



Zootaxa 20th Anniversary Celebration: section Acanthocephala

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Abstract

Of 32 papers including Acanthocephala that were published in Zootaxa from 2001 to 2020, 5, by 11 authors from 5 countries, described 5 new species and redescribed 1 known species and 27 checklists from 11 countries and/geographical regions by 72 authors. A bibliographic analysis of these papers, the number of species reported in the checklists, and a list of new species are presented in this paper.

Key words: Acanthocephala, new species, checklist, bibliography

The Phylum Acanthocephala is a relatively small group of endoparasitic helminths (helminths = worm-like animals that are parasites; not a monophyletic group). Adults use vertebrates as definitive hosts (fishes, amphibians, reptiles, birds, and mammals), eggs are passed in the feces and infect arthropods (insects and crustacean) as intermediate hosts, where the cystacanth develops, and the cystacanth infects the definitive host when it is ingested. In some cases, fishes, reptiles, and amphibians that eat arthropods serve as paratenic (transport) hosts to bridge ecological barriers to adults of a species that typically does not feed on arthropods. Because of their strict life cycle requirements, acanthocephalans serve as excellent model organisms for the study of host-parasite relationships, coevolution, and speciation of hosts and parasites (Monks 2001).

There are few, if any, arguments that world biodiversity is not important, though it is not a priority for everyone. The protection of our biodiversity depends on our understanding, and the first step in that is the naming of a species (Thomson *et al.* 2018). Generally, the focus of the public is on larger animals, many of which undoubtedly are in risk of extinction, species of parasites are just as important and essential to the balance, and they outnumber the species of free-living organisms (Thompson *et al.* 2018); the Acanthocephala are part of that group.

Today, with the rapid increase of new journals, many not indexed in the major indices, such as Web of Science and Scopus, it is difficult to know how many species are known. However, extrapolating from the most recent estimates (Amin 1985;2013; Monks & Richardson 2011), the Phylum today comprises nearly 1,500 species, with an annual growth rate of about 15 species being described each year since 1985. Given the number of journals that specialize in studies of helminths, taxonomic works in general (Zootaxa falls within this category), and national journals with more limited distribution, one might expect a particular journal to average less than 1 description of a new species of acanthocephalan per year. Of course, the number species described per year is variable and the number of species being identified taxonomically per year is increasing as new, more precise methods of delimiting species are found and become used commonly.

It also should be noted that the majority of papers on Acanthocephala published in Zootaxa come from developing countries, where it is difficult to obtain research grants and to pay for the cost of open access publication. As a result, only 2 of 39 papers were published with open access. However, because there is no cost for regular publication of articles in Zootaxa, the journal give authors the chance to publish in an internationally-recognized venue.

One of the highest priorities of Zootaxa is the descriptions of new taxa (Zhang 2010; Zhang 2011). During the first 20 years of Zootaxa, descriptions of 6 species of Acanthocephala were published in the journal (5 new species and 1 redescription) (Table 1). Three of these are members of the class Eoacanthocephala and 3 of Palaeacanthocephala; 1 from North America (México), 1 from South America (Ecuador), and 4 from Eurasia (1—Saudi Arabia, 1—

Pakistan, and 2—India). One species was described in 2007, 1 in 2008, 1 in 2011, 1 in 2012, and 2 in 2020 (Fig. 1). This may seem like a small number, but it is about 2% of all of the species of Acanthocephala described during that period. Considering that *Zootaxa* does not specialize in studies of parasites and that there are a number of journals dedicated to studies of parasites and systematics of parasites, this is a reasonable number, especially given that the first description was in 2007, which is about 1 species every other year. In *Zookeys*, a journal of similar scope to *Zootaxa*, no new species have been described from 2008 to 2020, although 6 checklists including Acanthocephala and 2 phylogenetic studies were published in a similar period; descriptions of new species of Acanthocephala generally are published in parasitology-specific journals.

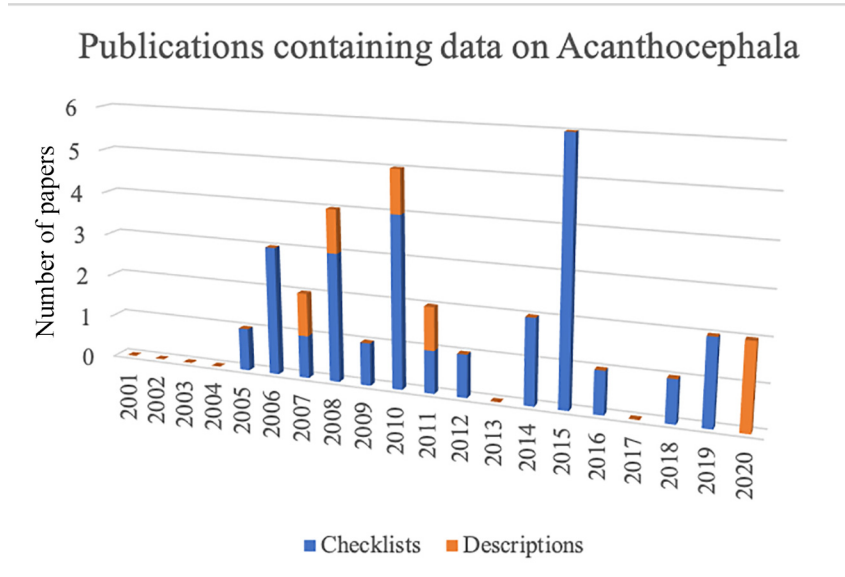


FIGURE 1. Number of papers, descriptions and checklists, per year published in *Zootaxa* from 2001 to 2020.

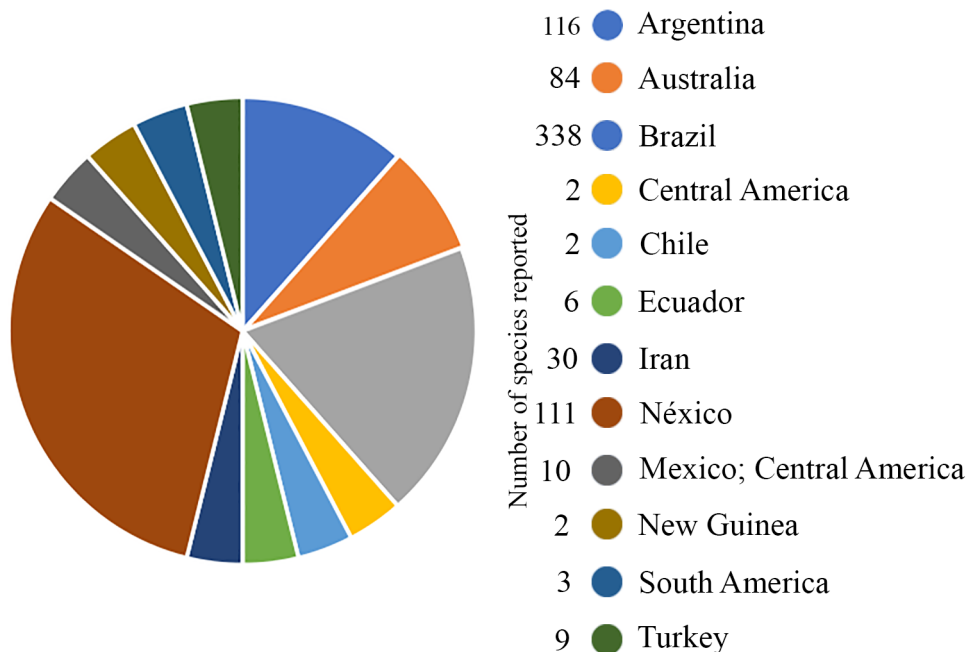


FIGURE 2. Proportion of the number of papers published in *Zootaxa* from 2001 to 2020 containing checklists from each geographic region of the report or the country. A list of the number of species reported from each region is given (see text for comments on duplication of species).

TABLE 1. List of species of Acanthocephala described in Zootaxa (5 new and 1 known). Note: * indicates redescription.

Class	Family	Species	Citation	Locality
Eoacanthocephala				
	Neoechinorhynchidae	<i>Pandosentis napoensis</i> Smales, 2007	Smales 2007	Ecuador
	Quadrigyridae	<i>Acanthosentis seenghalae</i> Chowhan, Gupta, and Khera, 1988*	Chowhan <i>et al.</i> 1988; Gautam <i>et al.</i> 2020	India
		<i>Pallisentis thapari</i> Gautam, Misra, Saxena, and Monks, 2020	Gautam <i>et al.</i> 2020	India
Palaeacanthocephala				
	Cavisomidae	<i>Sclerocollum saudii</i> Al-Jahdali, 2010	Al-Jahdali 2010	Saudi Arabia
	Illiosentidae	<i>Dollfusentis salgadoi</i> Monks, Alemán-García, and Pulido-Flores, 2008	Monks <i>et al.</i> 2008	México
	Polymorphidae	<i>Polymorphus fulicai</i> Birmani, Dharejo, and Khan MM 2011	Birmani <i>et al.</i> 2011	Pakistan

A second emphasis of *Zootaxa* is the publication of catalogues and checklists of species. During this period, *Zootaxa* published 27 checklists that included acanthocephalans. Some provided a list of species of parasites from particular geographical regions or types of hosts, while others focused entirely on acanthocephalans (Table 2; Fig. 2). The surveys provided lists of acanthocephalans in 12 geographical areas or countries: Argentina, Australia, Brazil, Central America, Chile, Ecuador, Iran, México, México combined with Central America, New Guinea, South America, and Turkey. The checklists reported 713 species; of course, some species lists overlapped in content when there were multiple lists for a region and when a species occurred in more than one region.

The total number of species described plus the number of checklists including data on Acanthocephala is shown in Figure 2. The first checklist was published in 2005 and the first description in 2007. The highest number of species described was in 2020 (2 species) and the highest number of checklists was in 2015 (6 papers).

For *Zootaxa*, another important theme is the study of phylogenetic relationships. Several works mentioned above included phylogenetic studies. Pinacho-Pinacho *et al.* (2015), in their checklist of the species of *Neoechinorhynchus* Hamann from México and Central America also included a phylogenetic analysis of the relationships between those species. In their descriptions of two species of Pallisentinae (Eoacanthocephala; Quadrigyridae), Gautam *et al.* (2020) provided an analysis of selected members of that subfamily.

Finally, 2 other papers were published that were not included in the previous discussions. In the first paper, Monks & Richardson (2011) provided a review/summary of the taxonomic groups with the Acanthocephala up to that date. In the second, Doweld (2013) corrected a nomenclatural problem, a case of homonymy between the genus *Gigantorhynchus* Sapelnikov & Malygina (Brachiopoda) (now = *Alairhynchus* Doweld) preoccupied by *Gigantorhynchus* Hamann (Acanthocephala: Paleacanthocephala: Gigantorhynchidae); this paper was not submitted to the section “Acanthocephala”.

TABLE 2. List of papers with checklists of species, in order by number of species reported. Some checklists were part of descriptions of a new species; some lists were reported for geographical regions rather than geopolitical entities. Note: Sp. = number of species reported in that work.

Sp.	Country/Region	Citation
1	Brazil	Bursey <i>et al.</i> 2010
1	México	Guillén-Hernández <i>et al.</i> 2008
1	México	Panti-May <i>et al.</i> 2018
1	New Guinea	Smales 2006b
1	New Guinea	Smales 2006a
2	Australia	Spratt & Beveridge 2016
2	Central America	Salgado-Maldonado 2008
2	Chile	San-Martín-Órdenes <i>et al.</i> 2019
2	México	Martínez-Aquino <i>et al.</i> 2014
2	México	Méndez <i>et al.</i> 2010
3	South America	Santos & Gibson 2015
4	Brazil	Luque <i>et al.</i> 2010
4	México	Ortega-Olivares <i>et al.</i> 2011
6	Ecuador	Smales 2007
8	Argentina	Hernández-Orts <i>et al.</i> 2015
8	Brazil	Muniz-Pereira <i>et al.</i> 2009
9	Turkey	Öktener 2005
10	México; Central America	Pinacho-Pinacho <i>et al.</i> 2015
12	México	García-Prieto <i>et al.</i> 2012
12	México	Salgado-Maldonado 2006
21	Argentina	Fugassa 2015
30	Iran	Tavakol <i>et al.</i> 2015
47	Brazil	Santos <i>et al.</i> 2008
77	México	García-Prieto <i>et al.</i> 2010
82	Australia	Smales & Weaver 2015
87	Argentina	Hernández-Orts <i>et al.</i> 2019
278	Brazil	Campião <i>et al.</i> 2014

In the present work, 5 descriptive papers, 27 checklists, 1 nomenclatural paper, and one review, all including members of Acanthocephala are reviewed. However, not all of these were submitted to the editorial section “Acanthocephala”. Because of this, it is difficult to determine the absolute proportion of manuscripts that were not accepted vs. the number accepted. No papers were published by *Zootaxa* that contained taxonomic actions or descriptions of species from other phyla and of Acanthocephala, but it is unknown whether any such manuscripts dealing with multiple phyla were submitted to other sections but subsequently not accepted. In the section “Acanthocephala”, only one paper was returned to the authors without acceptance (based on the decision of the reviewers).

As mentioned above, a priority of *Zootaxa* is the publication of high-quality manuscripts that further our understanding of the depth and breadth of Global Biodiversity; that also is a priority of this Editor. Thus, the objective was to work with authors to make their manuscript acceptable, not to reject it. To reach this goal, some manuscripts with sound scientific information on the biodiversity of little-studied regions were returned to the authors with the request for major textual or editorial changes—all but 1 of these were subsequently revised, accepted, and published in *Zootaxa*. Of course, some were almost letter-perfect and passed the review process virtually unchanged. To all those authors whose papers provided new knowledge of Acanthocephala, I personally offer my professional gratitude, and I say, sincerely, please send us more!

In closing, the Editorial of *Zootaxa* (Magnolia Press) should be congratulated. All of the papers mentioned in this work presented information from regions where information on the biodiversity in general, and specifically of Acanthocephala, is woefully unknown. Of the regions/countries from which these reports were derived, Australia and México probably are now the best studied regions (2 and 7 papers- approximately 6% and 22% of all papers, respectively), but there are still many unreported species from these regions. The majority of the papers (23 papers, about 72%) provided essential knowledge of acanthocephalans from regions where there were virtually no reports of the biodiversity of this important taxonomic group. In celebrating the 20th anniversary of *Zootaxa*, we are also celebrating 20 years of promoting studies of biodiversity—Happy Anniversary, *Zootaxa*!

References

- Al-Jahdali, M.O. (2010) Helminth parasites from Red Sea fishes: *Neowardula brayi* gen. nov., sp. nov. (Trematoda: Mesometridae Poche, 1926) and *Sclerocollum saudii* sp. nov. (Acanthocephala: Cavisomidae Meyer, 1932). *Zootaxa*, 2681, 57–65.
<https://doi.org/10.11646/zootaxa.2681.1.5>
- Amin, O.M. (1985) Classification. In: Crompton, D.W.T. & Nickol, B.B. (Eds.) *Biology of the Acanthocephala*. Cambridge University Press, Cambridge, England, pp. 27–72.
- Amin, O.M. (2013) Classification of the Acanthocephala. *Folia Parasitologica*, 60, 273–305.
- Birmani, N.A., Dharejo, A.M. & Khan, M.M. (2011) A new species of *Polymorphus* Luhe, 1911 (Acanthocephala: Polymorphidae) in Black Coot, *Fulica atra* (Aves: Rallidae), Pakistan. *Zootaxa*, 2929, 64–68.
<https://doi.org/10.11646/zootaxa.2929.1.7>
- Burseley, C., Rocha, C., Rocha, D., Menezes, V., Ariani, C. & Vrcibradic, D. (2010) New species of *Oochoristica* (Cestoda: Linstowiidae) and other endoparasites of *Trachylepis atlantica* (Sauria: Scincidae) from Fernando de Noronha Island, Brazil. *Zootaxa*, 2715, 45–54.
<https://doi.org/10.11646/zootaxa.2715.1.3>
- Campião, K.M., Morais, D.H., Dias, O.T., Aguiar, A., Toledo, G.d.M., Tavares, L.E.R. & da Silva, R.J. (2014) Checklist of Helminth parasites of Amphibians from South America. *Zootaxa*, 3843, 1–93.
<http://dx.doi.org/10.11646/zootaxa.3843.1.1>
- Chowhan, J.S., Gupta, N.K. & Khera, S. (1988) On *Acanthosentis putitora* sp. nov. and *A. seenghalae* sp. nov. (Acanthocephala: Quadrigyridae) from freshwater fishes of northern India. *Research Bulletin of the Panjab University (Science)*, 39, 197–206.
- Doweld, A. (2013) *Alairhynchus*, a new name for the genus *Gigantorhynchus* Sapelnikov & Malygina 1977 (Brachiopoda: Camarotoechioidea) preoccupied by *Gigantorhynchus* Hamann 1892 (Vermees: Acanthocephala). *Zootaxa*, 3734, 497–498.
<https://doi.org/10.11646/zootaxa.3734.4.8>
- Fugassa, M. (2015) Checklist of helminths found in Patagonian wild mammals. *Zootaxa*, 4012, 271.
<https://doi.org/10.11646/zootaxa.4012.2.3>
- García-Prieto, L., Falcón-Ordaz, J. & Guzmán-Cornejo, C. (2012) Helminth parasites of wild Mexican mammals: list of species, hosts and geographical distribution. *Zootaxa*, 3290, 1–92.
<https://doi.org/10.11646/zootaxa.3290.1.1>
- García-Prieto, L., García-Varela, M., Mendoza-Garfías, B. & Pérez-Ponce de León, G. (2010) Checklist of the Acanthocephala in wildlife vertebrates of Mexico. *Zootaxa*, 2419, 1–50.
<https://doi.org/10.11646/zootaxa.2419.1.1>
- Gautam, N.K., Misra, P.K., Saxena, A.M. & Monks, S. (2020) Description of *Pallisentis thapari* n. sp. and a re-description of *Acanthosentis seenghalae* (Acanthocephala, Quadrigyridae, Pallisentinae) using morphological and molecular data, with analysis on the validity of the sub-genera of *Pallisentis*. *Zootaxa*, 4766, 139–156.
<https://doi.org/10.11646/zootaxa.4766.1.7>
- Guillén-Hernández, S., García-Varela, M. & Pérez-Ponce de León, G. (2008) First record of *Hexaglandula corynosoma* (Travassos, 1915) Petrochenko, 1958 (Acanthocephala: Polymorphidae) in intermediate and definitive hosts in Mexico. *Zootaxa*, 1873, 61–68.
<https://doi.org/10.11646/zootaxa.1873.1.6>
- Hernández-Orts, J., Kuchta, R., Semenas, L., Crespo, E., González, R. & Aznar, F. (2019) An annotated list of the Acanthocephala from Argentina. *Zootaxa*, 4663, 1–64.
<https://doi.org/10.11646/zootaxa.4663.1.1>
- Hernández-Orts, J., Paso Viola, M., García, N., Crespo, E., González, R., García-Varela, M. & Kuchta, R. (2015) A checklist of the helminth parasites of marine mammals from Argentina. *Zootaxa*, 3936, 301–334.
<https://doi.org/10.11646/zootaxa.3936.3.1>
- Luque, J., Muniz-Pereira, L., Siciliano, S., Siqueira, L., Oliveira, M. & Vieira, F. (2010) Checklist of helminth parasites of cetaceans from Brazil. *Zootaxa*, 2548, 57.
<https://doi.org/10.11646/zootaxa.2548.14>

- Martínez-Aquino, A., Mendoza-Palmero, C.A., Aguilar-Aguilar, R. & León, G. (2014) Checklist of helminth parasites of Goodeinae (Osteichthyes: Cyprinodontiformes: Goodeidae), an endemic subfamily of freshwater fishes from Mexico. *Zootaxa*, 3856, 151–191.
<https://doi.org/10.11646/zootaxa.3856.2.1>
- Méndez, O., Salgado-Maldonado, G., Caspeta-Mandujano, J. & Cabañas-Carranza, G. (2010) Helminth parasites of some freshwater fishes from Baja California Sur, Mexico. *Zootaxa*, 2327, 44–50.
<https://doi.org/10.11646/zootaxa.2327.1.3>
- Monks, S. (2001) Phylogeny of the Acanthocephala based on morphological characters. *Systematic Parasitology*, 48, 81–116.
<https://doi.org/10.1023/A:1006400207434>
- Monks, S., Alemán-García, B. & Pulido-Flores, G. (2008) A new species of *Dollfusentis* Golvan, 1969 (Palaeacanthocephala: Illiosentidae) in the striped mojarra, *Eugerres plumieri* (Perciformes: Actinoptergii), from Bahía de Chetumal, Quintana Roo, México. *Zootaxa*, 1853, 45–56.
<https://doi.org/10.11646/zootaxa.1853.1.4>
- Monks, S. & Richardson, D.J. (2011) Phylum Acanthocephala Kohltreuther, 1771. In: Zhang, Z.-Q. (Ed.) *Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness*. Magnolia Press, Auckland, New Zealand, pp. 234–237.
<https://doi.org/10.11646/zootaxa.3148.1.45>
- Muniz-Pereira, L., Vieira, F. & Luque, J. (2009) Checklist of helminth parasites of threatened vertebrate species from Brazil. *Zootaxa*, 2123, 1–45.
<https://doi.org/10.11646/zootaxa.2123.1.1>
- Ökten, A. (2005) A checklist of parasitic helminths reported from sixty-five species of marine fish from Turkey including two new records of monogeneans. *Zootaxa*, 1063, 33–52.
<https://doi.org/10.11646/zootaxa.1063.1.2>
- Ortega-Olivares, M., Hernández Mena, D., León, G. & García-Varela, M. (2011) Helminths of the white ibis, *Eudocimus albus* (Aves: Threskiornithidae) in Mexico. *Zootaxa*, 3088, 15–26.
<https://doi.org/10.11646/zootaxa.3088.1.2>
- Panti-May, J., Digiani, M., Arjona, E., Gurubel-González, Y., Navone, G., Williams, C., Hernández-Betancourt, S. & Robles, M.d.R. (2018) A checklist of the helminth parasites of sympatric rodents from two Mayan villages in Yucatán, México. *Zootaxa*, 4403, 495–512.
<https://doi.org/10.11646/zootaxa.4403.3.4>
- Pinacho-Pinacho, C.D., Sereno-Urbe, A.L., Pérez-Ponce de León, G. & García-Varela, M. (2015) Checklist of the species of *Neoechinorhynchus* (Acanthocephala: Neoechinorhynchidae) in fishes and turtles in Middle-America, and their delimitation based on sequences of the 28s rDNA. *Zootaxa*, 3985, 98–116.
<https://doi.org/10.11646/zootaxa.3985.1.5>
- Salgado-Maldonado, G. (2006) Checklist of helminth parasites of freshwater fishes from Mexico. *Zootaxa*, 1324, 1–357.
<https://doi.org/10.11646/zootaxa.1324.1.1>
- Salgado-Maldonado, G. (2008) Helminth parasites of freshwater fish from Central America. *Zootaxa*, 1915, 29–53.
<https://doi.org/10.11646/zootaxa.1915.1.2>
- San-Martín-Órdenes, J., Muñoz-Leal, S., Garín, C. & González-Acuña, D. (2019) A systematic review of parasites and micropredators of non-avian reptiles (Reptilia=Sauropsida) in Chile. *Zootaxa*, 4543, 301–340.
<https://doi.org/10.11646/zootaxa.4543.3.1>
- Santos, C.P. & Gibson, D. (2015) Checklist of the Helminth Parasites of South American Bats. *Zootaxa*, 3937, 471–499.
<https://doi.org/10.11646/zootaxa.3937.3.3>
- Santos, C.P., Gibson, D.I., Tavares, L.E.R. & Luque, J.L. (2008) Checklist of Acanthocephala associated with the fishes of Brazil. *Zootaxa*, 1938, 1–22.
<https://doi.org/10.11646/zootaxa.1938.1.1>
- Smales, L. (2006a) Helminths Of the Hydromyini (Muridae: Hydromyinae) from Papua New Guinea with the description of a new species Of *Labiobulura* (Nematoda: Ascaridida). *Zootaxa*, 57–68.
<https://doi.org/10.11646/zootaxa.1332.1.4>
- Smales, L. (2006b) A new acuariid species (Spirurida, Acuariidae) and other nematodes from *Hydromys* (Muridae, Hydromyinae) from Papua, Indonesia and Papua New Guinea. *Zootaxa*, 1110, 27–37.
<https://doi.org/10.11646/zootaxa.1110.1.3>
- Smales, L.R. (2007) Acanthocephalans of Amphibians and Reptiles (Anura and Squamata) from Ecuador, with the description of *Pandosentis napoensis* n. sp. (Neoechinorhynchidae) from *Hyla fasciata*. *Zootaxa*, 1445, 49–56.
<https://doi.org/10.11646/zootaxa.1445.1.4>
- Smales, L.R. & Weaver, H.J. (2015) An annotated checklist of Acanthocephala from Australian fish. *Zootaxa*, 3985, 349–374.
<https://doi.org/10.11646/zootaxa.3985.3.2>
- Spratt, D. & Beveridge, I.A.N. (2016) Helminth parasites of Australasian monotremes and marsupials. *Zootaxa*, 4123, 1–198.
<https://doi.org/10.11646/zootaxa.4123.1.1>
- Tavakoli, S., Amin, O., Luus-Powell, W. & Halajian, A. (2015) The acanthocephalan fauna of Iran, a check list. *Zootaxa*, 4033, 237–258.

<https://doi.org/10.11646/zootaxa.4033.2.3>

Thompson, R.C.A., Lymbery, A.J. & Godfrey, S.S. (2018) Parasites at Risk – Insights from an Endangered Marsupial. *Trends in Parasitology*, 34, 12–22.

<https://doi.org/10.1016/j.pt.2017.09.001>

Thomson, S.A., Pyle, R.L., Ah Yong, S.T., Alonso-Zarazaga, M., Ammirati, J., Araya, J.F., Ascher, J.S., Audisio, T.L., Azevedo-Santos, V.M., Bailly, N., Baker, W.J., Balke, M., Barclay, M.V.L., Barrett, R.L., Benine, R.C., Bickerstaff, J.R.M., Bouchard, P., Bour, R., Bourgoïn, T., Boyko, C.B., Breure, A.S.H., Brothers, D.J., Byng, J.W., Campbell, D., Ceriaco, L.M.P., Cernák, I., Cerretti, P., Chang, C.-H., Cho, S., Copus, J.M., Costello, M.J., Cseh, A., Csuzdi, C., Culham, A., D'Elia, G., d'Udekem d'Acoz, C., Daneliya, M.E., Dekker, R., Dickinson, E.C., Dickinson, T.A., van Dijk, P.Paul, Dijkstra, K.-D.B., Dima, B., Dmitriev, D.A., Duistermaat, L., Dumbacher, J.P., Eiserhardt, W.L., Ekrem, T., Evenhuis, N.L., Faille, A., Fernández-Triana, J.L., Fiesler, E., Fishbein, M., Fordham, B.G., Freitas, A.V.L., Friol, N.R., Fritz, U., Frøslev, T., Funk, V.A., Gaimari, S.D., Garbino, G.S.T., Garraffoni, A.R.S., Geml, J., Gill, A.C., Gray, A., Grazziotin, F.G., Greenslade, P., Gutiérrez, E.E., Harvey, M.S., Hazevoet, C.J., He, K., He, X., Helfer, S., Helgen, K.M., van Heteren, A.H., Hita Garcia, F., Holstein, N., Horváth, M.K., Hovenkamp, P.H., Hwang, W.S., Hyvönen, J., Islam, M.B., Iverson, J.B., Ivie, M.A., Jaafar, Z., Jackson, M.D., Jayat, J. P., Johnson, N.F., Kaiser, H., Klitgård, B.B., Knapp, D.G., Kojima, J.-I, Köljalg, U., Kontschán, J., Krell, F.-T., Krisai-Greilhuber, I., Kullander, S., Latella, L., Lattke, J.E., Lencioni, V., Lewis, G.P., Lhano, M.G., Lujan, N.K., Luksenburg, J.A., Mariaux, J., Marinho-Filho, J., Marshall, C.J., Mate, J.F., McDonough, M.M., Michel, E., Miranda, V.F.O., Mitroiu, M.-D., Molinari, J., Monks, S., Moore, A.J., Moratelli, R., Murányi, D., Nakano, T., Nikolaeva, S., Noyes, J., Ohl, M., Oleas, N.H., Orrell, T., Páll-Gergely, B., Pape, T., Papp, V., Parenti, L.R., Patterson, D., Pavlinov, I.Y., Pine, R.H., Poczai, P., Prado, J., Prathapan, D., Rabeler, R.K., Randall, J.E., Rheindt, F.E., Rhodin, A.G.J., Rodríguez, S.M., Rogers, D.C., Roque, F.de-O., Rowe, K.C., Ruedas, L.A., Salazar-Bravo, J., Salvador, R.B., Sangster, G., Sarmiento, C.E., Schigel, D.S., Schmidt, S., Schueler, F.W., Segers, H., Snow, N., Souza-Dias, P.G.B., Stals, R., Stenroos, S., Stone, R.D., Sturm, C.F., Štys, P., Teta, P., Thomas, D.C., Timm, R.M., Tindall, B.J., Todd, J.A., Triebel, D., Valdecasas, A.G., Vizzini, A., Vorontsova, M.S., de Vos, J.M., Wagner, P., Watling, L., Weakley, A., Welter-Schultes, F., Whitmore, D., Wilding, N., Will, K., Williams, J., Wilson, K., Winston, J.E., Wüster, W., Yanega, D., Yeates, D.K., Zaher, H., Zhang, G., Zhang, Z.-Q., Zhou, H.-Z. (2018) Taxonomy based on science is necessary for global conservation. *PLoS Biology*, 16, e2005075.

<https://doi.org/10.1371/journal.pbio.2005075>

Zhang, Z.-Q. (2010) Reviving Descriptive Taxonomy after 250 Years: promising Signs from a Mega-Journal in Taxonomy. *In*: Polaszek, A. (Ed.) *Systema Naturae 250—The Linnaean Ark*. Taylor & Francis, Boca Raton, Florida, pp. 95–107.

<https://doi.org/10.1201/EBK1420095012-C9>

Zhang, Z.-Q. (2011) Accelerating biodiversity descriptions and transforming taxonomic publishing: the first decade of *Zootaxa*. *Zootaxa*, 2896, 1–7.

<https://doi.org/10.11646/zootaxa.2896.1.1>