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Two new stygobiotic species of *Elaphoidella* (Crustacea: Copepoda: Harpacticoida) with comments on geographical distribution and ecology of harpacticoids from caves in Thailand

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Abstract

Elaphoidella thailandensis sp. nov. and *E. jaesornensis* sp. nov., collected during an investigation of cave-dwelling copepod fauna in the northern part of Thailand, are described and figured herein. The new species were collected from pools filled by percolating water from the unsaturated zone of a karstic aquifer in Phitsanulok and Lampang Provinces, respectively. *Elaphoidella thailandensis*, from Tham Khun cave, is distinguished from its congeners by the two-segmented endopod of pediger 1, the absence of endopod on pediger 4, and the setal formula 4, 5, 6 for the distal exopodal segment of pedigers 2–4. *Elaphoidella jaesornensis*, from Tham Phar Ngam cave, is distinguished from its most closely related species, *E. namnaoensis* Brancelj, Watiroyram & Sanoamuang, 2010, by the armature formula of the endopod of pedigers 2–5. The geographical distribution and ecology of Harpacticoida from Thai caves is also presented.

Key words: karstic caves, zoogeography, Southeast Asia, stygobiont, subterranean

Introduction

The genus *Elaphoidella* Chappuis, 1929 is distributed worldwide, with more than 200 known species (for a complete list see Wells 2007). They inhabit various habitats in both epigeal and hypogean environments throughout different zoogeographic regions. The genus is characterized by a large number of stygobiotic taxa (Boxshall & Defaye 2008; Mori & Brancelj 2008; Galassi *et al.* 2009). Many of them are common in percolating water from unsaturated karstic habitats (i.e. epikarst) in the temperate zone (Brancelj 2009).

In the past, information on the species of *Elaphoidella* from Southeast Asia was limited and sporadic. Chappuis (1928) reported three new species from Java: *E. bromeliacola* (Chappuis, 1928) collected from phytotelmata (water bodies held by plants) of *Colocasia glabra* Banks ex Gaertn, *Pandanus* sp. (Pandanaceae); *E. malayica* (Chappuis, 1928) from phytotelmata of *Billbergia pyramidalis* (Sims) Lindl (Bromeliaceae); and *E. javaensis* (Chappuis, 1928) from moist moss. Three years later, Chappuis (1931) reported eight *Elaphoidella* species from phytotelmata of *C. glabra* and from a thermal spring in Java and Sumatra: *E. grandidieri* (Guerne & Richard, 1893), *E. bidens* (Schmeil, 1894), *E. longipedis* Chappuis, 1931, *E. thienemanni* Chappuis, 1931, *E. similis* Chappuis, 1931, *E. cornuta* Chappuis, 1931, *E. elegans* Chappuis, 1931 and *E. intermedia* Chappuis, 1931. Considering their ecology, only *E. intermedia* could be considered as a potentially subterranean species, while the rest of the species are epigeal, living in phytotelmata or in surface water. However, during recent investigations of caves in Thailand it appears that they are frequently found in epikarst, where they have viable populations (Watiroyram, pers. observ.). From this point of view they can be considered as stygophilic taxa with very wide ecological tolerance (pers. observ. of the authors). Apart from the already listed species from the Indonesian islands, there are more records from research expeditions to Vietnam and Thailand. Borutzky (1967) described a second subterranean species, *E. vietnamica* Borutzky, 1967, from a cavern water reservoir in Vietnam. A third

References

- Apostolov, A. (1985) Étude sur quelques copépodes harpacticoides du genre *Elaphoidella*. Chappuis, 1929 avec une révision du genre. *Acta Musei Macedonici Scientiarum Naturalium, Skopje*, 17, 133–163.
- Apostolov, A. (2007) Nortes sur les harpacticoides cavernicoles (Crustacea: Copepoda) de Vietnam du nord. *Historia Naturalis Bulgarica*, 18, 65–73.
- Borutzky, E.V. (1967) Freshwater Copepoda Harpacticoida of North Vietnam. *Zoologicheskii Zhurnal SSSR*, 46, 1015–1023.
- Boxshall, G.A. & Defaye, D. (2008) Global diversity of copepods (Crustacea: Copepoda) in freshwater. *Hydrobiologia*, 595, 195–207.
<http://dx.doi.org/10.1007/s10750-007-9014-4>
- Brancelj, A. (2002) Microdistribution and high diversity of Copepoda (Crustacea) in a small cave in central Slovenia. *Hydrobiologia*, 477, 59–72.
<http://dx.doi.org/10.1023/A:1021043014879>
- Brancelj, A. (2006) The epikarst habitat in Slovenia and the description of a new species. *Journal of Natural History*, 40, 403–413.
<http://dx.doi.org/10.1080/00222930600646608>
- Brancelj, A. (2009) Fauna of an unsaturated karstic zone in central Slovenia: two new species of Harpacticoida (Crustacea: Copepoda), *Elaphoidella millenni* n. sp. and *E. tarmani* n. sp., their ecology and morphological adaptations. *Hydrobiologia*, 621, 85–104.
<http://dx.doi.org/10.1007/s10750-008-9634-3>
- Brancelj, A. & Culver, D.C. (2005) Epikarst communities. In: Culver, D.C. & White, W.B. (Eds.), *Encyclopedia of Caves*. Elsevier Academic Press, Amsterdam, pp. 223–229.
- Brancelj, A., Watirogram, S. & Sanoamuang, L. (2010) The first record of cave-dwelling Copepoda from Thailand and description of a new species: *Elaphoidella namnaoensis*, n. sp. (Copepoda, Harpacticoida). *Crustaceana*, 83, 779–793.
<http://dx.doi.org/10.1163/001121610X502894>
- Bruno, M.C. & Cottarelli, V. (1999) Harpacticoids from groundwaters in the Philippines: *Parastenocaris mangyans*, new species, *Epactophanes philippinus*, new species, and redescription of *Phyllognathopus bassoti* (Copepoda). *Journal of Crustacean Biology*, 19, 510–529.
<http://dx.doi.org/10.2307/1549260>
- Chappuis, P.A. (1928) Neue Harpacticiden aus Java. *Treubia*, 10, 271–283.
- Chappuis, P.A. (1931) Copepoda Harpacticoida der Deutschen Limnologischen Sunda- Expedition. *Archiv für Hydrobiologie*, Supplement 8, 512–584.
- Cottarelli, V., Bruno, M.C. & Berera, R. (2006) A new species of *Parastenocaris* from Mindoro Island, Philippines: *Parastenocaris distincta* sp. nov. (Crustacea: Copepoda: Harpacticoida: Parastenocarididae). *Zootaxa*, 1368, 57–68.
- Cottarelli, V., Bruno, M.C. & Berera, R. (2010) First record of Parastenocarididae from Thailand and description of a new genus (Copepoda: Harpacticoida). *Journal of Crustacean Biology*, 30, 478–494.
<http://dx.doi.org/10.1651/09-3201.1>
- Galassi, D.M.P., Huys, R. & Reid, J.W. (2009) Diversity, ecology and evolution of groundwater copepods. *Freshwater Biology*, 54, 691–708.
<http://dx.doi.org/10.1111/j.1365-2427.2009.02185.x>
- Huys, R. & Boxshall, G.A. (1991) *Copepod evolution*. The Ray Society, London, 468 pp.
- Lang, K. (1948) *Monographie der Harpacticiden*. Håkan Ohlsson, Lund, 1682 pp.
- Mori, N. & Brancelj, A. (2008) Distribution and habitats preferences of species within the genus *Elaphoidella* Chappuis, 1929 (Crustacea: Copepoda: Harpacticoida) in Slovenia. *Zoologischer Anzeiger*, 247, 85–94.
<http://dx.doi.org/10.1016/j.jcz.2007.01.002>
- Pesce, G.L. (2010) *Copepod web portal*. Available from: <http://www.lucioesce.net/copepods/arpa/elaph.htm> (accessed 2 September 2011)
- Pesce, G.L. & Apotolov, A. (1985) *Elaphoidella margaritae* sp. n., a new phreatobitic harpacticoid from subterranean waters of Thailand (Crustacea, Copepoda, Canthocamptidae). *Acta Zoologica Bulgarica*, 28, 70–75.
- Stoch, F., Gerecke, R., Pieri, V., Rossetti, G. & Sambugar, B. (2011) Exploring species distribution of spring meiofauna (Annelida, Acari, Crustacea) in the south-eastern Alps. *Journal of Limnology*, 70, 65–76.
<http://dx.doi.org/10.4081/jlimnol.2011.s1.65>
- Walter, T.C. (2010) *WoRMS, world register of marine species*. Available from: <http://www.marinespecies.org/copepoda/aphia.php?p=taxdetails&id=347106> (accessed 2 September 2011)
- Wells, J.B.J. (2007) An annotated checklist and keys to the species of Copepoda Harpacticoida (Crustacea). *Zootaxa*, 1568, 1–872.