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Termite taxonomy from 2001–2021: the contribution of *Zootaxa*

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Termites comprise a relatively small group of insects, with 3176 known species (2976 living and 200 fossil) (Constantino 2020). They include, however, very important urban and agricultural pests, and also major decomposers of plant matter in terrestrial ecosystems, especially in the tropics. For instance, the annual economic impact of a single invasive termite species, *Coptotermes formosanus*, was estimated as US$11 billion in the United States in 1999 (Su 2002), placing it among the most important insect pests in the world.

Although traditionally classified as a separate order (Isoptera), termites are highly derived, eusocial and polymorphic cockroaches. Today, most entomologists treat termites as part of the order Blattaria or Blattodea (synonyms without nomenclatural precedence), either preserving the name Isoptera ranked as infraorder (*e.g.* Krishna *et al.* 2013), or as epifamily Termitoidae (Beccaloni & Eggleton 2013). Nevertheless, termites comprise a clearly monophyletic group and the name Isoptera, which is well established, can be used to refer to the clade.

For a detailed history of termite taxonomy, see Krishna *et al*. (2013, pages 11–43). A brief summary is presented here. Termite taxonomy showed little advance during the 18th and 19th centuries (Figure 1). The first major taxonomic work was Hagen's (1858) world monograph, which listed 100 species. Taxonomic activity increased during 1896–1913, with most work conducted by European taxonomists (J. Desneux, N. Holmgren, F. Silvestri, Y. Sjöstedt, among others), and then decreased as a result of World War I. It accelerated again in the period between the wars, with major contributions from American taxonomists (A.E. Emerson, S.F. Light, T.E. Snyder), and also from other regions (*e.g.* G.F. Hill in Australia, C. Fuller in South Africa, M. Oshima in Japan, among others), as well as several Europeans. World War II also had a marked negative impact on termite research. The first worldwide taxonomic catalog was published by Snyder (1949), recording 1773 species (1710 living and 63 fossil). Termite taxonomic activity increased during the following decades, including contributions from many taxonomists from most continents. The most recent world catalog (Krishna *et al.* 2013) listed 3106 species (2933 living and 173 fossil).

Interestingly, Wilson (1971) suggested that termite taxonomy was nearly complete almost half a century ago and that relatively few species remained to be described. However, more than 1000 termite species have been described since 1971, and the total number of living species was estimated as more than 5000 by Constantino (2018). Termite taxonomy is more advanced than the average for insects, but it is far from complete.

From 1980 to the present, most termite taxonomists have retired and taxonomic activity has been conducted mainly as a secondary line of research by ecologists, applied entomologists, molecular biologists etc. Very few termite taxonomists with a permanent position in institutions holding major collections remain active. Taxonomic activity has declined or stagnated in most regions, except for the neotropics (Constantino 2018).

In the past two decades, *Zootaxa* became the main outlet for taxonomic papers about termites, especially revisionary work (Figure 2). From 2001 to the present, *Zootaxa* published 18% (40) of all termite taxonomy papers, 21% (49) of the new species, and 47% (9) of revisionary works, with a total of 517 pages. Papers published in *Zootaxa* were distributed among regions as follows: Neotropical 77.5%; Ethiopian 10%; Palaearctic 5%; Australian 2.5; Nearctic 2.5%; Oriental 2.5%. All termite papers published in *Zootaxa* were about living (extant) species.

Most papers published in *Zootaxa* were about Termitidae (80%), including subfamilies Apicotermitinae (15%), Nasutitermitinae (25%), Syntermitinae (17,5%), and Termitinae (20%). Other papers were about Kalotermitidae (10%) and Rhinotermitidae (2.5%).

The rejection rate from 2008 to the present was about 25%. Most rejected papers were single species descriptions based on few specimens and limited data; among these, at least three were descriptions of "new" species which were not really new. Among the termite papers published in *Zootaxa*, 20% are open access.

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I believe *Zootaxa* will continue to play an important role in the documentation of termite diversity. The rapid publication, expert peer review, and the possibility of publishing large papers with no page charges (which is important for taxonomists from developing countries) are great advantages.

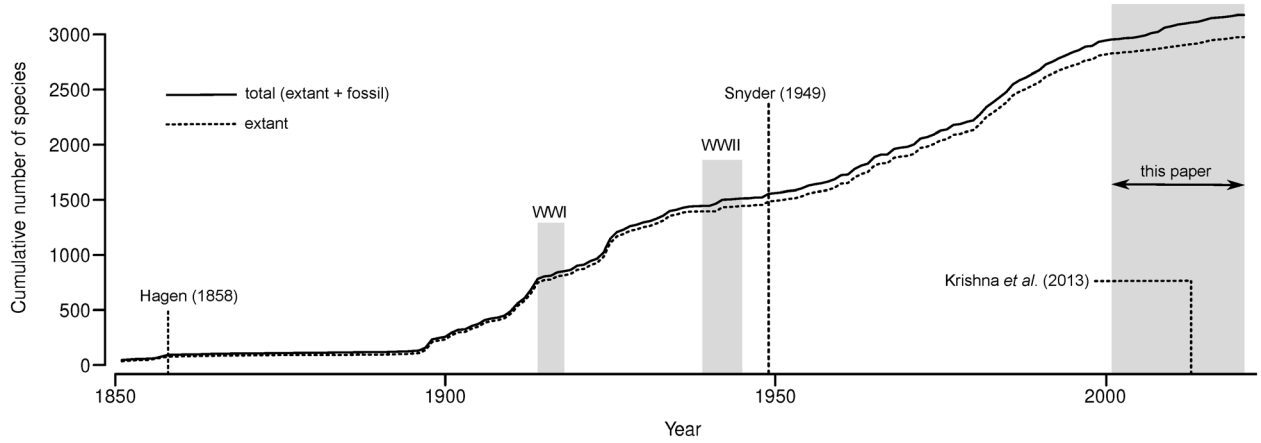

FIGURE 1. Cumulative number of described termite species from 1850 to the present. Hagen (1858): first world monograph (Monographie der Termiten); Snyder (1949): Catalog of the termites of the world; Krishna *et al*. (2013): Treatise of the Isoptera of the World. WWI: World War I (1914-1918); WWII: World War II (1939-1945). Data source: Constantino (2020).

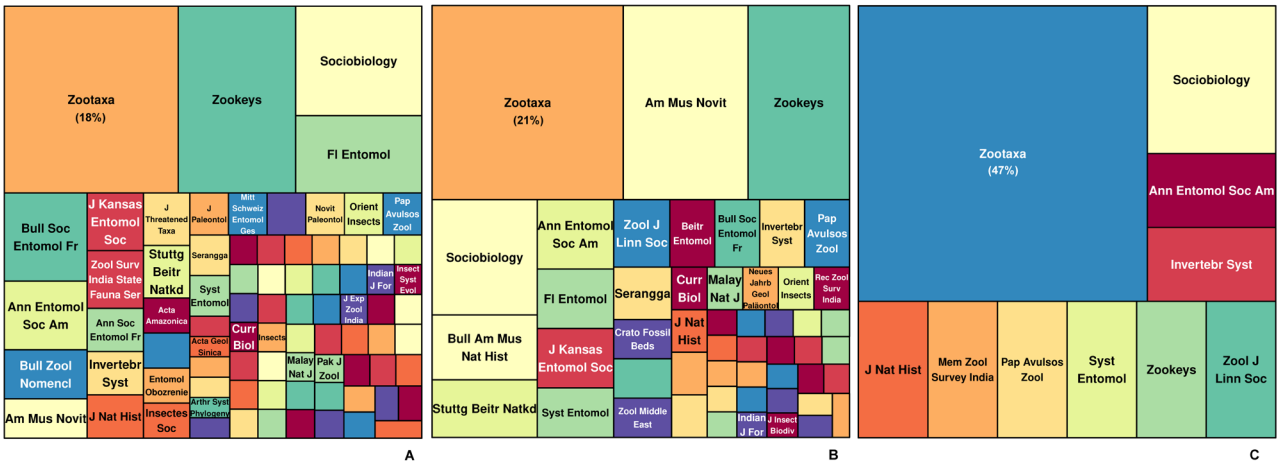

FIGURE 2. Distribution of termite taxonomic papers among journals (living and fossil). A) number of papers; B) number of new species described per journal; C) number of taxonomic revisions per journal. Graphs ploted using R (R Core Team 2021) with package *treemap*. Data source: Constantino (2020).

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