

PROGRAMA DE PÓS-GRADUAÇÃO EM ZOOLOGIA

EDITAL n. 04/2025

SELEÇÃO DE CANDIDATAS(OS) ÀS VAGAS DO PROGRAMA DE PÓS-GRADUAÇÃO EM ZOOLOGIA PARA OS CURSOS DE MESTRADO E DOUTORADO ACADÊMICOS PARA O PRIMEIRO PERÍODO LETIVO DE 2026

PROVA DE INTERPRETAÇÃO DE TEXTO EM LÍNGUA ESTRANGEIRA

A prova escrita abaixo deve ser respondida individualmente pelas(os) candidatas(o)s em folha pautada anexa, à caneta esferográfica. **Apenas** o número de inscrição deve ser informado tanto no caderno de questões quanto na folha de respostas, de forma que nenhum outro tipo de identificação deve ser colocado, sob penalidade de invalidação da prova. A prova tem tempo previsto máximo de duas (2) horas para resolução. Não podem ser consultados nenhum tipo de material nem outras pessoas. Tanto o caderno de questões quanto a folha de respostas devem ser entregues. As(os) candidatas(os) podem usar uma folha de rascunho. As respostas devem ser em língua portuguesa. É permitido o uso de dicionário impresso. A pontuação é apresentada para cada questão.

Boa prova.

Número de inscrição: _____

Avalie o texto 1 e responda (em português) as questões 1 a 3.

TEXTO 1

A total of 74 Biological Scientific Fish Collections (BSFCs) were found in 25 federal units of Brazil (24 States plus the Federal District). The only Brazilian States not represented in our data sample were Roraima and Goiás. The majority of BSFCs are associated with public higher education institutions, accounting for 83% of the total. Currently, 2646 primary types (holotypes, neotypes, lectotypes, and syntypes) are deposited in BSFCs. In addition, paratypes of 3886 species in 16278 lots are also present in BSFCs. Considering that about 5000 valid species have been recorded in the country, this indicates that around 1000 species were either described from other neighbouring countries or have their holotypes housed in foreign institutions. This is especially common for species described during the 19th and much of the 20th centuries, when it was standard practice for foreign naturalists to deposit all type specimens at their home institution.

We found that ichthyological collections with a larger number of specimens (hereafter referred to as larger collections) tend to receive more funding ($\beta = 0.153$, $SE = 0.0004$, $z = 470.5$, $P < .001$), are located in regions with higher species richness ($\beta = 0.24$, $SE = 0.0003$, $z = 668$, $P < .001$), and are more often led by multiple curators (i.e. two or more; $\beta = 0.33$, $SE = 0.0003$, $z = 882.3$, $P < .001$). In addition, older collections ($\beta = -0.185$, $SE = 0.0003$, $z = -559.9$, $P < .001$) and those located in more densely populated cities ($\beta = 0.212$, $SE = 0.0002$, $z = 709.8$, $P < .001$) also tend to be larger. Together, these five predictors explained 48.47% of the variation in collection size (adjusted $R^2 = .502$).

In terms of gender representation among BSFC curators, the majority of collections are curated exclusively by men (38), while a smaller proportion are curated exclusively by women (23). A few collections (five) report mixed-gender teams. Gender disparities among curators were observed in all regions, with an average male prevalence of 65% for curators. Only the North has slightly more female curators (54%). Collections in the Southeast and Northeast show the most pronounced

gender bias, with 76% and 75%, respectively, of male curators. The disparities toward male curators are slightly lower in the South (67%) and Central-West (54%) collections. Collections in the Amazon, Caatinga, Pampa, and Pantanal are mostly led by male curators, while those in the Cerrado and Atlantic Forest have mainly female curators. In addition, gender composition of curators ($\beta = 0.591$, $SE = 0.017$, $z = 33.3$, $P < .001$) significantly influenced funding levels. Collections led by male curators receive approximately USD14,000 more annually than those led by female curators.

The CARDUME initiative: integrating Brazil's scientific fish collections to promote research and biodiversity conservation. Birindelli, JLO et al. Biological Journal of the Linnean Society, Volume 146, Issue 3, November 2025, blaf088, <https://doi.org/10.1093/biolinnean/blaf088>

1. Quantos e quais são os principais preditores para uma coleção ictiológica apresentar um grande número de espécimes depositados?
2. Em termos de representatividade de gênero, qual o gênero mais representado dentre os curadores de Coleções Científicas Biológicas de peixes? Em qual região socio-econômica brasileira a disparidade de gênero é maior?
3. Quantas espécies de peixes apresentam registro para o Brasil? E quantas espécies de peixes apresentam seus tipos primários depositados em coleções brasileiras? A o que se deve a discrepância entre o número de espécies registradas e o número de tipos primários depositados em coleções no Brasil?

Avalie o texto 2 e responda (em português) as questões 4 a 6.

TEXTO 2

The species problem — questions regarding the nature of species — has been a central puzzle of biology since antiquity. Darwin evaluated this subject in detail, discussing conceptual frameworks that still resonate today. Following the development of scientific species concepts during the modern synthesis, the species problem now encompasses three distinct dimensions. First is what species are — in conceptual and philosophical terms — and how they relate to what is observed in nature. Second is how species arise — the ecological, evolutionary, and genetic mechanisms of speciation. Third is how researchers delimit species — what data, algorithms, and criteria reveal species boundaries. These classically defined dimensions influence modern perceptions of species, and contribute to management and policy decisions guiding research and conservation efforts.

Philosophers and systematists converged in the 1970s, on the idea of species as ontological individuals. This idea contrasts with previous understandings of species as classes or kinds, categories into which organisms were sorted based on their traits. This complex philosophical distinction has subtle but crucial implications for research and conservation. However, challenges arise not only from apparently common gene flow between species, but also from edge cases such as asexual, colonial, and multisymbiotic organisms, which can be difficult or impossible to understand as lineages or species.

But investigations of reproductive isolation (RI) and hybridization raise fundamental questions about what mechanisms regulate species boundaries. Crucially, RI occupies a central place in understanding speciation, but explicit tests of how RI relates to the formation or maintenance of species boundaries are rarely incorporated into species delimitation.

Increasingly sophisticated computational algorithms and theoretical insights now provide for robust, quantitative, and integrative analyses across numerous axes of organismal variation beyond simple genetic and phenotypic divergence. Researchers can increasingly quantify divergence

in physiology, behaviour, ecology, and other dimensions in non-model systems, but it is often unclear how to link such differences to underlying speciation mechanisms. Species delimitation requires not only the identification of lineages, but explicit quantitative testing of speciation hypotheses that tie patterns to processes, tying delimitation to speciation and species concepts.

Pyron et al. 2026. The species problem evolving in the Anthropocene. *Nature Reviews Biodiversity*. <https://doi.org/10.1038/s44358-025-00125-x>

4. O texto afirma que o problema das espécies atualmente envolve três dimensões distintas. Explique quais são essas três dimensões e porque elas não se limitam apenas a uma definição conceitual de espécie.
5. Como o texto conecta o avanço de algoritmos computacionais e análises integrativas com a necessidade de redefinir a relação entre delimitação de espécies, mecanismos de especiação e conceitos de espécie?
6. De acordo com o texto, por que a investigação do isolamento reprodutivo (RI) é considerada central para o entendimento da especiação, mas ainda assim pouco integrada à delimitação de espécies?

Avalie o texto 3 e responda (em português) as questões 7 e 8.

TEXTO 3

“Open-ended” or “dark” taxa are species-rich clades so abundant and diverse that conventional taxonomic methods cannot keep pace with the volume of specimens and species. New approaches based on the presorting of specimens to putative species with low-cost DNA barcoding followed by morphological checks of a subset of specimens have made tackling these taxa more manageable. However, large scale integrative taxonomy will still require limiting the geographic scope of taxonomic revisions, given that most countries and biogeographic regions will have too many specimens and species for comprehensive coverage. Here, we present a case study of this type approach by carrying out a revision of the Mycetophilidae (Diptera), or fungus gnats, of Singapore with a reverse taxonomy workflow. The studied material was obtained from 496 samples collected with 71 Malaise traps placed at 107 sites in a variety of habitats in the country: mangroves, a swamp forest, freshwater swamp, primary rainforests, a coastal forest, and different types of secondary forest (old, maturing, young, urban). Based on molecular and morphological data for 1,454 specimens, we were able to delimit 120 species belonging to 23 genera. Of these, only five species had been previously described. The remaining 115 are new to science and described here. However, we only name 98 of these species, since 14 (*Manota* spp. A–G, *Neoempheria* spp. A–G) were represented solely by females from which we could not prepare a fully satisfactory morphological diagnosis, and three lacked molecular data (*Epicrypta* sp. A, *Epicrypta* sp. B, and *Neoempheria* sp. H). To assess congruence among species delimited by DNA barcodes (3% clusters) and morphology, we calculated match ratio and found it to be overall high across the entire family (95%), with even higher ratios (99%) for MOTUs clustered at 5% with Objective Clustering and MOTUs obtained with ABGD set to $P=0.060$. Overall, the ratio of undescribed to described species was an astonishing 20:1. Our revision of the Singapore fauna alone, we were able to increase the number of described Oriental Mycetophilidae species by about 25%, underscoring the magnitude of the taxonomic impediment for fungus gnats.

An integrative taxonomic treatment of the Mycetophilidae of Singapore reveals 115 new species from just 730 km² (Diptera: Bibionomorpha). Amorim, D.S et al. (2025) *Integrative Systematics: Stuttgart Contributions to Natural History*, 8(sp1), 1-318.

7. Segundo os autores, por que é necessário limitar geograficamente ao se conduzir revisões taxonômicas de taxa “obscuros”?
8. Qual o material examinado e a metodologia utilizada no referido trabalho?