

## Re-evaluation of the genus *Biapertura* Smirnov, 1971 (Cladocera: Anomopoda: Chydoridae)

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### Abstract

Copyright © 2020 Magnolia Press The genus *Biapertura* Smirnov, 1971, with type species *B. affinis* (= *Lynceus affinis* Leydig, 1860) is re-evaluated, removing the *affinis*-group from polyphyletic *Alona* s. lato. *Biapertura* s. str. is a taxon which could be defined by large size (up to 1.1 mm), having head shield with triangular posterior portion and two connected major head pores, and by having massive postabdomen with over 10 well-developed composite marginal denticles and well-developed lateral fascicles of setulae. Thoracic limbs of *Biapertura* are of *Hexalona*-type, inner distal lobe of limb I bear extremely large, usually claw-like seta 1. Australian species of the genus, *B. kendallensis* (Henry, 1919) and *B. elliptica* (Sinev, 1997), are fully redescribed here. Morphological analysis suggests that *Biapertura* s. str. is a sister-group to *Alona* s. str. A key to seven species of the genus is provided and a discussion of their geographic distribution and habitat type is given.

<http://dx.doi.org/10.11646/zootaxa.4885.3.1>

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### Keywords

Aloninae, *Biapertura*, Cladocera, Distribution, Morphology, Revision, Systematics

### References

- [1] Alonso, M. (1996) Crustacea, Branchiopoda. in: Ramos, M. (Ed.), Fauna Iberica. Museo Nacional de Ciencias Naturales. Consejo Superior de investigaciones Científicas, Madrid, 7, pp. 1-486.
- [2] Alonso, M. & Pretus, J.L. (1989) *Alona iberica*, new species: first evidence of noncosmopolitanism within the *A. karua* complex (Cladocera: Chydoridae). Journal of crustacean Biology, 9 (3), 459-476. <https://doi.org/10.1163/193724089X00449>
- [3] Baird, W. (1843) The natural history of the British Entomostraca. VI. the Annals and Magazine of Natural History, Series 1, 11 (68), 81-95. <https://doi.org/10.1080/03745484309445268>
- [4] Behning, A.L. (1941) the Cladocerans of the Caucasus. Gruzmedgiz Publishing, Tbilisi, 384 pp. [in Russian]
- [5] Birge, E.A. (1892) List of Crustacea Cladocera from Madison, Wisconsin. transactions of the Wisconsin Academy of Science and Arts Letters, 9, 379-398.
- [6] Bledzki, L.A. & Rybak, J.I. (2016) Freshwater Crustacean Zooplankton of europe: Cladocera & Copepoda (Calanoida, Cyclopoida). Key to species identification, with notes on ecology, distribution, methods and introduction to data analysis. Springer International Publishing Cham, 918 pp. <https://doi.org/10.1007/978-3-319-29871-9>
- [7] Brancelj, A. & Sket, B. (1990) Occurrence of Cladocera (Crustacea) in subterranean waters in Yugoslavia. Hydrobiologia, 199, 17-20. <https://doi.org/10.1007/BF00007829>
- [8] Chengalath, R. (1987) The distribution of chydorid Cladocera in Canada. Hydrobiologia, 145 (1), 151-157. <https://doi.org/10.1007/BF02530275>

- [9] Daday, E. (1905) Untersuchungenuber die Susswasser Mikrofauna Paraguays. *Zoologica*, 18 (44), 1-374. <https://doi.org/10.5962/bhl.title.11316>
- [10] Dumont, H.J. & Silva-Briano, M. (2000) Karualona n.gen. (Anomopoda: Chydoridae), with a description of two new species, and a key to all known species. *Hydrobiologia*, 435, 61-82. <https://doi.org/10.1023/A:1004006521874>
- [11] Flössner, D. (1972) Krebstiere, Crustacea (Kiemen- und Blattfüßer, Branchiopoda, Fischläuse, Branchiura). in: Die tierwelt Deutschlands. Vol. 60. VEB Gustav Fischer Verlag, Jena, pp. 1-499.
- [12] Flössner, D. (2000) Die Haplopoda und Cladocera (ohne Bosminidae) Mitteleuropas. Backhuys, Leiden, 428 pp.
- [13] Garibian, P.G., Chertoprud, E.S., Sinev, A.Y., Korovchinsky, N.M. & Kotov, A.A. (2019) Cladocera and Copepoda (Crustacea: Branchiopoda) of the Lake Bolon and its basin (Far East of Russia). *Arthropoda Selecta*, 28 (1), 37-63. <https://doi.org/10.15298/arthsel.28.1.05>
- [14] Henry, M. (1919) On some Australian Cladocera. *Journal and proceedings of the Royal Society of New South Wales*, 52, 463-485.
- [15] Henry, M. (1922) A monograph of the freshwater Entomostraca of New South Wales. Part I. Cladocera. *proceedings of the Linnean Society of New South Wales*, 47, 186, 26-52.
- [16] Herbst, H.V. (1962) Blattfüsskrebse (Phyllopoden: EchteBlattfüsser und Wasserflöhe). Kosmos, Stuttgart, 130 pp.
- [17] Hudec, I. (2010) Anomopoda, Ctenopoda, Haplopoda, Onychopoda (Crustacea: Branchiopoda). Fauna Slovenska iii. VEDA, Bratislava, 496 pp.
- [18] Idris, B.A.G. (1983) Freshwater Zooplankton of Malaysia (Crustacea: Cladocera). Penerbit Universiti Pertanian Malaysia, Syarikat Percetakan Selangor, Kuala Lumpur, 153 pp.
- [19] Korovchinsky, N.M. (2013) Cladocera (Crustacea: Branchiopoda) of South East Asia: history of exploration, taxon richness and notes on zoogeography. *Journal of Limnology*, 72 (S2), 109-124. <https://doi.org/10.4081/jlimnol.2013.s2.e7>
- [20] Kotov, A.A., Sinev, A.Y., Garibian, P.G., Neretina, A.N., Jeong, H.G., Lee, W., Chae, K.S. & Min, G.S. (2018) Recent progress in studies of the Cladocera (Crustacea: Branchiopoda) of South Korea with seven new records for the Korean Peninsula. *Journal of Species Research*, 6, 227-246. <https://doi.org/10.11646/zootaxa.3368.1.4>
- [21] Kotov, A.A., Van Damme, K., Bekker, E.I., Siboualipha, S., Silva-Briano, M., Ortiz, A.A., de la Rosa, R.G. & Sanoamuang, L. (2013) Cladocera (Crustacea: Branchiopoda) of Vientiane province and municipality, Laos. *Journal of Limnology*, 72 (S2), 81-180. <https://doi.org/10.4081/jlimnol.2013.s2.e6>
- [22] Leydig, F. (1860) Naturgeschichte der Daphniden. H. Lauppsche Buchhandlung, Laupp & Siebeck, Tübingen, 252 pp.
- [23] Liévin, F. (1848) Die Branchiopoda der Danziger Geden, ein Beitragzur Fauna der Provinz Preussen. *Neueste Schriften der Naturforschenden Gesellschaft in Danzig*, 2 (4), 1-52.
- [24] Lilljeborg, W. (1901) Cladocera Sueciae. *Nova acta regiae societatis scientiarum upsalensis, Seriei Tertiae*, 19, 1-701.
- [25] Michael, R.G. & Sharma, B.K. (1988) Fauna of india and ajacent countries. *indian Cladocera (Crustacea: Branchiopoda: Cladocera)*. Zoological Survey of India, Calcutta, 262 pp.
- [26] Müller, P.E. (1867) Danmarks Cladocera. *Naturhistorisk tidskrift*, København, 3 (5), 53-240.
- [27] Negrea, S. (1983) Cladocera. *Fauna Republicii Socialiste România*, Bucureşti, Crustacea, 4 (12), 1-399.
- [28] Sars, G.O. (1896) On fresh-water Entomostraca from the neighbourhood of Sydney, partly raised from dried mud. *Archiv for Mathematik og Naturvidenskab Christiania*, 18, 1-81.
- [29] Sars, G.O. (1901) Contributions to the knowledge of the freshwater Entomostraca of South America, as shown by artificial hatching from dried material. 1. Cladocera. *Archiv for Mathematik og Naturvidenskab Christiania*, 23, 1-102.
- [30] Sars, G.O. (1916) The fresh-water Entomostraca of the Cape Province (Union of South Africa). Part 1: Cladocera. *Annals of the South African Museum*, 15, 303-351. <https://doi.org/10.5962/bhl.part.22197>
- [31] Schödler, J.E. (1863) Neue Beiträgezur Naturgeschichte der Cladoceren (Crustacea Cladocera). Verlag von August Hirschwald, Berlin, 80 pp.
- [32] Shiel, R.J. & Dickson, J.A. (1995) Cladocera recorded from Australia. *transactions of the Royal Society of South Australia*, 119, 29-40.
- [33] Sinev, A.Y. (1997) Review of the affinis-group of Alona Baird, 1843, with the description of a new species from Australia (Anomopoda: Chydoridae). *Arthropoda Selecta*, 6 (3-4), 47-58.
- [34] Sinev, A.Y. (1998) Alona ossiana sp. n., a new species of the Alona affinis complex from Brasil, deriving from the collection of G. O. Sars (Anomopoda: Chydoridae). *Arthropoda Selecta*, 7 (2), 103-110.
- [35] Sinev, A.Y. (1999) Alona costata Sars, 1862 versus related palaeotropical species: the first example of close relations between species with a different number of main head pores among Chydoridae (Crustacea: Anomopoda). *Arthropoda Selecta*, 8 (3), 131-148.

- [36] Sinev, A.Y. (2000) Postembrial development of male and abnormal sexual individuals of *Alona affinis* (Leydig, 1860) (Anomopoda, Chydoridae). *Hydrobiologia*, 437, 197–202. <https://doi.org/10.1023/A:1026515226055>
- [37] Sinev, A.Y. (2004) *Armatalona* gen. n.—a new genus of subfamily Aloninae (Anomopoda, Chydoridae), separated from genus *Alona* Baird, 1840. *Hydrobiologia*, 420, 29–47. <https://doi.org/10.1023/B:HYDR.0000027723.38965.11>
- [38] Sinev, A.Y. (2009) Cladocerans of the *Alona affinis* (Leydig, 1860) group from South Africa. *Zootaxa*, 1990 (1), 41–54. <https://doi.org/10.11646/zootaxa.1990.1.3>
- [39] Sinev, A.Y. (2012) *Alona kotovi* sp. nov., a new species of Aloninae (Cladocera: Anomopoda: Chydoridae) from South Vietnam. *Zootaxa*, 3475 (1), 45–54. <https://doi.org/10.11646/zootaxa.3475.1.4>
- [40] Sinev, A.Y. (2013) Cladocerans of *Alona affinis* group (Cladocera: Anomopoda: Chydoridae) from North America. *Zootaxa*, 3693 (3), 329–343. <https://doi.org/10.11646/zootaxa.3693.3.3>
- [41] Sinev, A.Y. (2015) Revision of the pulchella-group of *Alona* s. lato leads to its translocation to *Ovalona* Van Damme et Dumont, 2008 (Branchiopoda: Anomopoda: Chydoridae). *Zootaxa*, 4044 (4), 451–492. <https://doi.org/10.11646/zootaxa.4044.4.1>
- [42] Sinev, A.Y. (2016) Key for identification of Cladocera of the subfamily Aloninae (Anomopoda: Chydoridae) from South-East Asia. *Zootaxa*, 4200 (4), 451–486. <https://doi.org/10.11646/zootaxa.4200.4.1>
- [43] Sinev, A.Y. (2018) Genus *Campnocercus* (Cladocera: Anomopoda: Chydoridae) in North America. *Zootaxa*, 4459 (3), 583–599. <https://doi.org/10.11646/zootaxa.4459.3.11>
- [44] Sinev, A.Y. (2020) Revision of the elegans-group of *Alona* s. lato and its status as a subgenus of *Coronatella* Dybowski & Grochowski, 1894 (Cladocera: Anomopoda: Chydoridae). *Zootaxa*, 4732 (2), 501–526. <https://doi.org/10.11646/zootaxa.4732.4.1>
- [45] Sinev, A.Y. & Coronel, J.S. (2006) A new species of genus *Alona* Baird, 1843 (Cladocera: Anomopoda: Chydoridae) from the Bolivian Andes. *Archiv für Hydrobiologie, Monographiae Studiae*, Supplement 15/114, 395–408.
- [46] Sinev, A.Y. & Dumont, H.J. (2016) Revision of costata-group of *Alona* s. lato (Cladocera: Anomopoda: Chydoridae) confirms its generic status. *European Journal of Taxonomy*, 233, 1–38. <https://doi.org/10.5852/ejt.2016.223>
- [47] Sinev, A.Y. & Elmour-Loureiro, L.M.A. (2010) Three new species of chydorid cladocerans of subfamily Aloninae (Branchiopoda: Anomopoda: Chydoridae) from Brazil. *Zootaxa*, 2390 (1), 1–25. <https://doi.org/10.11646/zootaxa.2390.1.1>
- [48] Sinev, A.Y., Gu, Y. & Han, B. (2015) Cladocera of Hainan Island, China. *Zootaxa*, 4006 (3), 569–585. <https://doi.org/10.11646/zootaxa.4006.3.9>
- [49] Sinev, A.Y. & Hollwedel, W. (2005) Translocation of *Alona muelleri* Richard, 1897 into the genus *Karualona* Dumont & Silva-Briano, 2000 (Branchiopoda: Anomopoda: Chydoridae). *Arthropoda Selecta*, 14, 93–101.
- [50] Sinev, A.Y., Karabanov, D.P. & Kotov, A.A. (2020) A new North Eurasian species of the *Alona affinis* complex (Cladocera: Chydoridae). *Zootaxa*, 4767 (1), 115–137. <https://doi.org/10.11646/zootaxa.4767.1.5>
- [51] Sinev, A.Y. & Korovchinsky, N.M. (2013) Cladocera (Crustacea: Branchiopoda) of Cat Tien National Park, South Vietnam. *Journal of Limnology*, 70 (2), 125–141. <https://doi.org/10.4081/jlimnol.2013.s2.e8>
- [52] Sinev, A.Y. & Kotov, A.A. (2012) New and rare Aloninae (Cladocera: Anomopoda: Chydoridae) from Indochina. *Zootaxa*, 3334 (1), 1–28. <https://doi.org/10.11646/zootaxa.3334.1.1>
- [53] Sinev, A.Y. & Shiel, R.J. (2008) Redescription of *Alona macracantha* Smirnov and Timms, 1983 and its assignment to *Maraura* gen. nov. (Cladocera: Anomopoda: Chydoridae). *Journal of Natural History*, 42 (45–46), 2809–2824. <https://doi.org/10.1080/00222930802361048>
- [54] Sinev, A.Y., Silva-Briano, M. (2012) Cladocerans of genus *Alona* Baird, 1843 (Cladocera: Anomopoda: Chydoridae) and related genera from Aguascalientes State, Mexico. *Zootaxa*, 3569 (1), 1–24. <https://doi.org/10.11646/zootaxa.3569.1.1>
- [55] Sinev, A.Y., Van Damme, K. & Kotov, A.A. (2005) Redescription of tropical-temperate cladocerans *Alona diaphana* King, 1853 and *Alona davidi* Richard, 1895 and their translocation to *Leberis* Smirnov, 1989 (Branchiopoda: Anomopoda: Chydoridae). *Arthropoda Selecta*, 14 (3), 183–205.
- [56] Sinev, A. Y. & Yusoff, F. M. (2018) New data on Cladocera (Crustacea: Branchiopoda) of Sabah State, Borneo Island, Malaysia. *Zootaxa*, 4438 (2), 362–372. <https://doi.org/10.11646/zootaxa.4438.2.10>
- [57] Smirnov, N.N. (1971) Chydoridae of the world fauna. Fauna SSSR. Rakoobraznie, 1 (2), 1–531. [in Russian]
- [58] Smirnov, N.N. & Timms, B. (1983) A revision of the Australian Cladocera. *Records of the Australian Museum*, Supplement 1, 1–132. <https://doi.org/10.3853/j.0812-7387.1.1983.103>
- [59] Sousa, F.D.R., Elmoor-Loureiro, L.M.A. & Santos, S. (2016a) New findings of Hexalona-branch representatives in Brazil, with a description of *prenda* gen. nov. (Crustacea: Anomopoda: Aloninae). *Journal of Natural History*, 50 (43–44), 2727–2768. <https://doi.org/10.1080/00222933.2016.1208302>

- [60] Sousa, F.D.R., Elmoor-Loureiro, L.M.A. & Santos, S. (2016b) Position of the dentifera-group in the Coronatella-branch and its relocation to a new genus: *Magnospina* gen. n. (Crustacea, Chydoridae, Aloninae). *ZooKeys*, 586, 95-119. <https://doi.org/10.3897/zookeys.586.8209>
- [61] Stingelin, T. (1895) Die Cladoceren der Umgebung von Basel. *Revue Suisse de Zoologie*, 3, 161-274. <https://doi.org/10.5962/bhl.title.53708>
- [62] Stingelin, T. (1906) Neue Beiträge zur Kenntnis der Cladocerfauna der Schweiz. *Revue Suisse de Zoologie*, 14, 317-387. <https://doi.org/10.5962/bhl.part.8298>
- [63] Tiang-Nga, S., Sinev, A.Y. & Sanoamuang, L. (2016) A new species of the genus *Anthalona* Van Damme, Sinev & Dumont, 2011 (Cladocera: Anomopoda: Chydoridae) from North-East Thailand. *Zootaxa*, 4150 (1), 93-100. <https://doi.org/10.11646/zootaxa.4150.1.6>
- [64] Van Damme, K., Brancelj, A. & Dumont, H.J. (2009) Adaptations to the hyporheic in Aloninae (Crustacea: Cladocera): allocation of *Alona protzi* Hartwig, 1900 and related species to *phreatalona* gen. nov. *Hydrobiologia*, 618, 1-34. <https://doi.org/10.1007/s10750-008-9607-6>
- [65] Van Damme, K. & Dumont, H.J. (2008a) Further division of *Alona* Baird, 1843: separation and position of Coronatella Dybowski & Grochowski and *Ovalona* gen.n. (Crustacea: Cladocera). *Zootaxa*, 1960 (1), 1-44. <https://doi.org/10.11646/zootaxa.1960.1.1>
- [66] Van Damme, K. & Dumont, H.J. (2008b) The 'true' genus *Alona* Baird, 1843 (Crustacea: Cladocera: Anomopoda): characters of the *A. quadrangularis*-group and description of a new species from Democratic Republic Congo. *Zootaxa*, 1943, 1-25.
- [67] Van Damme, K. & Eggermont, H. (2011) The Afromontane Cladocera (Crustacea: Branchiopoda) of the Rwenzori (Uganda—D. R. Congo): taxonomy, ecology and biogeography. *Hydrobiologia*, 676, 57-100. <https://doi.org/10.1007/s10750-011-0892-0>
- [68] Van Damme, K., Kotov, A.A. & Dumont, H.J. (2010) A checklist of names in *Alona* Baird 1843 (Crustacea: Cladocera: Chydoridae) and their current status: an analysis of the taxonomy of a lump genus. *Zootaxa*, 2330 (1), 1-63. <https://doi.org/10.11646/zootaxa.2330.1.1>
- [69] Van Damme, K. & Maiphae, S. (2013) *Salinalona* gen. nov., an euryhaline chydorid lineage (Crustacea: Branchiopoda: Cladocera: Anomopoda) from the Oriental region. *Journal of Limnology*, 72 (S2), 142-173. <https://doi.org/10.4081/jlimnol.2013.s2.e9>
- [70] Van Damme, K. & Sinev, A.Y. (2011) A new genus of cave-dwelling microcrustaceans from the Dinaric Region (south-east Europe): adaptations of true stygobitic Cladocera (Crustacea: Branchiopoda). *Zoological Journal of the Linnean Society*, 161, 31-52. <https://doi.org/10.1111/j.1096-3642.2010.00639.x>
- [71] Van Damme, K., Sinev, A.Y. & Dumont, H.J. (2011) Separation of *Anthalona* gen.n. from *Alona* Baird, 1843 (Branchiopoda: Cladocera: Anomopoda): morphology and evolution of scraping stenothermic alonines. *Zootaxa*, 2875 (1), 1-64. <https://doi.org/10.11646/zootaxa.2875.1.1>
- [72] Werestchagin, G.Y. (1911) Zur Cladocerfauna des Nowgorodischen Gouvernements (Waldayscher Bezirk). *Zoologischer Anzeiger*, 37, 553-561.