialisation of ecology and evolution journals. Panel A shows the number of journals focusing on each non-human animal taxon, with panel B showing the impact

factor of these journals (curtailed *x*-axis with 6 as maximum value; only taxa focused by at least five journals are shown). Panel C shows the taxonomic specialisation of journals within each Journal Citation Report (JCR) category. In panels A and B, "Other invertebrate*" refers to invertebrates other than arachnids, crustaceans, insects, and molluscs. In panel B, dots represent individual journals, boxes enclose 50% of the data (interquartile range), the whiskers contain values up to 1.5 times the interquartile range, the solid line within the boxes represents the median, and distinct letters represent statistical differences between groups of journals with different focused taxa (z-values with $p < 0.05$ for all pairwise comparisons).

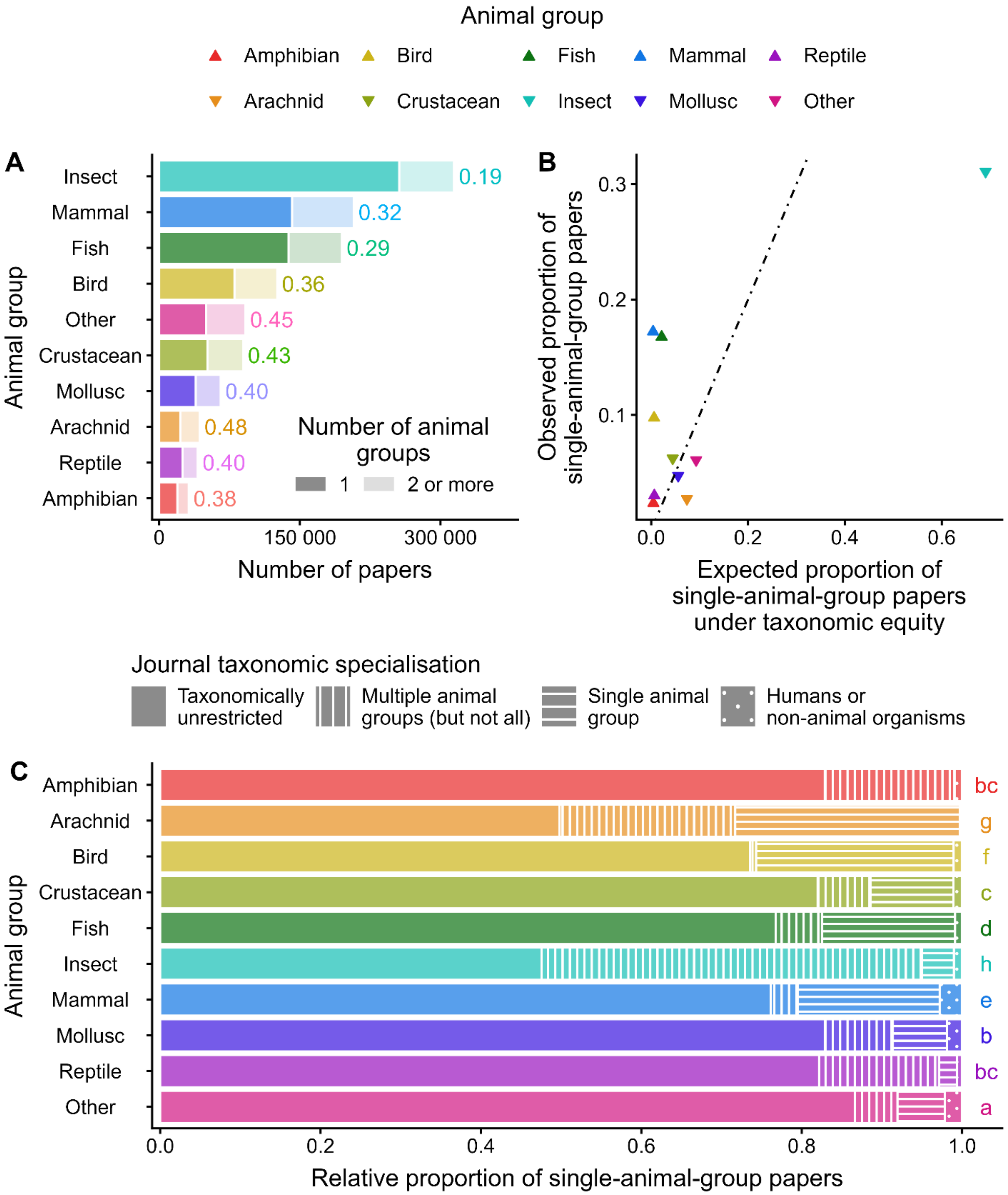


Figure 2. Taxonomic patterns across all papers mentioning at least one animal group. In panel A, dark-coloured bars represent the number of papers solely on that animal group, light-coloured bars represent the number of papers examining that animal group in conjunction with

other animals, and numbers beside these bars represent its proportion in relation to all papers on that animal group. Panel B shows the relationship between the expected proportion of single-animal-group papers under taxonomic equity (i.e. proportional to the species richness of animal groups) and the observed corresponding proportion, where the dot-dashed line highlights a perfect relationship; points above the line signify overrepresentation, while points below the line signify underrepresentation. Panel C shows the relative proportion of single-animal-group papers on each animal taxon published in each type of journal taxonomic specialisation, in which distinct letters represent statistical differences between animal groups regarding their proportion of such papers in taxonomically unrestricted journals (z-values with $p < 0.05$ for all pairwise comparisons).

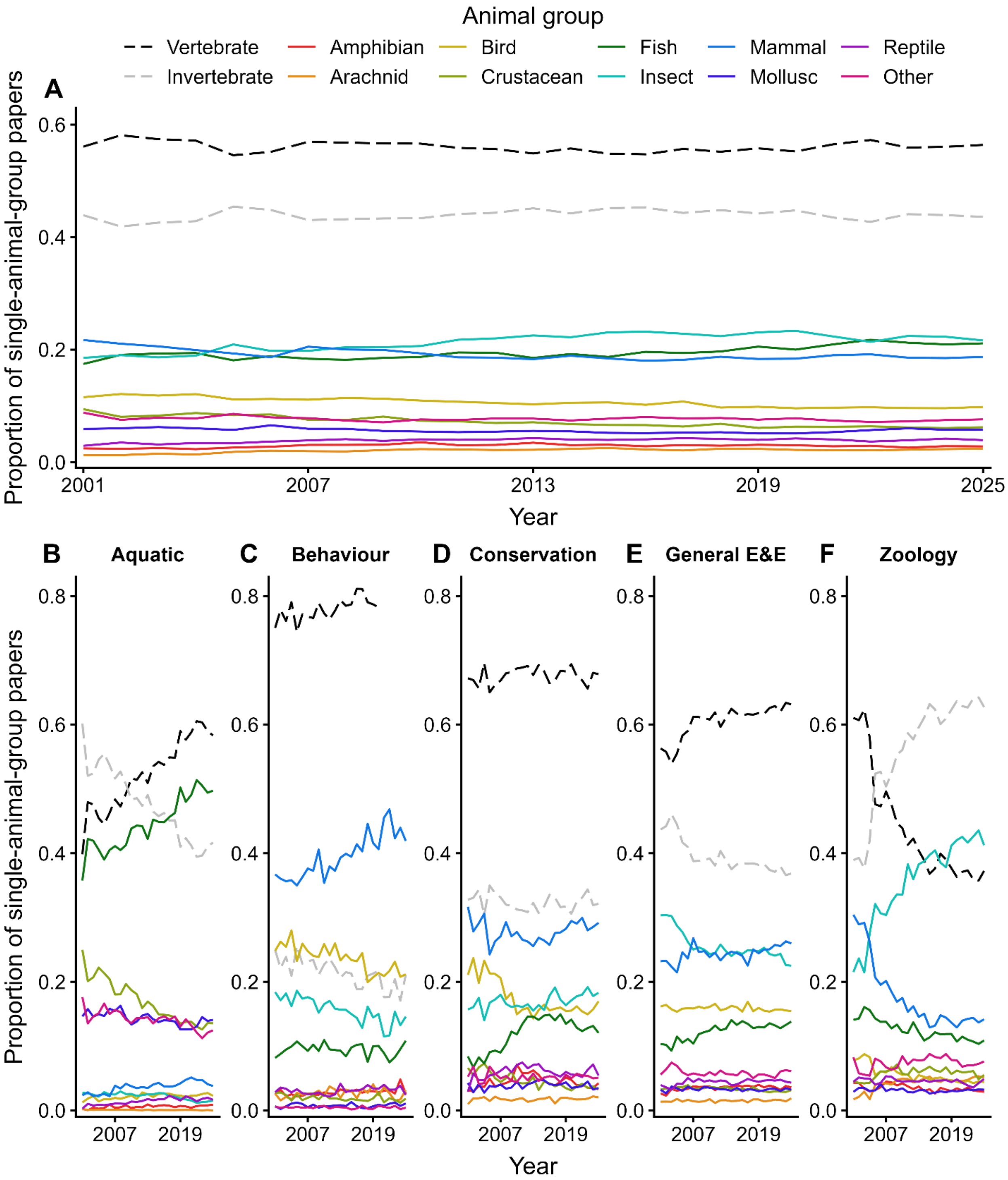


Figure 3. Proportion of single-animal-group papers investigating each animal group over time. While panel A shows estimates for all journals together, panels B-F show journals divided into five separate sets. See also the Supplementary file S1.

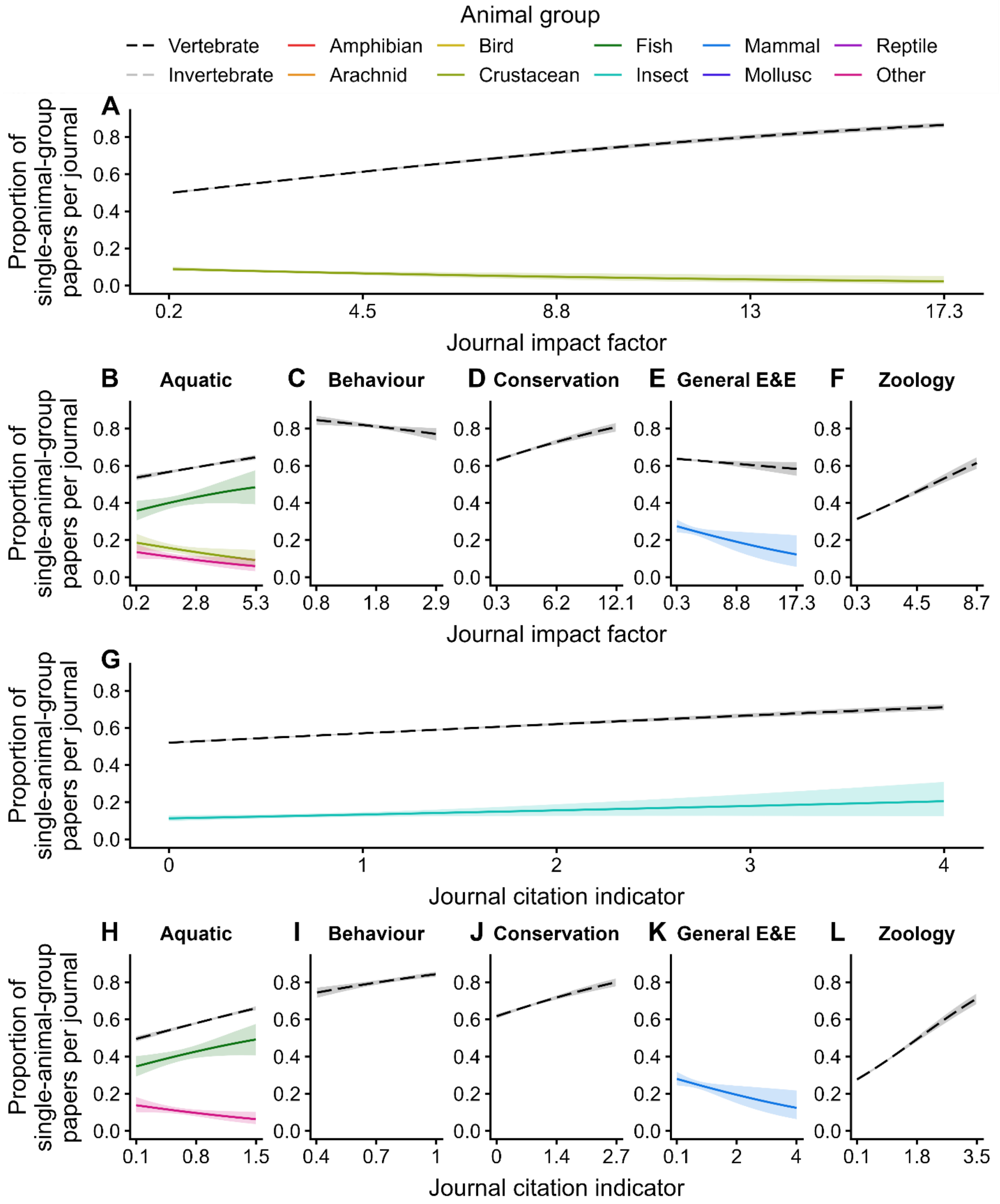
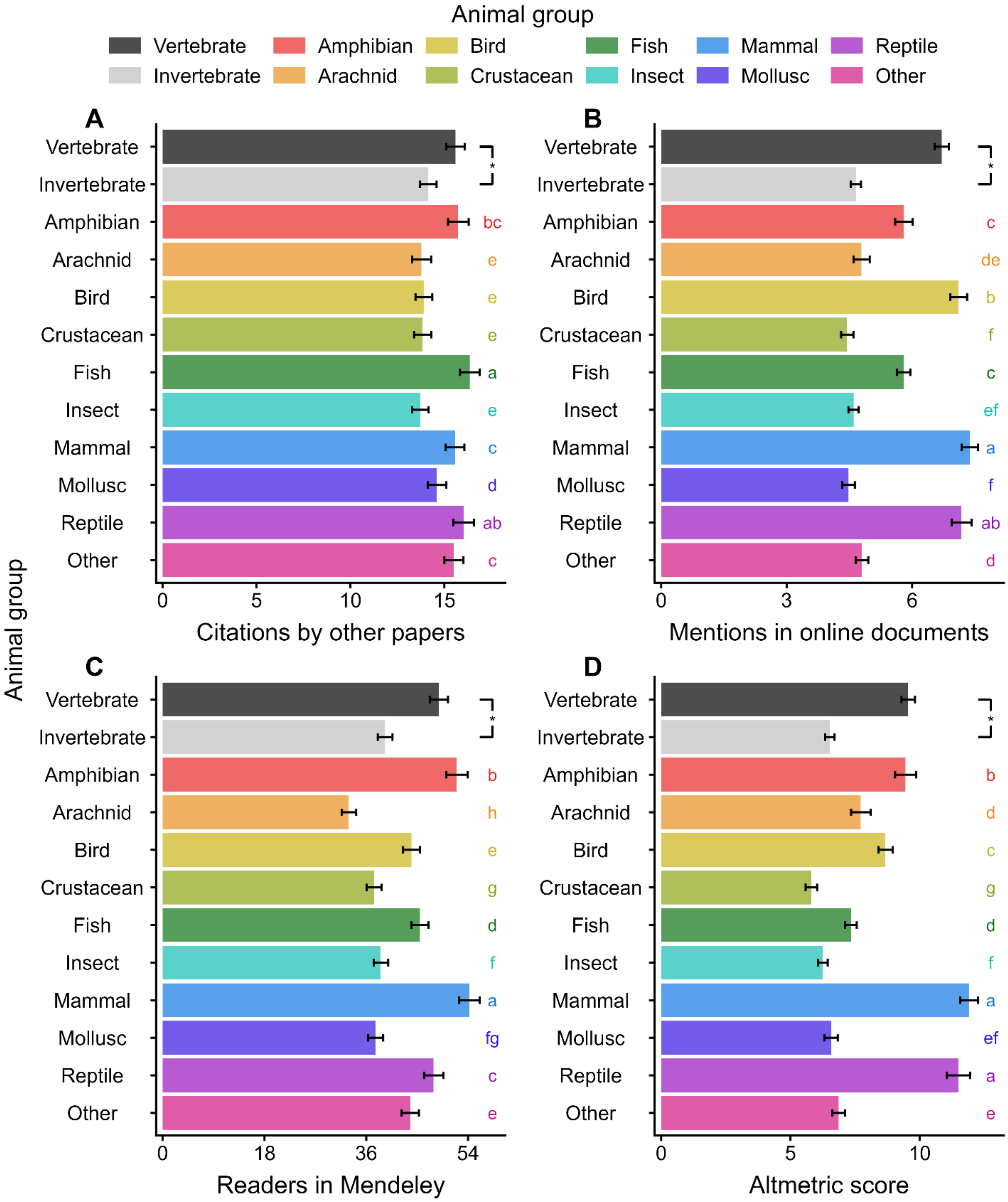


Figure 4. Proportion of single-animal-group papers investigating each animal group in relation to journal impact metrics. The journal impact metric explored in panels A-F is journal

impact factor, while journal citation indicator is explored in panels G-L. Panels A and G show trends for all journals in ecology and evolution together, while panels B-F and H-L do so within journal sets. Note that only positive or negative relationships are shown.



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641 **Figure 5. Attention metrics for papers on distinct animal groups.** Distinct letters represent

642 statistical differences among papers on specific animal groups within each panel (z-values with p

< 0.05 for all pairwise comparisons), while differences between papers on vertebrates *vs.* invertebrates are shown with a star.

Supplementary material

Supplementary figures

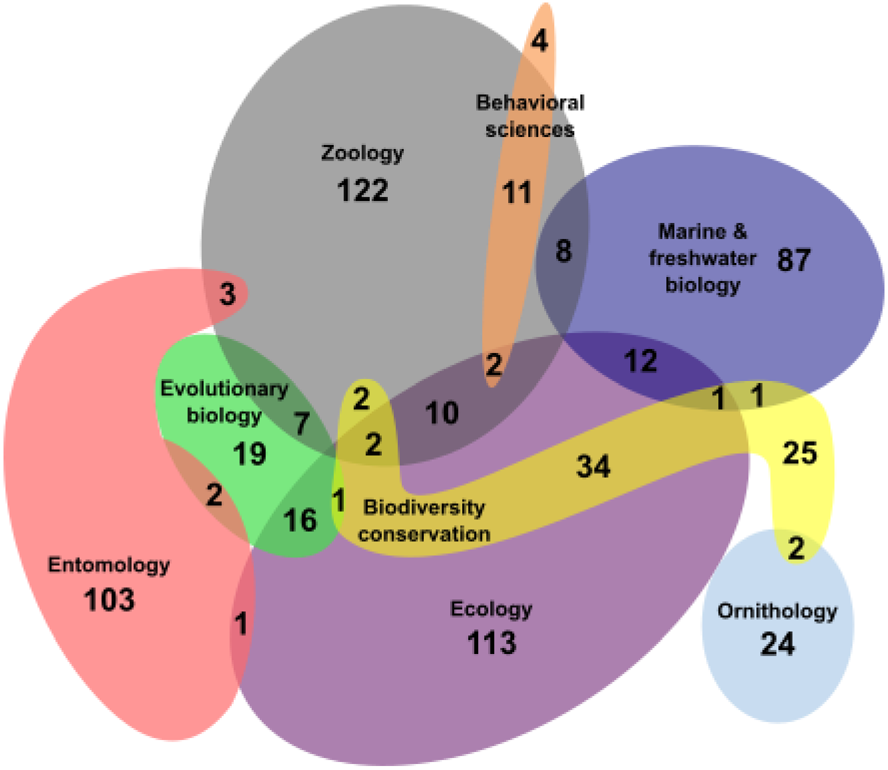


Figure S1. Clarivate's Journal Citation Report (JCR) classification of assessed journals. Numbers represent the number of journals within each set combination.

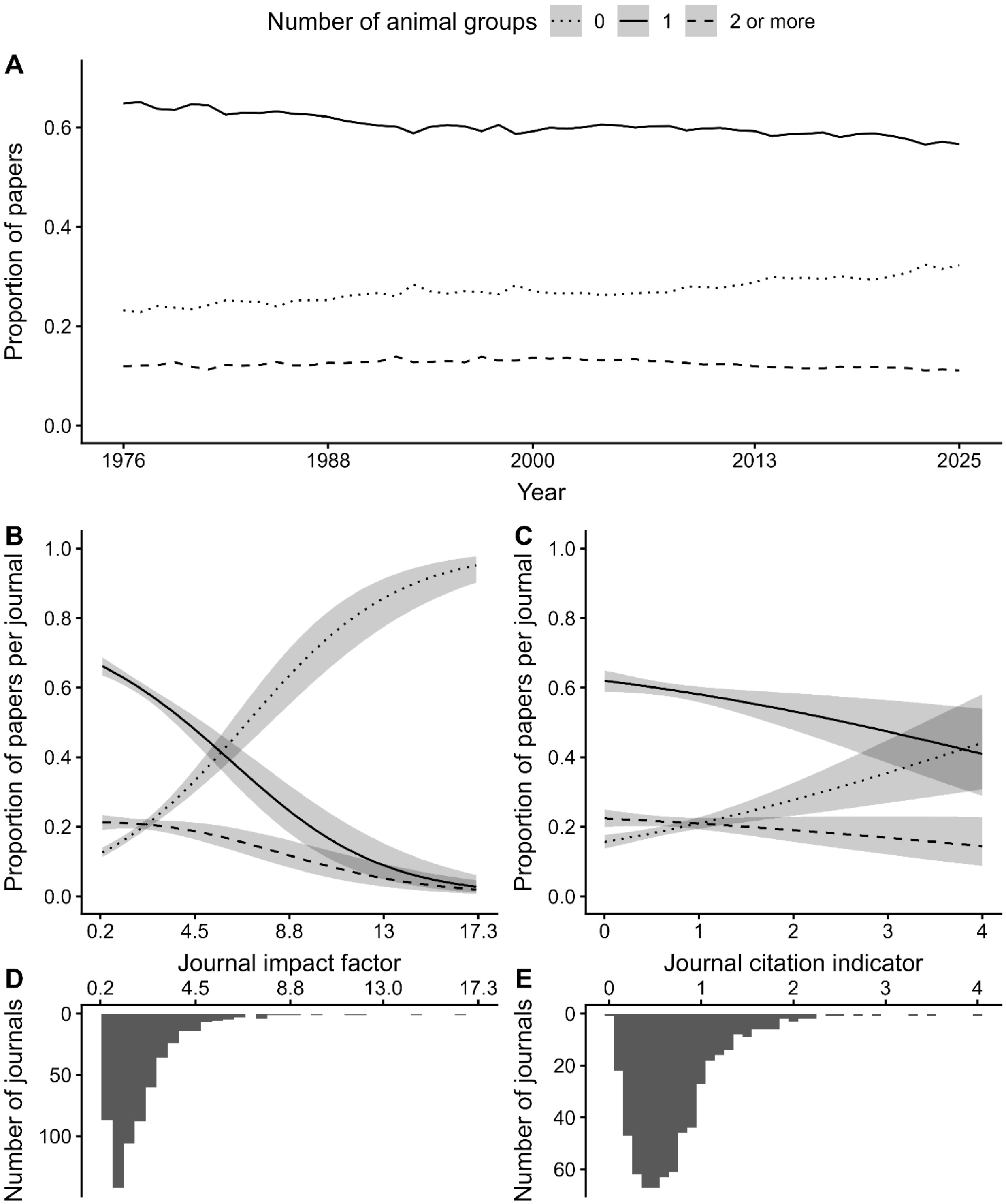


Figure S2. Number of animal groups examined in papers in ecology and evolution. Panel A shows the proportion of papers on distinct numbers of animal taxa investigated from over the last 50 years (1976-2025). Panels B and C show the mean proportion of papers per journal on distinct numbers of animal taxa investigated collectively over the last five years (2021-2025) by journal impact factor and journal citation indicator, respectively. Panels D and E show the distribution of journal impact factor and journal citation indicator in 2024, respectively.

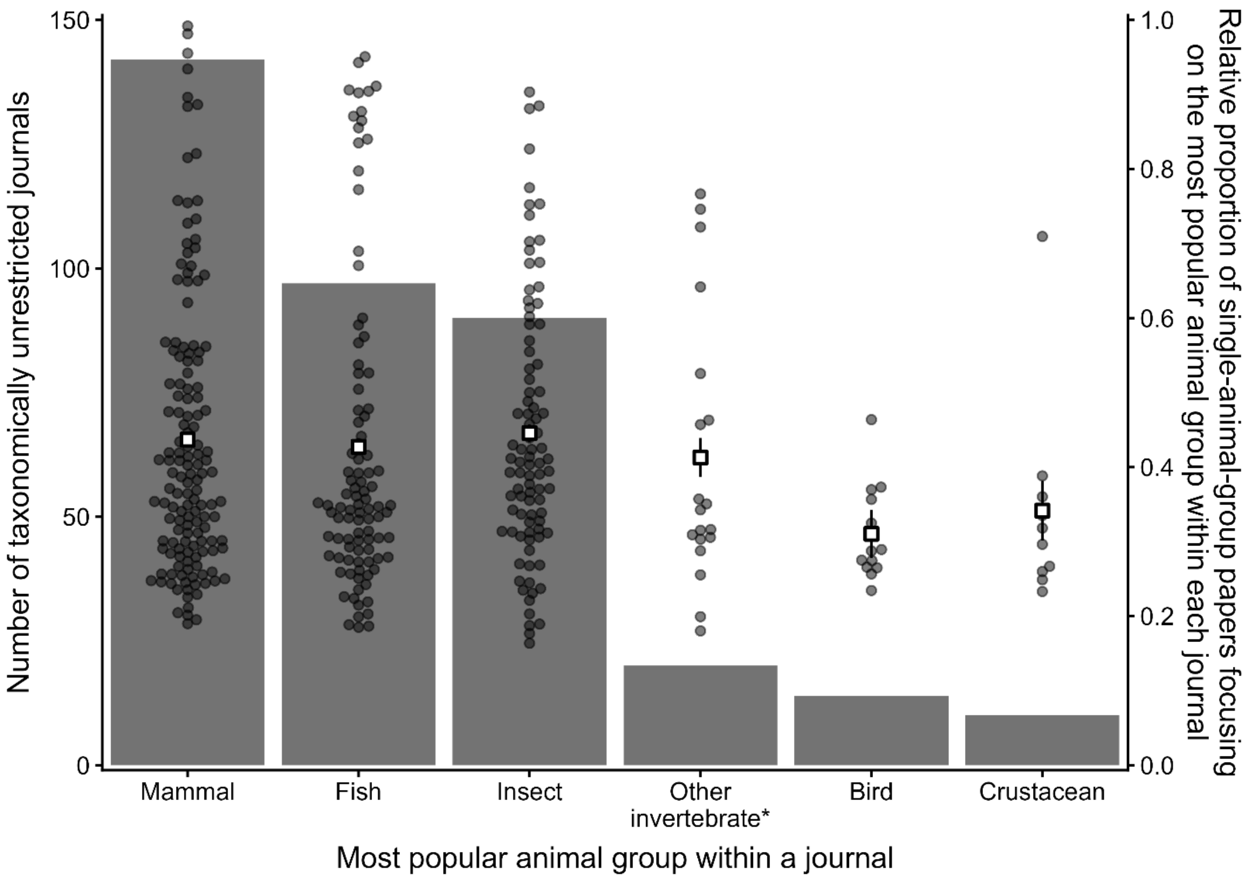


Figure S3. Most popular animal groups within journals. Bars represent the number of taxonomically unrestricted journals for which an animal group was the most frequently investigated. Dots represent the proportion of single-animal-group papers focusing on the most popular animal group in each journal, while squares represent the mean of these estimates per most popular animal group, with whiskers encompassing its 95% confidence interval. "Other invertebrate*" refers to invertebrates other than arachnids, crustaceans, insects, and molluscs.

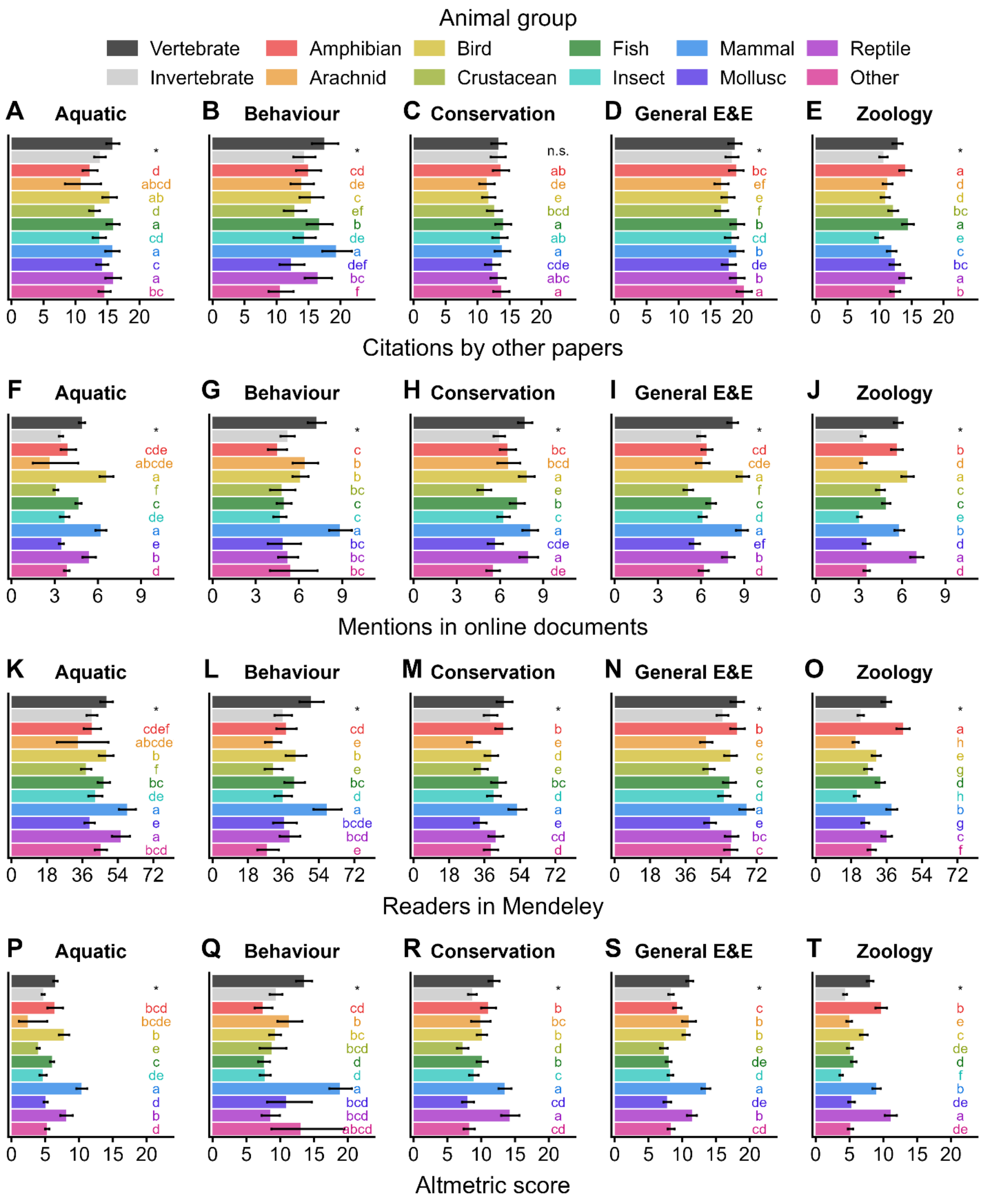
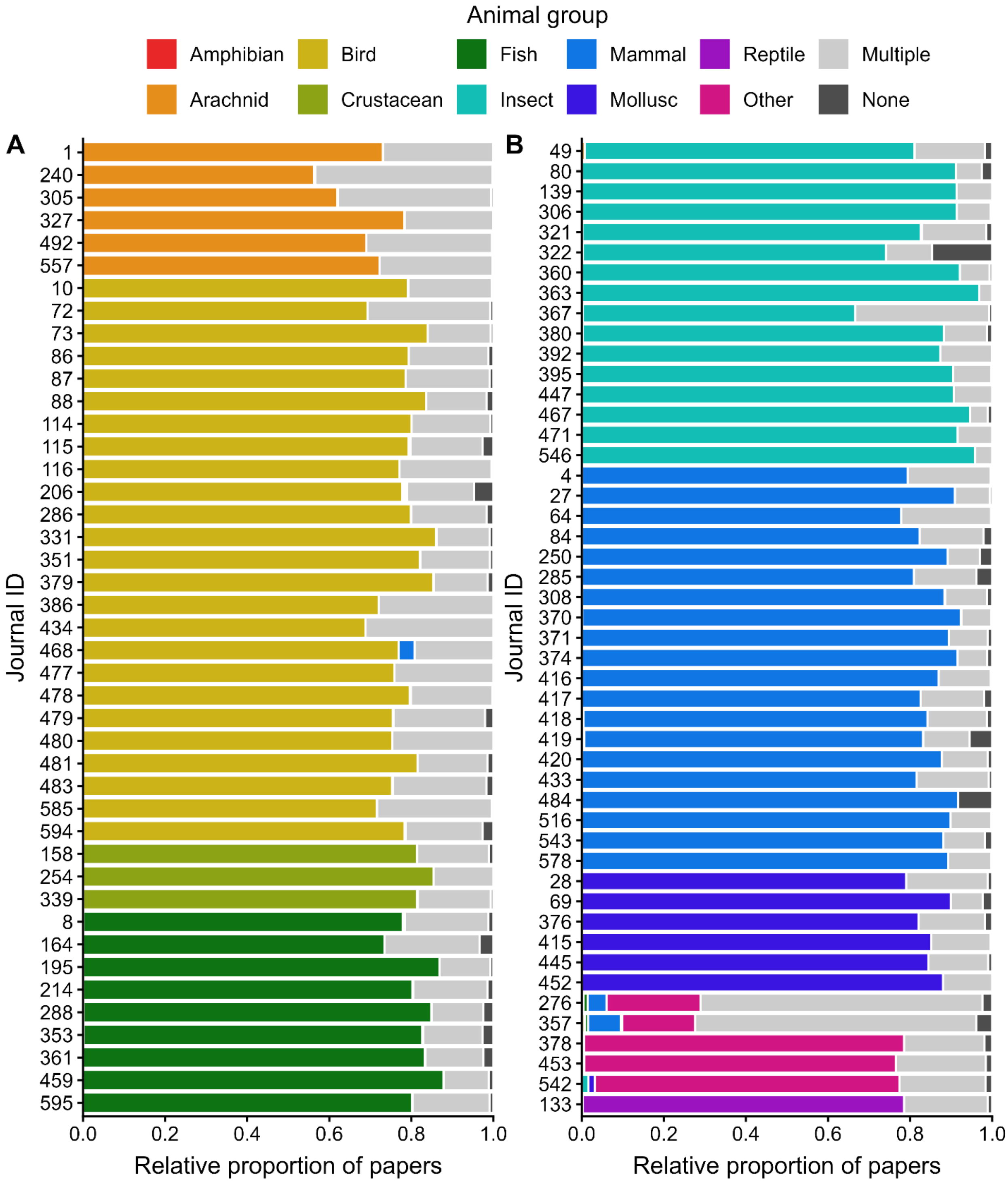


Figure S4. Attention metrics for papers on distinct animal groups within journal sets. Distinct letters represent statistical differences among papers on specific animal groups within each panel (z-values with $p < 0.05$ for all pairwise comparisons), while differences between papers on vertebrates *vs.* invertebrates are shown with a star.


Animal group
Amphibian
Bird
Fish
Mammal
Reptile
Multiple
Arachnid
Crustacean
Insect
Mollusc
Other
None
A
1
240
305
327
492
557
10
72
73
86
87
88
114
115
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206
286
331
351
379
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8
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595
Journal ID
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543
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445
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276
357
378
453
542
133
Journal ID
0.0
0.2
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0.6
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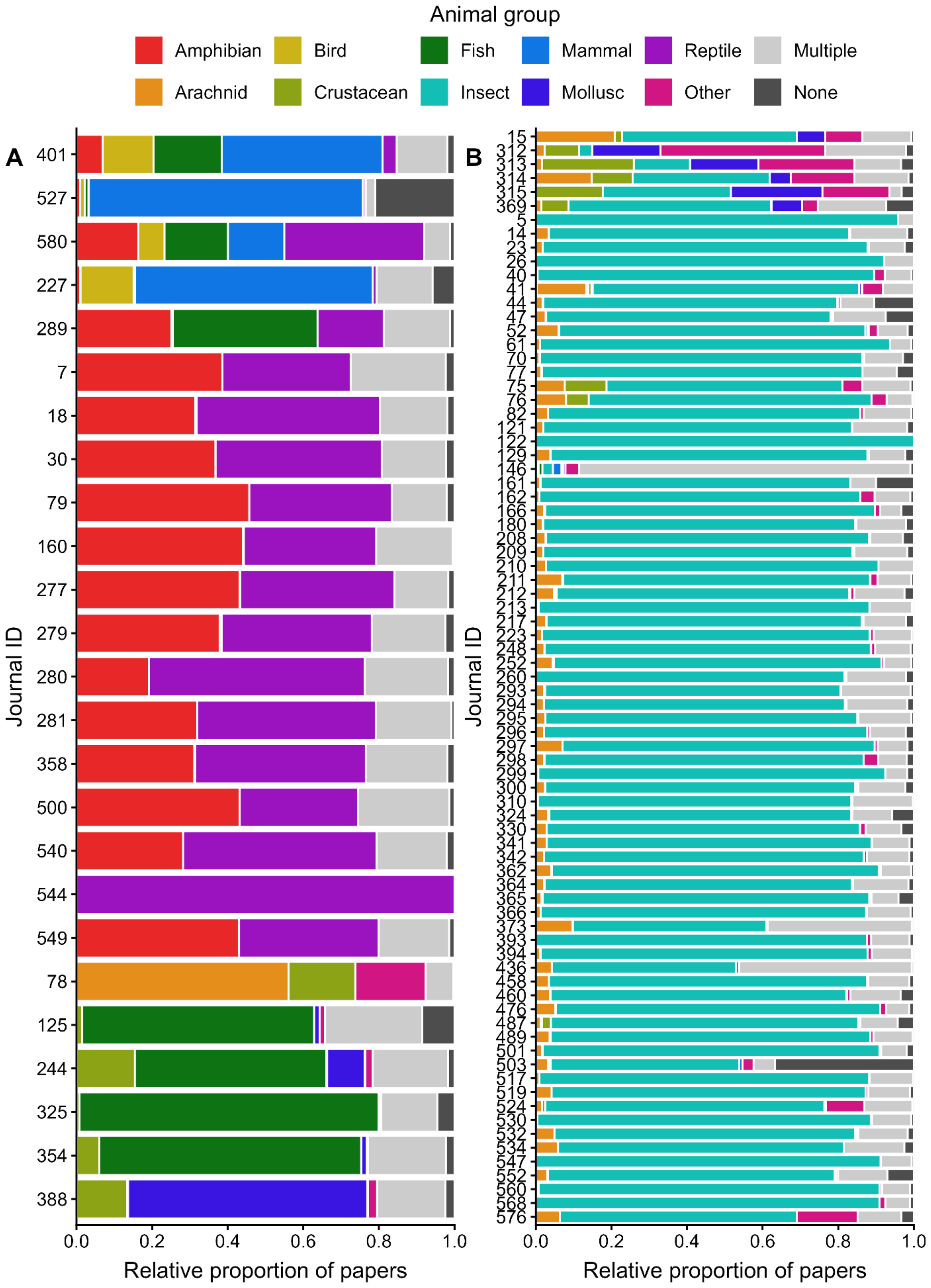
Relative proportion of papers

Figure S5. Taxonomic focus of papers published in journals specialised in one animal group. Panel A shows journals specialised in arachnids, birds, crustaceans, or fish, while panel B shows remaining journals.



Animal group
Amphibian
Bird
Fish
Mammal
Reptile
Multiple
Arachnid
Crustacean
Insect
Mollusc
Other
None
A
B
Journal ID
Relative proportion of papers
0.0
0.2
0.4
0.6
0.8
1.0
401
527
580
227
289
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Figure S6. Taxonomic focus of papers published in journals specialised in multiple animal groups. Panel A shows journals that do not publish research on insects, while panel B shows journals that publish research on insects.

Supplementary tables

Table S1. Examples of how papers were manually classified regarding their taxonomic focus. Terms in red highlight organisms mentioned in papers.

Details of specific papers	**Focused animal taxa**	**Number of animal groups identified**
Buchsbaum & Morse [54] compared the behaviour of spiderlings released in the field with those fed in the laboratory with fruit flies.	Arachnids, insects	Two or more
Bochkov & O'Connor [55] analysed the phylogeny and host associations of certain mites and murines.	Arachnids, mammals	Two or more
Eraud et al. [56] injected sheep red blood cells (SRBC, a common method to represent an immunological challenge) to understand the cost of immune responses on collared doves (*Streptopelia decaocto*).	Birds, mammals	Two or more
Suzuki [57] investigated the production of alarm calls in great tits (*Parus major*) by exposing their nests to three predator species (snakes, crows, and martens).	Birds, mammals, reptiles	Two or more
Tchana et al. [58] assessed the effects of *Protocalliphora* larvae on the plumage colours of blue tits (*Cyanistes caeruleus*).	Birds, insects	Two or more
Milinski [59] showed that three-spined sticklebacks prefer prey of familiar size by conducting experiments with water fleas (*Daphnia magna*) of various sizes as prey items.	Crustaceans, Fish	Two or more
Coop et al. [60] observed that black bears (*Ursus americanus*) forage on aggregations of cutworm moths (*Euxoa axiliaris*).	Insects, mammals	Two or more
Cross & Jackson [61] tested problem-solving skills of nine species of jumping spiders, mentioning that one of these species specialises on preying mosquitoes.	Arachnid	One
Latta et al. [62] presented evidence of ivory-billed woodpeckers (*Campephilus principalis*) in Louisiana despite the US Fish and Wildlife Service suggesting that this species was extinct.	Birds	One
Mercado et al. [63] explored song copying in humpback whales, mentioning in that song learning in birds is well understood.	Mammals	One
Iriarte et al. [64] investigated the diet and behaviours of pumas (*Felis concolor*), finding that these animals feed from ungulates and compete with jaguars (*Panthera onca*).	Mammals	One
Olson et al. [65] investigated patterns in the transcriptome of a tapeworm species (*Hymenolepis microstoma*).	Other invertebrate	One
García et al. [66] assessed manure (of unmentioned animals) for management strategies.	-	Zero

Table S2. Evaluation metrics for the algorithm used in our study to classify the taxonomic focus of studies in ecology and evolution. TP, TN, FP, and FN stand for true positives, true negatives, false positives, and false negatives, respectively.

Animal group	**TP**	**TN**	**FP**	**FN**	**Total**	**Accuracy**	**Precision**	**Sensitivity**	**Specificity**	**F1 score**
Amphibian	49	1760	6	0	1815	0.997	0.891	1.000	0.997	0.942
Arachnid	55	1758	2	0	1815	0.999	0.965	1.000	0.999	0.982
Bird	194	1600	21	0	1815	0.988	0.902	1.000	0.987	0.949
Crustacean	107	1702	4	2	1815	0.997	0.964	0.982	0.998	0.973
Fish	204	1583	23	5	1815	0.985	0.899	0.976	0.986	0.936
Insect	407	1390	16	2	1815	0.990	0.962	0.995	0.989	0.978
Mammal	260	1505	48	2	1815	0.972	0.844	0.992	0.969	0.912
Mollusc	82	1730	3	0	1815	0.998	0.965	1.000	0.998	0.982
Reptile	62	1742	8	3	1815	0.994	0.886	0.954	0.995	0.919
Other	126	1681	6	2	1815	0.996	0.955	0.984	0.996	0.969