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Bibliometrics on one of the largest termite inventories in the Cerrado: "Studies on termites from the Mato Grosso State, Brazil by AGA Mathews 1977"

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ABSTRACT

This paper consists on a bibliometric analysis of the international influences of the book "Studies on termites from the Mato Grosso State, Brazil", by AGA Mathews (1977). The number of citations has increased over the years after the first citation. Mathews book was cited in articles, reviews, theses, dissertations, books, book chapters, abstracts in conference proceedings, comments and scientific notes. Most these studies are empirical and descriptive. The studies were conducted in 35 countries of the Neotropical, Palearctic, Afrotropical, Nearctic, Australasia and Indomalaya regions. 55% of the studies were carried out in Brazil. The journals Sociobiology and Insectes Sociaux, have social insect studies within its scope, and the highest number of articles citing Mathews. Most of the 71 authors that cited Mathews more than twice are Brazilian. Constrictotermes cyphergaster *was the most studied in over 80% of the studies addressing Isoptera. The most frequent keywords were termite, Isoptera and taxonomy, generalist terms indexed in most publications carried out in different countries. Most of the research studies were carried out in laboratories and native vegetation areas. Studies in agroecosystems were implemented predominantly in Brazil. This study shows the diversity of application (citations) of Mathews' book, and that the number of citations will continue to increase due to the large amount of information presented by the author.*

Key-Words: Citation number; Isoptera; Systematic review; Termitology.

INTRODUCTION

Studies at different scales (local to global) are observed in the scientific literature, and influence the scientific community. Such studies bring new information, are characterized as pioneer studies (Cutright, 1989), and are commonly referred to as *Hotpapers* (Garfield, 1972). The impacts of such papers may be measured by bibliometric techniques (Pinto *et al.,* 2003). Some studies have become renowned in wildlife inventories for being pioneers in the expeditions and for the richness in information (often not

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replicated in other regions). Therefore, analyzing the citations of scientific literature that refer to noteworthy studies becomes important, once it systematizes the knowledge generated. Such systematization is very important especially in Neotropical inventories studies.

Several inventories of the Neotropical fauna significantly contributed to the knowledge of specific groups (*e.g.,* The Mulford Expedition; Hutchison, 1921; Snyder, 1926 and resulted in important applications as the study of Darwin's finches on the Galapagos Islands; Darwin, 1859: cap. XII). Several studies were extremely important for the Neotropical termites, and are still the basis of knowledge on certain taxonomic groups and biogeographic patterns. Holmgren (1906, 1910), Silvestri (1901, 1903), Emerson (1925) and Mathews (1977) are highlighted among the many studies that significantly contributed to understanding termites, their role in ecosystems, their taxonomy and species diversity.

Termites are among the animals with highest abundance and biomass in terrestrial ecosystems (Bignell & Eggleton, 2000). Termites are detritivorous (Wood & Sands, 1978; Bignell & Eggleton, 2000), ecosystem engineers (Jones *et al.,* 1994), key species (Redford, 1984), food source for predators (Wood & Sands, 1978) and several species are major pests in agricultural and urban environments (Constantino, 2002; Rouland-Lefèvre, 2011). Therefore, the termites have been increasingly studied in the last two centuries, especially from the 20th century (Constantino, 2005). Since the 1950s, Neotropical termites have been gradually better known thanks to studies of European and American researchers and to increasing contributions of South American termite researchers (Araujo, 1977; Constantino, 2005).

Several Neotropical ecosystems already have a relatively well known termite fauna due to inventories and ecological studies (Eggleton, 2000). Termites are specially known in the Brazilian Amazon (Bandeira & Macambira, 1988; Constantino, 1992; Constantino & Cancello, 1992; DeSouza & Brown, 1994), Atlantic Forest (Brandão, 1998; Souza *et al.,* 2012; Cancello *et al.,* 2014), Caatinga (Vasconcellos *et al.,* 2010; Vasconcellos & Moura, 2014) and Cerrado (Mathews, 1977; Constantino, 2005; Cunha *et al.,* 2006). More complete lists are available in Cancello (1996) and Constantino & Acioli (2008). Among these studies, Mathew's book on the Cerrado (Brazilian savanna) had the most impact the termite knowledge. This work is considered a reference on Cerrado termites and is still a primary source of ecological and taxonomic data on Cerrado termites.

Mathews' book has a large local termite inventory, and recorded more than 100 species, among seven vegetation types; many more species than the vast majority of other local termite fauna inventories (see Constantino, 2005; Constantino & Acioli, 2008). Mathews (1977) also features an array of ecological and behavioral information on termites and other species with which termites interact. The highlight of Mathews' work is a detailed taxonomic study of most species he found, including the description of five new genera and 28 new species. His book is also the only information available for several species. However, the area studied by Mathews is a transition region between the Cerrado and Amazon ecosystems, partially explaining the high species richness and many of the species described belonging to the Amazon fauna (Constantino, 2005).

The book "Studies on Termites from the Mato Grosso State, Brazil" is the doctoral thesis of Mathews and his only contribution to the study of termites. The book was Mathews' only publication. After that, he probably abandoned his academic career. Mathews earned his doctorate in the "Departament of Forestry and Natural Resources", under the supervision of Dr. David R. Gifford, and was co-supervised by the famous termite researcher W.A. Sands. The report of an expedition to Cappadocia in 1964 to assist in a friend's doctorate is one of the few information obtained on Mathews' life before he came to Brazil for the doctoral sampling procedures (Mackay, 2014). Lucinda L. Mackay is an artist who wrote her doctoral thesis on Catholic paintings of the Cappadocia churches at the University of Edinburgh. A.G.A. Mathews, then 22 years old, was one of her companions.

After nearly 40 years, the book on termites of Mato Grosso is still one of main reference for both Ecology and taxonomy of Cerrado termites. We made a bibliometric analysis of the Mathews' book to accurately measure its impact on termitology. In addition, we assembled a list of the species found by Mathews and updated it according to the current classification (Krishna *et al.,* 2013).

MATERIALS AND METHODS

The impact of the book "Studies on termites from the Mato Grosso State, Brazil by AGA Mathews 1977" was quantified by analyzing the literature that cited "Mathews 1977". The literature search was performed in Google Scholar from the year the book was published (from 1977 to 2014). Google Scholar platform was used because, only one (1) result was obtained on the Web of Knowledge-Thomsom Reuters plataform and none (zero) in SCOPUS. We obtained a total of 214 results, of which 178 were considered after excluding duplicates.

The variables obtained from the title, keywords and summary of each publication were: (i) publication year; (ii) type of publication (article, review, letter, note, book, book chapter, abstracts in conference proceedings, dissertation or thesis); (iii) study type (theoretical, empirical or descriptive); (iv) environment where the study was conducted (Forest, Cerrado, field, pasture, plantation, urban or laboratory); (v) biogeographical region where the study was conducted; (vi) names and number of authors per publication; (vii) taxonomic group studied (Isoptera species or other taxa); and (viii) keywords.

The Pearson correlation coefficient ($P < 0.05$) was calculated to view the temporal growth between the number of publications that cited "Mathews 1977" and the number of authors per publication over the years.

We performed a Principal Component Analysis (PCA) between the keyword frequencies, ordered in regards to the study country. The PCA allows the quantification of the variation existing within large data sets (represented here by the keywords matrix by countries) by reducing the variables to few independent components (originally in Pearson, 1901; see Legendre & Legendre, 2012). Moreover, other bibliometric studies have used this approach to investigate temporal trends related to keywords (see Carneiro *et al.,* 2008; Nabout *et al.,* 2012). We first counted the number of times each keyword appeared in the articles, independently in each country. In this step, synonymous words were grouped. The PCA was performed using the Vegan package (Oksanen *et al.,* 2013) of R software (R Core Team, 2012).

A correspondence analysis (CA) was performed to analyze the relationships between the study area (native vegetation, studies conducted in laboratories, agricultural ecosystems, urban area, fossil formation) and study country, based on the frequency of studies in these categories. We used the chi-square test ($P < 0.05$) to evaluate the dependence between the two matrices (study area and study country).

RESULTS AND DISCUSSION

A total of 178 publications citing "Studies on termites from the Mato Grosso State, Brazil" were recorded over the 37 years since its publication (1977 until 2014). Prestwich *et al.* (1980), the first to cite Mathews (Oecologia; "Mathews 1977"), made a single citation, where they suggest that the digestion of litter feeding termites may be a nitrogen source for the ecosystem. The number of publications citing "Mathews 1977" varied over the years. However, citation number tends to increase over time (Fig. 1; $n = 35$ years; $r = 0.6716$; $P < 0.001$). The increase in publications citing "Mathews 1977" indicates a growth in termite research.

The publications that cited "Mathews 1977" were classified into six categories, where 67% were published as scientific articles, 9% as review articles, 6% as abstracts in Conference Proceedings and as books or book chapters, and 3% as Comments and scientific notes. However, it is possible that citations made by theses and dissertations are underestimated, because some of these documents are not indexed by Google Scholar.

Over 50% of the studies are in the ecology area of study, 22% taxonomy, 17% entomology, 3% paleontology and 2% evolution and pedology. Most publications are of practical studies (49% empirical and 50% descriptive) and only 1% had a theoretical approach. Studies from collections or field/laboratory experiments were considered empirical. Revision articles and articles of taxonomic revision or description of morphological structures were classified as descriptive. Only two studies classified as theoretical: "Termite Eusocial Evolution: A Re-Examination of Bartz's Hypothesis and Assumptions" (Myles & Nutting, 1988) and "Explaining global termite diversity: productivity or history?" (Eggleton *et al.,* 1994). Myles & Nutting (1988) cited "Mathews 1977" twice when cited the foraging habits of *Rhinotermes* and *Embiratermes neotenicus.* Eggleton *et al.* (1994) cited "Mathews 1977" only as a reference of South American termites to build the "Map of generic richness of termites worldwide".

The studies were carried out in 35 countries, comprising almost all biogeographic regions, except the Antarctic and Oceanic regions: 51% in

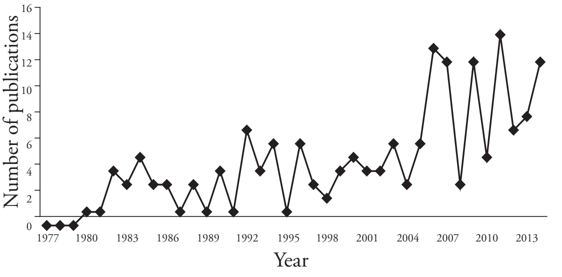

FIGURE 1: Number of publications citing Mathews 1977 (n = 178) from 1977 to 2014.

Neotropical countries, 17% in the Palearctic, 11% in the Afrotropical, 9% in the Nearctic, 6% in the Australasia and 6% in the Indomalaya. 100 studies (56%) were carried out in Brazil, 10 in Argentina and USA, 9 in Republic of Panama and French Guiana, five or less were carried out in other countries. In 20 countries only one study was performed. Some studies were implemented at more than one bio-geographical region, thus n = 179. The studies were carried out in different environments: 45% in native vegetation (Cerrado, savannas, Lhanos, Chaco, forests, Earth mound fields (*murundus*), Pantanal, mangroves, salt marshes and coastal areas), 45% in laboratories, 1% in fossil formations, 2% in urban areas and 7% in agricultural systems (pastures, plantations).

The 141 articles that cited “Mathews 1977” (scientific articles + review articles + comments + scientific notes) were published in 76 journals, and 23% of these articles were published in journals without impact factor. The article with the highest impact factor (FI = 13.59) was published in 1984 at the Annual Review of Entomology by Glenn Prestwich, a review of termite defense mechanisms, which has been cited over 150 times. Prestwich (1984) made a single citation of “Mathews 1977”, mentioning the defensive behavior of New world soldiers and workers through abdominal dehiscence. The journals Sociobiology and Insectes Sociaux have social insect studies within its scope, and the highest number of articles citing “Mathews 1977” (Fig. 2). Most journals (87%) have only one or two publications and 21% of the studies have been published elsewhere (Universities, events, institutes, books, etc.). Most articles were published in US (30%) and Brazilian (28%) journals.

A total of 278 authors were involved in the 178 publications that cited “Mathews 1977”. Most publications had only one author (35%; Fig. 3B), but the number of authors per publication is increasing (r = 0.4082; P < 0.00000002). However, there is a global trend in reducing the number of articles with single authors, even in zoology (Nabout *et al.,* 2015). Most of the 71 authors that cited “Mathews 1977” more than twice are Brazilian (56%), followed by North American (21%) (Fig. 3A). The authors who most cited Mathews 1977 were: Eliana M. Cancello from Zoology Museum of the University of São Paulo (Museu de Zoologia da Universidade de São Paulo)/Brazil, and Rudolf H. Scheffrahn from Florida University/USA (13 citations each), Reginaldo Constantino from University of Brasilia (Universidade de Brasília)/Brazil and Yves Roisin from Université Libre de Bruxelles/Belgium (11 each), and Jan Křeček from Florida University/USA and Tiago F. Carrijo from Zoology Museum of the University of São Paulo (Museu de Zoologia da Universidade de São Paulo)/Brazil (8 citations each).

Many of the studies that cited “Mathews 1977” are taxonomic and the four authors that most cited Mathew’s book are also taxonomists. It is important to update the names of the species reported by Mathews given the significant changes in the nomenclature of many termite taxa and higher clades. Nomenclature changes are even more important when we consider that the number of studies citing Mathews 1977 tends to increase in the next years (Fig. 1). Therefore we show a list of the species indexed by Mathews (sampled or not) and the updated nomenclature according to the most recent termite catalogs (Krishna *et al.,* 2013) in the Supplementary Material. Constantino & Cancello (1999) also made important corrections

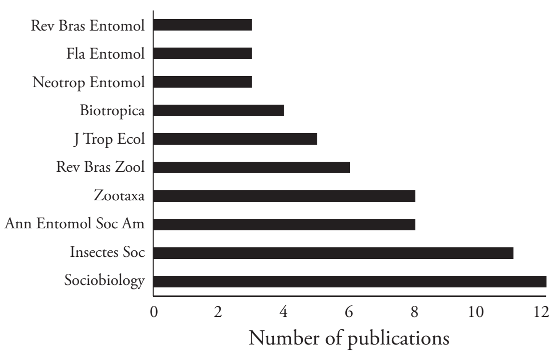

FIGURE 2: Journals (n = 76 journals) that cited Mathews 1977 on three or more publications (Articles + review articles + comments + notes).

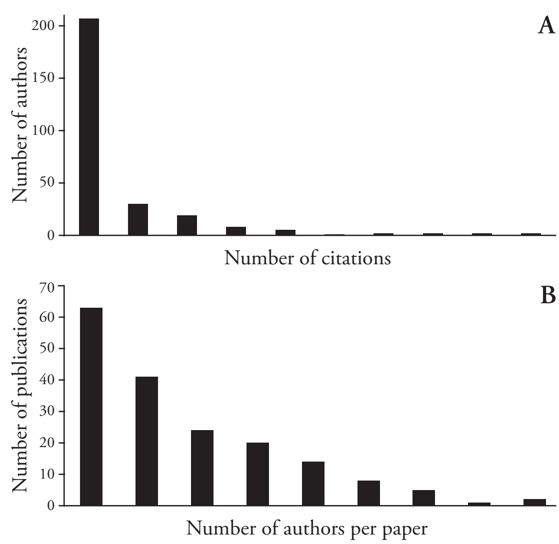

FIGURE 3: Number of authors compared to the number of citations of Mathews 1977 **(A)**. Number publications compared to the number of authors who cited Mathews 1977 **(B)** (n = 178 publications).

and updates to Mathew's study, mainly indicating the *nomina nuda* events created by Mathews.

The study objects of the publications that cited "Mathews 1977" comprised insects (Isoptera, Apidae, Formicidae, Diptera, Coleoptera, Tettigoniidae), Oligochaeta, Scorpiones, Araneae, Anura, Lacertilia, Mammalia, Fungi and Plantae. It was not possible to classify the object of study of four studies. Earth mound fields (*murundus*) and soil were also listed as objects of study. Over 80% of the studies were conducted with Isoptera: Nasutitermitinae (49%), Termitinae (19%), Syntermitinae (14%), Rhinotermidae (8%), Apicotermitinae (7%) and Serritermitidae (2%). We could not identify the species or family/subfamily studied in 41% of the studies conducted with termites. A total of 48 termite genus and 44 species were listed as the object of study. *Constrictotermes cyphergaster* (Silvestri, 1901) was the most studied species (10 studies). *Constrictotermes cyphergaster* has been extensively studied in the ecosystems where it occurs, and studies citing "Mathews 1977" have regarded its interaction with other species residing the termite nest (Cunha & Brandão, 2000; Cunha *et al.,* 2003; Cristaldo *et al.,* 2012; Cristaldo *et al.,* 2014), supplementary reproductives (Cunha & Brandão, 2002), eating habits (Moura *et al.,* 2006a; Moura *et al.,* 2006b), link between nest building and some plant species (Lima-Ribeiro *et al.,* 2006; Silva *et al.,* 2007; Bezerra-Gusmão *et al.,* 2013), nest population and biomass (Vasconcellos *et al.,* 2007), development of the caste system (Moura *et al.,* 2011), and contribution to the carbon cycle (Bezerra-Gusmão *et al.,* 2011).

About 30% of the articles and reviews did not provide keywords. A total of 244 keywords were grouped by the PCA in regards to the country where the study was conducted (Fig. 4). The two PCA axes explained about 26% of the keyword variability. Fig. 4 shows the keywords that most contributed to the 1st and 2nd PCA axes. The terms "termite", "Isoptera" and "taxonomy" were the most common keywords and are positively correlated to the study countries in the 1st axys. The terms *"Inquilinitermes johnchapmani"* and "Lhanos de Mojos" were negatively correlated with Bolivia in the 1st axys, once these terms appeared only in the single Bolivian study recorded. The terms "defense", "autothysis" and "forest" are positively correlated with the 2nd PCA axis. The terms "enteric valve", "proctodeal segments" and *"Anoplotermes"* are negatively correlated with the countries where the study was carried out (*e.g.,* French Guiana, Panama, Trinidad & Tobago, Paraguai and Czech Republic) in the 2nd axis. The distribution of keywords along the PCA axis depends on its frequency in each country. Brazil had the highest keyword frequency and holds the highest 1st axis value, since most studies were conducted in Brazil (97 versus less than 10 in all the countries).

The correspondence analysis showed relationships between study area and study country ($\chi^2 = 152.82$; df = 166; $P < 0.05$). In general, most countries conducted the studies in laboratories and native vegetation areas. Laboratory studies were performed in different countries, while most studies in natural vegetation areas were conducted in tropical countries, such as Brazil, Costa Rica, French Guiana, etc. Studies in agroecosystems were conducted predominantly in Brazil. Few surveys were performed in urban areas (Brazil and USA) and on fossil species (Argentina and the Dominican Republic).

CONCLUSION

The data analyzed in this study provide some indicators of the international repercussions of Mathews' book. The number of publications citing "Mathews 1977" varied over the past 37 years, with a rising trend. Much of the scientific literature citing Mathews are empirical and descriptive studies, and were published in journals as articles and reviews. The literature citing Mathews were concentrated in Neotropical countries, especially Brazil, despite the all citations coming from studies carried out in 35 countries of nearly all biogeographic regions. Most studies were conducted by one researcher throughout the years, but lately more publications with multiple authors have emerged. The authors that most cited Mathews are internationally renowned termite researchers who published their research studies in journals focused on the study of social insects, although most publications cited the book only once. Isoptera was the most studied taxonomic group, but other publications using other insects, scorpions, worms, herpetofauna, mammals, plants and fungi as objects of study also cited Mathews. The keywords that were used in each publication are so diverse that it was not possible find a pattern that characterizes termite research within the countries. There is a strong association between the area of study and the study country despite the diverse subjects and objects of study of the publications analyzed. Lastly, this study shows the diversity of application (citations) of Mathews' book, and that the number of citations will continue to increase due to the large amount of information presented by the author.

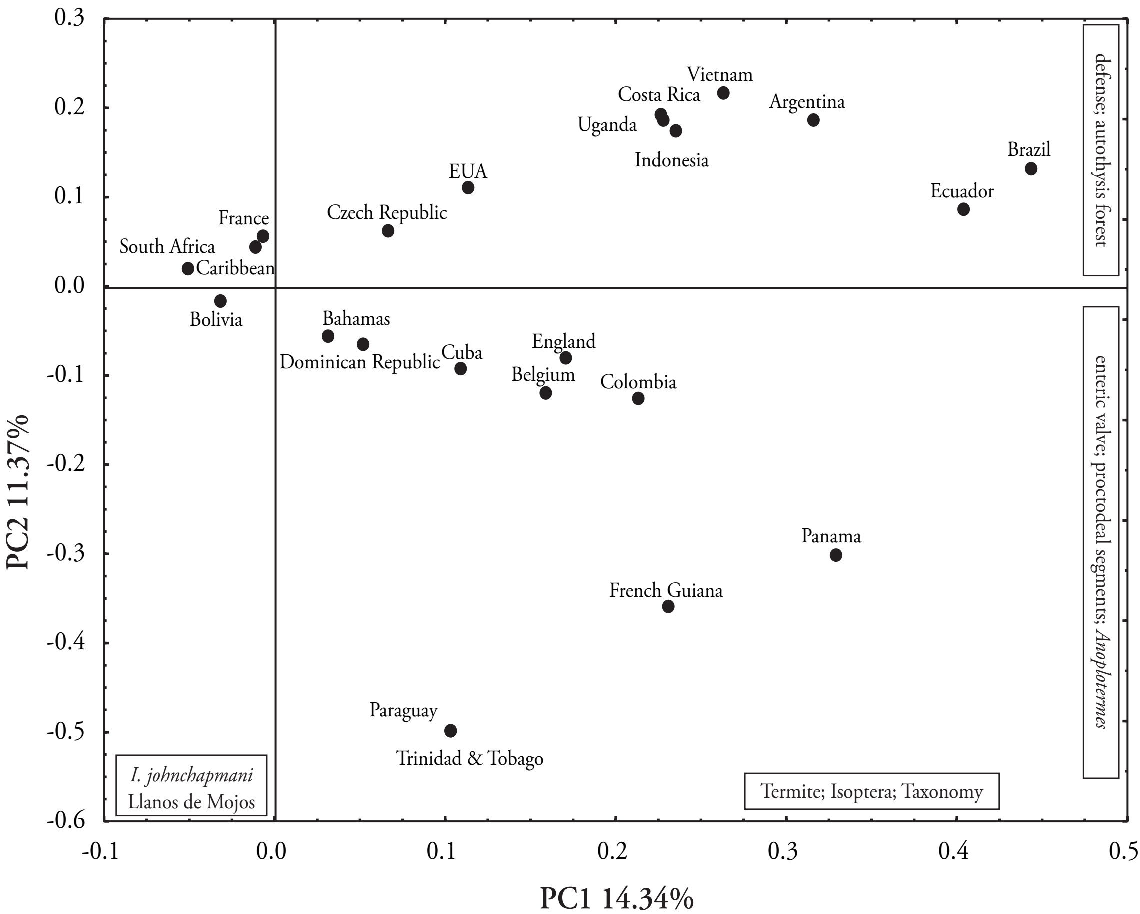

FIGURE 4: Principal Component Analysis (PCA) using the keywords frequency in articles in regards to the country of study. The shown terms are the ones which most contributed to the formation of the first and second axes. Dots represent the countries and indicate to which words they are more related.

RESUMO

Este trabalho fez uma análise bibliométrica da repercussão internacional do livro "Studies on termites from the Mato Grosso State, Brazil", de AGA Mathews (1977). O número de citações aumentou ao longo dos anos após a primeira citação. O livro de Mathews foi citado em artigos e revisões, teses e dissertações, livros e capítulos, resumos em anais de eventos e notas científicas. A maioria destes trabalhos é empírico e descritivo. Os estudos foram realizados em 35 países das regiões Neotropical, Paleártica, Afrotropical, Neártica, Australásia e Indomalaia. Entretanto, 55% dos trabalhos foram realizados no Brasil. As revistas Sociobiology e Insectes Sociaux, cujo escopo é publicar pesquisas sobre insetos sociais, apresentam o maior número de artigos que citaram Mathews. A maioria dos 71 autores que citaram Mathews mais de duas vezes é brasileiro. Constrictotermes cyphergaster *(Silvestri) foi a espécie mais estudada em 80% dos trabalhos que abordaram Isoptera. As palavras-chave mais frequentes (termite, Isoptera, taxonomy), são termos generalistas que foram associadas à maioria dos países. A maioria das pesquisas foi executada em laboratórios e em áreas de vegetação nativa. Estudos em agroecossistemas foram realizados predominantemente no Brasil. Este estudo mostra a diversidade de aplicações (citações) do livro Mathews, e que o número de citações tende a aumentar devido à grande quantidade de informações apresentadas pelo autor.*

Palavras-Chave: Número de citações; Isoptera; Revisão sistemática; Termitologia.

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List of species cited by Mathews 1977 and their present names according to Krishna et al. (2013). See also Constantino & Cancello 1999 for the *nomina nuda* cases. Names in bold were changed according to the catalog of Krishna *et al.* (2013). C = sampled in "Base Camp"; X = sampled in"Xavantina"; [1] new species, described by Mathews for the first time; [2] new combination; [3] typographical error.

Subfamily	Names cited in Mathews 1977	Updated names	Source
Rhinotermitinae	*Acorhinotermes*	*Acorhinotermes*	
Termitinae	*Amitermes* sp.	*Amitermes* sp.	C
Nasutitermitinae	*Angularitermes clypeatus*[1]	*Angularitermes clypeatus*	C
Nasutitermitinae	*Angularitermes nasutissimus*	*Angularitermes nasutissimus*	
Nasutitermitinae	*Angularitermes orestes*[2]	*Angularitermes orestes*	C
Apicotermitinae	*Anoplotermes arboreus*	*Ruptitermes arboreus*	
Apicotermitinae	*Anoplotermes hageni*	*Anoplotermes hageni*	
Apicotermitinae	***Anoplotermes jheringhi***[3]	***Anoplotermes jheringi***	
Apicotermitinae	*Anoplotermes pacificus*	*Anoplotermes pacificus*	
Apicotermitinae	*Anoplotermes* spp.	*Anoplotermes* spp.	C
Apicotermitinae	*Anoplotermes turricola*	*Anoplotermes turricola*	C
Syntermitinae	***Armitermes cerradoensis***[1]	***Silvestritermes euamignathus***	C
Syntermitinae	***Armitermes euamignathus***	***Silvestritermes euamignathus***	X
Syntermitinae	***Armitermes festivellus***	***Embiratermes festivellus***	C
Syntermitinae	***Armitermes holmgreni***	***Silvestritermes heyeri***	CX
Syntermitinae	***Armitermes neotenicus***	***Embiratermes neotenicus***	C
Syntermitinae	***Armitermes peruanus***	***Mapinguaritermes peruanus***	CX
Termitinae	*Cavitermes parmae*[1]	*Cavitermes parmae*	X
Termitinae	*Cavitermes parvicavus*[1]	*Cavitermes parvicavus*	C
Termitinae	*Cavitermes tuberosus*	*Cavitermes tuberosus*	
Nasutitermitinae	*Constictotermes cavifrons*	*Constictotermes cavifrons*	
Nasutitermitinae	*Constictotermes cyphergaster*	*Constictotermes cyphergaster*	CX
Nasutitermitinae	*Constictotermes latinotus*	*Constictotermes latinotus*	
Nasutitermitinae	*Constictotermes* sp.	*Constictotermes* sp.	
Nasutitermitinae	*Convexitermes clevelandi*	*Coatitermes clevelandi*	C
Nasutitermitinae	*Convexitermes* spp.	*Convexitermes* spp.	C
Coptotermitinae	*Coptotermes crassus*	*Coptotermes crassus*	
Coptotermitinae	*Coptotermes gestroi*	*Coptotermes gestroi*	
Coptotermitinae	***Coptotermes marabitanas***	***Coptotermes testaceus***	
Coptotermitinae	*Coptotermes niger*	*Coptotermes niger*	
Coptotermitinae	*Coptotermes* sp.	*Coptotermes* sp.	
Coptotermitinae	*Coptotermes testaceus*	*Coptotermes testaceus*	CX
Syntermitinae	*Cornitermes bequaerti*	*Cornitermes bequaerti*	C
Syntermitinae	*Cornitermes cumulans*	*Cornitermes cumulans*	
Syntermitinae	***Cornitermes snyderi***	***Cornitermes silvestrii***	CX
Nasutitermitinae	*Cortaritermes silvestrii*[2]	*Cortaritermes silvestrii*	CX
Termitinae	*Crepititermes verruculosus*	*Crepititermes verruculosus*	C
Syntermitinae	***Curvitermes angulariceps***[1]	***Cyrilliotermes angulariceps***	C
Syntermitinae	*Curvitermes minor*	*Curvitermes minor*	
Syntermitinae	*Curvitermes odontognathus*	*Curvitermes odontognathus*	C
Syntermitinae	***Curvitermes planioculus***[1]	***Curvitermes minor***	C
Syntermitinae	***Curvitermes projectidens***[1]	***Paracurvitermes manni***	C
Syntermitinae	***Curvitermes strictinasus***[1]	***Cyrilliotermes strictinasus***	C
Termitinae	*Cylindrotermes flangiatus*[1]	*Cylindrotermes flangiatus*	C
Termitinae	*Cylindrotermes parvignathus*	*Cylindrotermes parvignathus*	C
Nasutitermitinae	*Cyranotermes timuassu*	*Cyranotermes timuassu*	C
Termitinae	*Dentispicotermes brevicarinatus*	*Dentispicotermes brevicarinatus*	
Termitinae	*Dentispicotermes conjunctus*	*Dentispicotermes conjunctus*	
Termitinae	*Dentispicotermes pantanalis*[1]	*Dentispicotermes pantanalis*	X
Termitinae	*Dihoplotermes inusitatus*	*Dihoplotermes inusitatus*	C

Subfamily	Names cited in Mathews 1977	Updated names	Source
Nasutitermitinae	*Diversitermes aporeticus*[1]	*Diversitermes aporeticus*	C
Nasutitermitinae	*Diversitermes castaniceps*	*Diversitermes castaniceps*	
Nasutitermitinae	*Diversitermes diversimiles*	*Diversitermes diversimiles*	CX
Nasutitermitinae	***Diversitermes dubius***	***Diversitermes aporeticus***	
Rhinotermitinae	*Dolichorhinotermes longilabius*	*Dolichorhinotermes longilabius*	C
Nasutitermitinae	***Eutermes arenarius***	***Nasutitermes arenarius***	
Termitinae	*Genuotermes spinifer*	*Genuotermes spinifer*	C
Apicotermitinae	***Grigiotermes inquilinus***	***Grigiotermes metoecus***	
Apicotermitinae	*Grigiotermes metoecus*[1]	*Grigiotermes metoecus*	C
Apicotermitinae	*Grigiotermes* sp.	*Grigiotermes* sp.	C
Heterotermitinae	*Heterotermes aureus*	*Heterotermes aureus*	
Heterotermitinae	*Heterotermes cardini*	*Heterotermes cardini*	
Heterotermitinae	*Heterotermes convexinotatus*	*Heterotermes convexinotatus*	
Heterotermitinae	*Heterotermes longiceps*	*Heterotermes longiceps*	C
Heterotermitinae	*Heterotermes sulcatus*[1]	*Heterotermes sulcatus*	C
Heterotermitinae	*Heterotermes tenuis*	*Heterotermes tenuis*	CX
Termitinae	*Inquilinitermes fur*[2]	*Inquilinitermes fur*	C
Termitinae	*Inquilinitermes inquilinus*[2]	*Inquilinitermes inquilinus*	
Termitinae	*Inquilinitermes microcerus*[2]	*Inquilinitermes microcerus*	C
Syntermitinae	*Labiotermes brevilabius*	*Labiotermes brevilabius*	
Syntermitinae	*Labiotermes labralis*	*Labiotermes labralis*	C
Syntermitinae	*Labiotermes leptothrix*[1]	*Labiotermes leptothrix*	C
Syntermitinae	*Labiotermes longilabius*	*Labiotermes longilabius*	
Syntermitinae	*Labiotermes pelliceus*	*Labiotermes pelliceus*	
Syntermitinae	***Labiotermes pellisetaceus***	***Labiotermes leptothrix***	
Termitinae	*Microcerotermes arboreus*	*Microcerotermes arboreus*	
Termitinae	*Microcerotermes bouvieri*	*Microcerotermes bouvieri*	
Incertae sedis	*Microcerotermes debilis*	*Microcerotermes arboreus*	
Termitinae	*Microcerotermes exiguus*	*Microcerotermes exiguus*	C
Termitinae	*Microcerotermes indistinctus*[1]	*Microcerotermes indistinctus*	C
Termitinae	*Microcerotermes strunckii*	*Microcerotermes strunckii*	C
Nasutitermitinae	*Nasutitermes acajutlae*	*Nasutitermes acajutlae*	
Nasutitermitinae	*Nasutitermes bivalens*	*Nasutitermes bivalens*	
Nasutitermitinae	*Nasutitermes bolivari*[2]	*Nasutitermes bolivari*	C
Nasutitermitinae	*Nasutitermes callimorphus*[1]	*Nasutitermes callimorphus*	C
Nasutitermitinae	*Nasutitermes corniger*	*Nasutitermes corniger*	
Nasutitermitinae	*Nasutitermes costalis*	*Nasutitermes costalis*	
Nasutitermitinae	*Nasutitermes coxipoensis*	*Nasutitermes coxipoensis*	C
Nasutitermitinae	*Nasutitermes ephratae*	*Nasutitermes ephratae*	CX
Nasutitermitinae	*Nasutitermes fulviceps*	*Cortaritermes fulviceps*	
Nasutitermitinae	*Nasutitermes hubbardi*	*Nasutitermes hubbardi*	
Nasutitermitinae	***Nasutitermes indistinctus***	***Nasutitermes callimorphus***	
Nasutitermitinae	*Nasutitermes kemneri*	*Nasutitermes kemneri*	CX
Nasutitermitinae	*Nasutitermes macrocephalus*	*Nasutitermes macrocephalus*	
Nasutitermitinae	*Nasutitermes nigriceps*	*Nasutitermes nigriceps*	C
Nasutitermitinae	*Nasutitermes octopilis*	*Nasutitermes octopilis*	
Nasutitermitinae	*Nasutitermes silvestrii*	*Cortaritermes silvestrii*	
Nasutitermitinae	*Nasutitermes stricticeps*[1]	*Nasutitermes stricticeps*	C
Nasutitermitinae	*Nasutitermes surinamensis*	*Nasutitermes surinamensis*	CX
Nasutitermitinae	*Nasutitermes tatarendae*	*Nasutitermes tatarendae*	C
Nasutitermitinae	*Nasutitermes unduliceps*[1]	*Nasutitermes unduliceps*	C
Nasutitermitinae	*Nasutitermes wheeleri*	*Nasutitermes wheeleri*	C
Termitinae	*Neocapritermes bodkini*	*Neocapritermes bodkini*	
Termitinae	*Neocapritermes opacus*	*Neocapritermes opacus*	C
Termitinae	*Neocapritermes* sp.	*Neocapritermes* sp.	C
Termitinae	*Neocapritermes taracua*	*Neocapritermes taracua*	C
Kalotermitinae	*Neotermes acceptus*[1]	*Neotermes acceptus*	C
Kalotermitinae	*Neotermes araguaensis*	*Neotermes araguaensis*	

Subfamily	Names cited in Mathews 1977	Updated names	Source
Kalotermitinae	*Neotermes fulvescens*	*Neotermes fulvescens*	
Kalotermitinae	*Neotermes hirtellus*	*Neotermes hirtellus*	
Kalotermitinae	*Neotermes magnoculus*	*Neotermes magnoculus*	C
Kalotermitinae	***Neotermes manni***	***Comatermes perfectus***	
Kalotermitinae	*Neotermes setifer*	*Neotermes setifer*	
Termitinae	*Orthognathotermes aduncus*	*Orthognathotermes aduncus*	C
Termitinae	*Orthognathotermes brevipilosus*	*Orthognathotermes brevipilosus*	
Termitinae	*Orthognathotermes gibberorum*	*Orthognathotermes gibberorum*	C
Termitinae	*Orthognathotermes macrocephalus*	*Orthognathotermes macrocephalus*	
Termitinae	*Orthognathotermes wheeleri*	*Orthognathotermes wheeleri*	
Syntermitinae	***Paracornitermes hirsutus***	***Labiotermes orthocephalus***	CX
Nasutitermitinae	***Parvitermes bacchanalis***[1]	***Obtusitermes bacchanalis***	C
Nasutitermitinae	***Parvitermes laticephalus***	***Velocitermes laticephalus***	
Nasutitermitinae	*Parvitermes pallidiceps*	*Parvitermes pallidiceps*	
Nasutitermitinae	*Parvitermes wolcotti*	*Parvitermes wolcotti*	
Termitinae	*Planicapritermes planiceps*	*Planicapritermes planiceps*	C
Rhinotermitinae	*Rhinotermes marginalis*	*Rhinotermes marginalis*	C
Syntermitinae	***Rhynchotermes cerradoensis***	***Rhynchotermes nyctobius***	
Syntermitinae	*Rhynchotermes diphyes*[1]	*Rhynchotermes diphyes*	C
Syntermitinae	***Rhynchotermes diversimiles***	***Rhynchotermes diphyes***	
Syntermitinae	*Rhynchotermes nasutissimus*	*Rhynchotermes nasutissimus*	C
Syntermitinae	*Rhynchotermes nyctobius*[1]	*Rhynchotermes nyctobius*	C
Syntermitinae	*Rhynchotermes perarmatus*	*Rhynchotermes perarmatus*	
Nasutitermitinae	***Rotunditermes rotundiceps***	***Rotunditermes bragantinus***	C
Apicotermitinae	*Ruptitermes arboreus*[2]	*Ruptitermes arboreus*	
Apicotermitinae	***Ruptitermes grandis***	***Ruptitermes xanthochiton***	
Apicotermitinae	*Ruptitermes proratus*[2]	*Ruptitermes proratus*	
Apicotermitinae	*Ruptitermes reconditus*[2]	*Ruptitermes reconditus*	CX
Apicotermitinae	*Ruptitermes xanthochiton*[1]	*Ruptitermes xanthochiton*	C
Serritermitinae	*Serritermes serrifer*	*Serritermes serrifer*	C
Apicotermitinae	***Speculitermes proratus***	***Ruptitermes proratus***	
Termitinae	***Spinitermes allognathus***[1]	***Divinotermes allognathus***	C
Termitinae	*Spinitermes brevicornutus*	*Spinitermes brevicornutus*	
Termitinae	*Spinitermes nigrostomus*	*Spinitermes nigrostomus*	CX
Termitinae	*Spinitermes robustus*	*Spinitermes robustus*	C
Termitinae	*Spinitermes trispinosus*	*Spinitermes trispinosus*	CX
Nasutitermitinae	*Subulitermes* spp.	*Subulitermes* spp.	C
Syntermitinae	***Syntermes brasiliensis***	***Syntermes molestus***	
Syntermitinae	***Syntermes chaquimayensis***	***Syntermes spinosus***	
Syntermitinae	*Syntermes grandis*	*Syntermes grandis*	C
Syntermitinae	*Syntermes molestus*	*Syntermes molestus*	C
Syntermitinae	***Syntermes snyderi***	***Syntermes spinosus***	CX
Nasutitermitinae	*Tenuirostritermes incisus*	*Tenuirostritermes incisus*	
Termitinae	*Termes baculi*	*Termes baculi*	
Termitinae	*Termes bolivianus*	*Termes bolivianus*	C
Termitinae	*Termes hospes*	*Termes hospes*	
Termitinae	*Termes medioculatus*	*Termes medioculatus*	C
Nasutitermitinae	*Triangularitermes triangulariceps*[1]	*Triangularitermes triangulariceps*	C
Nasutitermitinae	***Velocitermes antillarum***	***Parvitermes antillarum***	
Nasutitermitinae	*Velocitermes beebei*	*Velocitermes beebei*	
Nasutitermitinae	***Velocitermes bolivari***	***Nasutitermes bolivari***	
Nasutitermitinae	*Velocitermes glabrinotus*[1]	*Velocitermes glabrinotus*	C
Nasutitermitinae	*Velocitermes heteropterus*	*Velocitermes heteropterus*	CX
Nasutitermitinae	*Velocitermes melanocephalus*[2]	*Velocitermes melanocephalus*	
Nasutitermitinae	*Velocitermes paucipilis*[1]	*Velocitermes paucipilis*	CX
Nasutitermitinae	*Velocitermes uniformis*[2]	*Velocitermes uniformis*	
Nasutitermitinae	*Velocitermes velox*[2]	*Velocitermes velox*	C