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Trends in the Brazilian journal *Revista de Etologia*: A review from 1998 to 2014

PEDRO F. R. SOARES, CAROLINA Q. MONTEIRO, ALDA L. HENRIQUES, ALESSANDRA C. S. FORMENTO, FLÁVIA I. B. BRANDÃO & PRISCILA I. S. L. COSTA

Revista de Etologia (RE) is a Brazilian journal aimed at publishing scientific articles in the field of Ethology (Animal Behavior). Recently, RE was renamed to "Current Ethology", and some of its publishing policies were changed. A survey of the published articles in the journal while still named RE was carried out with the purpose of recognizing publication trends and patterns. The journal was regularly published during two periods: from 1998 to 2006 and from 2010 to 2014. Recent years have seen a reduction in the number of volumes published, but studies listed as "Observational" were prevalent in almost all volumes. Class "Mammalia" was the most studied taxon in the RE reports. Southeast Brazil has the highest number of empirical investigations and of publishing institutions. RE also contains publications from 12 countries. These trends are discussed taking into account the development of Ethology in Brazil and the current state of the country's biodiversity cataloging. The low number of studies on animal behavior in most regions of Brazil is pointed out and a suggestion for further research is mentioned.

Keywords: Brazilian ethology. Publication trends. Current Ethology. *Revista de Etologia*.

Tendências no periódico brasileiro Revista de Etologia: Uma revisão de 1998 a 2014

A Revista de Etologia (RE) é um periódico brasileiro destinado à publicação de artigos científicos no campo da Etologia (Comportamento Animal) em geral. Recentemente, a RE foi renomeada *Current Ethology*, e algumas de suas políticas de publicação foram alteradas. Neste trabalho foi feito o levantamento dos artigos no periódico ainda como RE com o objetivo de indicar tendências e padrões nos trabalhos publicados. Houve regularidade nas publicações em dois períodos: de 1998 a 2006, e de 2010 a 2014. Os anos recentes foram menos prolíficos, e estudos identificados como "Observacionais" predominaram em todos os volumes. A classe "Mammalia" foi o táxon mais estudado nos artigos da RE. Instituições da região Sudeste do Brasil foram responsáveis pelo maior número de publicações no periódico estudado. A RE contém artigos de 12 países. Essas tendências são discutidas levando-se em conta o desenvolvimento da Etologia no Brasil e o estado atual da catalogação da biodiversidade do país. O número reduzido de estudos sobre comportamento animal na maior parte das regiões do Brasil é apontado, e sugestões para pesquisas adicionais são fornecidas.

Palavras chaves: Etologia brasileira. Tendências de publicação. *Current Ethology*. Revista de Etologia.

*Correspondent author: E-mail aldalhenriques@gmail.com
Universidade Federal do Pará, (UFPA), Belém, Pará
Rua Augusto Corrêa, 01, Cidade Universitária, Campus do Guamá, Núcleo de Teoria e Pesquisa do Comportamento. Belém-PA, Brasil. CEP: 66075-110.

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Introduction

Revista de Etologia (RE) is a peer-reviewed journal published from 1998 to 2014, with a three-year hiatus from 2007 to 2009. The *RE* was issued by the *Sociedade Brasileira de Etologia – SBEt* (Brazilian Society of Ethology), a non-profit organization linked to the *Laboratório de Psicoetologia* (Psychoethology Laboratory) of *Instituto de Psicologia* (Psychology Institute) at *Universidade de São Paulo*. Until 2012, the editorial board was under the guidance of prominent Brazilian ethologist César Ades (1943-2012). The journal published a wide range of scientific articles, both experimental and descriptive, all devoted to the study of animal behavior, human included.

In 2015, the *RE* changed its name to "Current Ethology" and modified some of the criteria for manuscript submission, such as the requirement of English-written reports. In this new phase, with a prospective greater reach, the journal kept its interest in articles about animal behavior, especially in the following areas: applied ethology, conservation behavior, neuroethology, behavioral ecology, evolutionary psychology, evolution of behavior, animal cognition and theories of behavior (see detailed information at http://www.etologiabrasil.org.br/publicacoes_revista/).

The *RE* is part of the process of making Ethology in Brazil and Latin America well known. Contributing to this task, scientists such as Walter Hugo de Andrade Cunha and César Ades played essential roles in the context of *Universidade de São Paulo* (Ades, 2010; Carvalho, 2012; Fuchs, 1995; Otta, 2012). The foundation of *SBEt* and *RE* by César Ades, which are examples of the many ways he strengthened this research area in the country, helped to establish a point of convergence for Brazilian Ethology (Carvalho, 2012). As *RE* is in the process of transition to new editorial policies, a characterization of the published articles in its first phase is certainly worthwhile. Thus, the present work surveyed all the articles published in *RE* from 1998 to 2014, in order to point out publication trends. Such a review may also give insights for future numbers of Current Ethology.

Material and Methods

All publications from *RE* (1998-2014) were obtained from the *SBEt* website http://www.etologiabrasil.org.br/publicacoes_revista/. Editorials, letters to the editor and supplementary material were excluded from analysis. Two of the authors extracted the following information from each article: year, volume, number, title, authors, institutional affiliation, animal as cited, taxonomic data, research type, country of institution, geographic region of data collection and keywords. Later, other two authors reviewed the listed information. Each and any case of disagreement was examined in group by all authors.

In order to fulfill taxonomic information, data available in the report was preferred; if it was not provided entirely, two specialized databases were consulted: the taxonomic sections from the National Center for Biotechnology Information website (https://www.ncbi.nlm.nih.gov/taxonomy) and from the Integrated Taxonomic Information System (https://www.itis.gov/). Any discordance between them was confronted with information obtained at the Animal Diversity Web database (http://animaldiversity.org/accounts/Animalia/).

Research types were determined according to adapted categories from Cozby and Bates (2015): Observational, Theoretical Review/Discussion, Experimental, Methods and Instruments, Developmental, Quasi-experimental, Correlational, Single Case, Book/Article Review, Documental, Survey, Biographical and Case Study.

Results

During its publishing years (1998-2006 and 2010-2014), the *RE* issued 13 volumes and a special number, totalizing 165 scientific articles as content. Most of the publishing years had two numbers per volume, except for 1998 (special number) and 2012, with only one number each. In 2013, these two numbers were published together as one. Figure 1 depicts the distribution of *RE* publications per year. The years with most publications were 1999 and 2000, with 16 articles each. Only 5 articles were published in 2013, the year with the least publications. The last four publishing years, in comparison with other years, are among the less prolific ones, with a maximum of 10 articles per year (2011 and 2014).

The research type of each of the 165 articles is listed in Table 1. Among the variety of employed research methodologies, three categories stand out: "Observational", with 78 publications (47.3% of the total published); "Theoretical Review/Discussion", with 30 articles (18.2% of the total); and "Experimental", with 25 publications (15%). Together, these 133 articles represent 80.6% of the *RE* content. Figure 2 shows their temporal distribution. The "Observational" methodology is prevalent in all years except the first, when it equaled the number of researches using the "Theoretical Review/Discussion" methodology. From 1998 to 2001, there was an increase in the frequency of studies using the "Observational" method, reaching 10 articles in 2001. The "Theoretical Review/Discussion" and "Experimental" methodologies had about the same frequency across the years, with some overlapping data, and varying from 0 publications (in 2013 of both types) to 4 (in 2004 and 2006 of "Experimental") and 5 (in 1999, of "Theoretical Review/Discussion").

Approximately 130 different species were studied in the *RE* articles. Table 2 presents the number of publications per taxono-

Table 1. Absolute frequency and correspondent percentage of research types in *RE*.

Rank	Research type	# of articles	%
1	Observational	78	47.3
2	Theoretical Review/ Discussion	30	18.2
3	Experimental	25	15.2
4	Methods and Instruments	7	4.2
5	Developmental	6	3.6
6	Quasi-experimental	5	3.0
7*	Correlational	3	1.8
7*	Single Case	3	1.8
8*	Book/Article Review	2	1.2
8*	Documental	2	1.2
8*	Survey	2	1.2
9*	Biographical	1	0.6
9*	Case Study	1	0.6

* Ties within the rank.

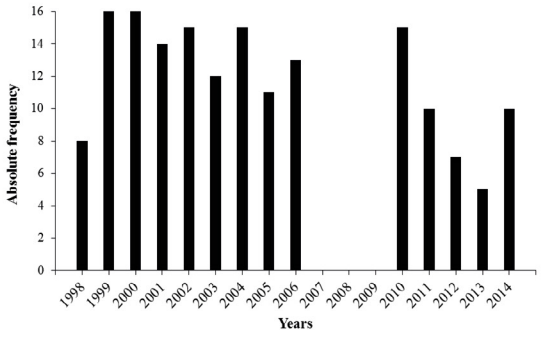

Figure 1. Number of published articles per year in RE from 1998 to 2014.

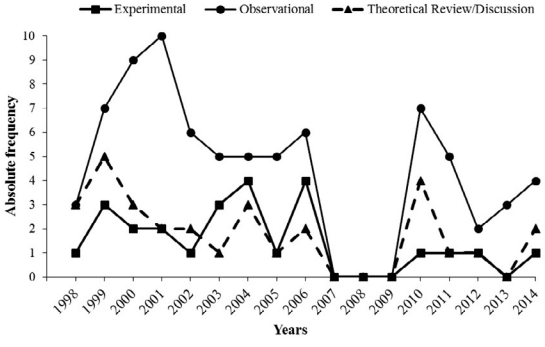

Figure 2. Absolute frequency of the top-three research types per year in RE from 1998 to 2014.

mic classes referred to the found species. Information about studied species was available in 141 articles. Class "Mammalia" comprised more than half (56%) of the publications with species information. Classes "Insecta", "Aves" and "Arachnida" follows the rank. Tables 3-6 depict detailed information about orders and families of these four main classes. As a reflex of its prevalence as the most reported class in the studies, class "Mammalia" is represented by a higher number of orders and families.

All regions of Brazil were reported as sites of empirical studies (i.e. with direct observation of species) in the *RE* articles, as can be seen in Table 7. The "Southeast" region was the most frequent choice for published research. Indeed, there is a consistency between the prevalent region for empirical research and the regions of the most prolific institutions. Table 8 presents the number of articles per institution. Twelve institutions are listed from the total number of 92 different institutions. The top three (*Universidade de São Paulo*, *Universidade Estadual Paulista* and *Universidade Federal de Juiz de Fora*) and three others (*Instituto Butantan*, *Universidade Federal de Uberlândia* e *Universidade Federal do Espírito Santo*) are located in Southeast Brazil (see Table 7). Additionally, Table 9 shows that although Brazil leads the rank with most publications, *RE* also published some articles from other countries, mostly from South America.

Table 2. Frequency of articles per Class.

Rank	Class	# of articles
1	Mammalia	79
2	Insecta	17
3	Aves	15
4	Arachnida	14
5*	Actinopterygii	6
5*	Reptilia**	6
6*	Gastropoda	2
6*	Malacostraca	2
7*	Amphibia	1
7*	Cephalopoda	1

* Ties within the rank. ** Reptilia as a paraphyletic group.

Discussion

The central objective of this study was to indicate publication trends in *RE*. In terms of publishing activity, the journal had an almost fair distribution of publications through the years. Apart from the three-year hiatus, the

Table 3. Frequency of articles per Order and detailed information on subjacent Families for Class Mammalia.

Rank	Order	Family	# of articles
1	Primates		33
		Hominidae	13
		Cebidae	10
		Atelidae	5
		Callitrichidae	2
		Cercopithecidae	2
		Not applicable	1
2	Rodentia		19
		Muridae	10
		Caviidae	5
		Echimydae	2
		Agoutidae	1
		Cricetidae	1
		Dasyproctidae	1
3	Artiodactyla		11
		Bovidae	5
		Tayassuidae	3
		Cervidae	1
		Suidae	1
		Tatassuidae	1
4	Carnivora		7
		Canidae	3
		Felidae	1
		Mustelidae	1
		Mustelinae	1
		Otariidae	1
5	Cetartiodactyla		5
		Delphinidae	3
		Balaenopteridae	2
6	Perissodactyla		3
		Equidae	3
7	Pilosa		2
		Myrmecophagidae	2
8	Not applicable		1

publishing years (1998-2006 and 2010-2014) were mostly healthy. However, fewer numbers were issued in recent years, which might have been partly due to the sudden death of César Ades in 2012, the founder editor of *RE* (Japyassú, 2012). The reduction in publications may have contributed to stimulating the efforts for the journal internationalization, thus enlarging the population of both authors and readers. *RE* is following a global trend (Flowerdew, 2015) in this aspect.

In terms of content, *RE* is a repository of assorted ethological and behavioral research. Empirical articles mostly employed the observational/descriptive method, a pivotal research strategy in Ethology, oriented to the generation of ethograms (Lahitte *et al*., 2002). Significant number of reports also used the experimental approach. The expressive application of either method in *RE* reports assures the journal commitment to the complementary aspect of these research types in Ethology

Table 4. Frequency of articles per Order and detailed information on subjacent Families for Class Insecta.

Rank	Order	Family	# of articles
1	Hymenoptera		15
		Apidae	6
		Formicidae	6
		Vespidae	5
2*	Diptera		1
		Tephridae	1
2*	Hemiptera		1
		Reduviidae	1

* Ties within the rank.

Table 5. Frequency of articles per Order and detailed information on subjacent Families for Class Aves.

Rank	Order	Family	# of articles
1	Passeriformes		5
		Thraupidae	2
		Coerebidae	1
		Emberizidae	1
		Icteridae	1
		Tyrannidae	1
		Tyrannoidea	1
2*	Apodiformes		2
		Trochilidae	2
2*	Psittaciformes		2
		Psittacidae	2
2*	Rheiformes		2
		Rheidae	2
3*	Cathartiformes		1
		Cathartidae	1
3*	Charadriiformes		1
		Charadriidae	1
3*	Falconiformes		1
		Falconidae	1
3*	Galliformes		1
		Phasianidae	1
3*	Struthioniformes		1
		Rheidae	1

* Ties within the rank.

Table 6. Frequency of articles per Order and detailed information on subjacent Families for Class Arachnida.

Rank	Order	Family	# of articles
1	Aranae		10
		Theriididae	4
		Araneidae	2
		Lycosidae	1
		Nephilidae	1
		Pholcidae	1
		Sicariidae	1
2	Scorpiones		3
		Bothriuridae	2
		Buthidae	2
3	Uropygi		1
		Thelyphonidae	1

Table 7. Frequency of choice of Brazilian geographic regions with reported empirical studies.

Rank	Region of the study (Brazil)	# chosen
1	Southeast	75
2	Northeast	16
3	South	14
4	Center-West	7
5	North	5

Table 8. Frequency of articles per Institution and detailed information on its State and Country.

Rank	Institution	State	Country	# of articles
1	*Universidade de São Paulo*	*São Paulo*	Brazil	45
2	*Universidade Estadual Paulista*	*São Paulo*	Brazil	22
3	*Universidade Federal de Juiz de Fora*	*Minas Gerais*	Brazil	11
4	*Universidad de la Republica*	*Montevideo*	Uruguay	10
5	*Universidade Federal do Pará*	*Pará*	Brazil	8
6	*Universidade Estadual de Santa Cruz*	*Bahia*	Brazil	7
7	*Universidade Federal de Santa Catarina*	*Santa Catarina*	Brazil	6
8*	*Instituto Butantan*	*São Paulo*	Brazil	5
8*	*Universidade Federal do Espírito Santo*	*Espírito Santo*	Brazil	5
8*	*Universidade Federal do Paraná*	*Paraná*	Brazil	5
8*	*Universidade Federal de Uberlândia*	*Minas Gerais*	Brazil	5
8*	*Universidad Nacional de la Plata*	*Buenos Aires*	Argentina	5

* Ties within the rank.

Table 9. Frequency of articles per country.

Rank	Country of the institution	# of articles
1	Brazil	147
2	Uruguay	11
3	Argentina	8
4*	France	4
4*	United States	4
5*	Chile	1
5*	England	1
5*	Germany	1
5*	Portugal	1
5*	South Africa	1
5*	Spain	1
5*	Venezuela	1

* Ties within the rank.

(Dewsbury, 1992; Souto, 2005). Publications involving 11 additional research strategies strengthen the argument.

RE content also indicates flagrant prevalence of mammalian species. It is difficult to analyze this trend as representative or not of Brazilian animal diversity. Even though there are approximately 170.000 to 210.000 animal species described for Brazil (Lewinsohn and Prado, 2005), this number is below expectations, considering that the country has already been criticized for under cataloging its biodiversity (Geeta *et al*., 2004). Therefore, it is safer to just stress that reports in *RE* are mirroring an established trend in the history of ethology, that is, the study of mammalian species over others (Lahitte and Tujague, 2007).

The fact that Southeast Brazil is the frequent location for empirical studies and site of the most prolific institutions has a direct relation to the foundations of Ethology in the country. The *Instituto de Psicologia* at *Universidade de São Paulo*, which was the founder academic of *SBEt* and, consequently, of the *RE,* is located in Southeast Brazil. This university was and still is a leading institution for Brazilian Ethology (see Fuchs, 1995; Ades, 2010; Oliveira and Magrini, 2015). The importance of this region in the study of animal behavior can also be seen by the state-of-art of zoology research in Brazil (Marques and Lamas, 2006).

All other Brazilian regions and 11 different countries did publish in *RE*, an evidence of the pluralism of ideas that *RE* embraces. Even though some variability is expected, the relative shortage of studies coming from other regions rather than Southeast Brazil suggests that Ethology, as a field of research, still needs to develop in other parts of the country.

These trends give shape to some of the Brazilian ethological research, but they are only a loose indicative of general trends for

Ethology in Brazil. Further analyses are needed to give it a thorough account. Studies of citation analysis, for example, is a suggested research alternative. Besides that, Brazilian articles have been published in international journals such as "Journal of Ethology" and "Acta Ethologica", not to mention the specialized periodicals. Analysis of these publications is also recommended.

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