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New species of *Hebefustis* Siebenaller & Hessler 1977 (Isopoda, Asellota, Nannoniscidae) from the Clarion Clipperton Fracture Zone (equatorial NE Pacific)

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Abstract

Macrofaunal collections obtained during the French-German BIONOD expedition to the Clarion Clipperton Fracture Zone (CCFZ), equatorial NE Pacific, in spring 2012 yielded two new nannoniscid species, *Hebefustis juansenii* **sp. n.** and *H. vecino* **sp. n.**, which are described in the current paper. The number and position of posterolateral spines of the pleotelson distinguishes the two new species from all other species in the genus. Both species are similar to each other differ, though, in the length of maxilliped epipodite, the presence of a robust spine on pereonite 2 (in *H. juansenii* **sp. n.**) as well as the shape of pereonite 4 anterior margin. They also resemble *H. primitivus* Menzies, 1962 but can be differentiated from the latter by the shape of lateral margins of pereonites 1–4 and the setation and shape of male pleopod 1. A distribution map and a taxonomic key to all known species in the genus are provided, as well as a checklist of known nannoniscid species from the Pacific is presented.

Key words: Janiroidea*, Hebefustis,* new species, macrobenthos, distribution, abyssal, polymetallic nodules

Introduction

In the light of accelerating anthropogenic pressure on deep-sea resources (e.g., seafloor minerals, hydrocarbon and oil), a basic knowledge of species' taxonomy, life history and distribution is key to estimating faunal responses to predicted disturbance (Ramirez-Llodra *et al.* 2010). Assessing biogeographic ranges in the deep sea is extremely challenging though, partly due to its immense size; it is more than a half of the world's surface, less than 0.01% sampled and sampling is remarkably unevenly distributed. For example, large parts of the central Pacific remain poorly known (Stuart *et al.* 2008; but see Thistle & Wilson 1996). Furthermore, the majority of deep-sea isopod species is currently undescribed and thus excluded from biodiversity and biogeographic studies (e.g., Brandt *et al.* 2005; Brandt *et al.* 2007).

The Clarion and Clipperton Fracture Zone (CCFZ, equatorial NE Pacific, Fig. 1), is receiving increasing economical attention as it represents one of the commercially most attractive polymetallic nodule fields (Thiel 2001). First considerations to use these nodules as a potential source for metals such as Mn, Ni, and Cu started in the late 1960s and 70s, though technological advances as well as a growing demand for minerals and metals led to a recent resurgence of interest in deep-sea nodule mining (e.g., Wiedicke *et al.* 2012).

During the joint French-German BIONOD expedition sampling was conducted in the French and German licence area of the CCFZ in order to get a better understanding of the benthic communities inhabiting this environment. BIONOD macrofaunal collections comprised a high proportion of isopod crustaceans and among these the family Nannoniscidae Hansen, 1916 were one of the most dominant groups (Janssen *et al.* 2012).

The nannoniscid genus *Hebefustis* Siebenaller & Hessler 1977 currently includes 14 formally named species with most species being recorded from the Atlantic Ocean (Siebenaller & Hessler 1977; Kaiser 2008; Wilson 2008; Brix & Svavarsson 2010; incl. this study; Fig. 1). To date, only two *Hebefustis* species have been described from the Pacific Ocean (viz.: *Hebefustis vitjazi* Mezhov, 1986 and *Hebefustis robustus* [Birstein, 1963a]). However, past

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12a. Pereonites 1–4 anterolateral margins rounded; uropods not visible from dorsal view 13
12b. Pereonites 1–4 anterolateral margins acute; uropods clearly projecting beyond pleotelson posterior margin . . . . . *H. primitivus*
13a. Pereonite 2 antero-lateral margin with a strong spine in both male and female, maxilliped epipodite reaching upper third of palpal article 2 . . . . . *H. juansenii* **sp. n.**
13b. Pereonite 2 antero-lateral margin without a strong spine, maxilliped epipodite reaching mid of palpal article 3 . . . . . *H. vecino* **sp. n.**

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References

Beaulieu, S.E. (2001) Life on glass houses: sponge stalk communities in the deep sea. *Marine Biology*, 138, 803–817. http://dx.doi.org/10.1007/s002270000500

Birstein, J.A. (1963a) Deep-sea isopod crustaceans of the northwestern Pacific Ocean. *Institute of Oceanology of the U.S.S.R.*, Akademii Nauk, Moscow, 213 pp. [in Russian, with English summary]

Birstein, J.A. (1963b) Isopoda (Crustacea, Isopoda) from the ultraabyssal zone of the Bougainvielle Trench. *Zoologischeskii Zhurnal*, 42, 814–834. [in Russian]

Birstein, J.A. (1970) Additions to the fauna of Isopods (Crustacea, Isopoda) of the Kurile-Kamchatka Trench. Part I. *Academy of Sciences of the USSR, P.P. Shirshov Institute of Oceanology*, Moscow, 86 (Fauna of the Kurile-Kamchatka Trench and its Environment), 292–340.

Brandt, A., Brenke, N., Andres, H.G., Brix, S., Guerrero-Kommritz, J., Mühlenhardt-Siegel, U. & Wägele, J.W. (2005). Diversity of peracarid crustaceans (Malacostraca) from the abyssal plain of the Angola Basin. *Organisms Diversity & Evolution*, 5, 105–112.

Brandt, A., Gooday, A.J., Brandão, S.N., Brix, S., Brökeland, W., Cedhagen, T., Choudhury, M., Cornelius, N., Danis, B., De Mesel, I., Diaz, R.J., Gillan, D.C., Hilbig, B., Howe, J., Janussen, D., Kaiser, S., Linse, K., Malyutina, M., Pawlowski, J., Raupach, M. & Vanreusel, A. (2007) First insights into the biodiversity and biogeography of the Southern Ocean deep sea. *Nature*, 447, 307–311. http://dx.doi.org/10.1038/nature05827

Brenke, N. (2005) An epibenthic sledge for operations on marine soft bottom and bedrock. *Journal of the Marine Technology Society*, 39 (2), 10–19. http://dx.doi.org/10.4031/002533205787444015

Brix, S. & Svavarsson, J. (2010) Distribution and diversity of desmosomatid and nannoniscid isopods (Crustacea) on the Greenland-Iceland-Faeroe Ridge. *Polar Biology*, 33, 515–530. http://dx.doi.org/10.1007/s00300-009-0729-8

George, R.Y. (2001) Desmosomatidae and Nannoniscidae (Crustacea, Isopoda, Asellota) from bathyal and abyssal depths off North Carolina and their evolution. *Journal of Natural History*, 35, 1831–1859. http://dx.doi.org/10.1080/00222930152667131

Gooday, A.J. (1984) Records of deep-sea rhizopod tests inhabited by metazoans in the North-east Atlantic. *Sarsia*, 69, 45–53.

Gurjanova, E. (1950) K faune ravonogich rakov (Isopoda) Tichogo okeana V. Isopod po sboram Kamchatskoi morskoi stasii Gosudarsevennogo gidrologischskogo in-ta. *Akademiya Nauk SSSR. Zoologischskii Instituta, Isseldovaniia dal Nevostochnykh Morei SSSR*, 2, 281–292.

Hansen, H.J. (1916) Crustacea Malacostraca: The order Isopoda. *Danish Ingolf Expedition*, 3 (5), 1–262.

Hessler, R.R. (1970) The Desmosomatidae (Isopoda, Asellota) of the Gay Head-Bermuda Transect. *Bulletin of the Scripps Institution of Oceanography*, 15, 1–185.

Janssen, A., Kaiser, S., Albers, L. Mohrbeck, I., Miljutin, D., Larsen, K., Neal, L., Rogacheva, A, Menot, L. & Rühlemann, C. (2012) Deep-sea treasures - macrobenthic assemblages of the tropical Pacific nodule province (Clarion-Clipperton Fracture Zone). 13th *Deep-sea Biology Symposium, Wellington, NZ*, Abstract Volume, 1–221.

Kaiser, S. (2008) First record and new species of the genus *Hebefustis* Siebenaller & Hessler, 1977 (Isopoda: Asellota: Nannoniscidae) from the deep Weddell Sea Basin. *Zootaxa*, 1866, 467–481.

Kussakin, O.G. (1999) *Morskye I solonovatovodnye ravnonogie rakoobrasnye (Isopoda) cholodnix I umerennix vod severnogo polushariya [Marine and brackishwater likefooted Crustacea (Isopoda) from the cold and temperate waters of the Northern Hemisphere] Suborder Asellota. Part 2. Families Joeropsididae, Nannoniscidae, Desmosomatidae, Macrostylidae). Opredeliteli po Faune SSSR [Determinants of the Fauna], Izdavaemye Zoologischeskim Institutom Rossiiskiya Akademiya Nauk. (Ed A. F. Alimov.) Vol. III.* Nauka, St. Petersburg, 383 pp.

Latreille, P.A. (1803) Histoire Naturelle des Crustaces et des Insectes. In: Volume 5 of G.L.L. de Buffon, 1802-1805. *Histoire Naturelle*, nouvelle edition, accompagnee des notes.

Levin, L.A., & Thomas, C.L. (1988) The ecology of xenophyophores (Protista) on eastern Pacific seamounts. *Deep-Sea Research Part A. Oceanographic Research Papers*, 35 (12), 2003–2027.
http://dx.doi.org/10.1016/0198-0149(88)90122-7

Menzies, R.J. (1962) The isopods of abyssal depths in the Atlantic Ocean. *Vema Research Series,* 1, 79–206.

Menzies, R.J. & George, R.Y. (1972) Isopod Crustacea of the Peru-Chile Trench. *Anton Bruun Report*, 9, 1–124.

Mezhov, B.V. (1986) Bathyal and abyssal Nannoniscidae and Desmosomatidae (Isopoda, Asellota) from Alaska Bay. *Archives of the Zoological Museum*, *Moscow State University*, 24 (1986), 126–167. [in Russian]

Ramirez-Llodra, E., Tyler, P.A., Baker, M.C., Bergstad, O.A., Clark, M.R., Escobar, E., Levin, L.A., Menot, L., Rowden, A.A., Smith, C.R. & Van Dover, C.L. (2011) Man and the Last Great Wilderness: Human Impact on the Deep Sea. *PLoS ONE*, 6 (8), e22588.
http://dx.doi.org/10.1371/journal.pone.0022588

Riehl, T. & Brandt, A. (2010) Descriptions of two new species in the genus *Macrostylis* Sars, 1864 (Isopoda, Asellota, Macrostylidae) from the Weddell Sea (Southern Ocean), with a synonymisation of the genus *Desmostylis* Brandt, 1992 with *Macrostylis*. *ZooKeys*, 57, 9–49.
http://dx.doi.org/10.3897/zookeys.57.310

Sars, G.O. (1870) Nye Dybvandscrustaceer fra Lofoten. *Forhandlinger i Videnskaps-selskabet I Christiania*, 1869, 205–221.

Sars, G.O. (1897) Isopoda. Part VII, VIII. Desmosomidae, Munnopsidae. *An account of the Crustacea of Norway with short descriptions and figures of all the species*, 117–144.

Sars, G.O. (1899) *An account of the Crustacea of Norway: with short descriptions and figures of all the species: Vol. 2. Isopoda*. Bergen Museum, Bergen, Norway, 270 pp.

Siebenaller, J.F. & Hessler, R.R. (1977) The Nannoniscidae (Isopoda, Asellota): *Hebefustis* n. gen. and *Nannoniscoides* Hansen. *Transactions of the San Diego Society of Natural History*. 19, 17–44.

Schultz, G.A. (1966) Submarine canyons of southern California. Part 4. Systematics: Isopoda. *Allan Hancock Pacific Expeditions*, 27, 1–56.

Stuart, C.T., Martinez Arbizu, P., Smith, C.R., Molodtsova, T., Brandt, A., Etter, R.J., Escobar-Briones, E., Fabri, M.C. & Rex, M.A. (2008) CeDAMar global database of abyssal biological sampling. *Aquatic Biology*, 4, 143–145.
http://dx.doi.org/10.3354/ab00097

Thiel, H. (2001) Use and protection of the deep sea—an introduction. *Deep-Sea Research Part II*, 48, 3427–3431.
http://dx.doi.org/10.1016/s0967-0645(01)00050-9

Thistle D. & Wilson G.D.F. (1996) Is the HEBBLE isopod fauna hydrodynamically modified? A second test. *Deep-Sea Research Part I*, 43 (4), 545–554.
http://dx.doi.org/10.1016/0967-0637(96)00014-3

Vanhöffen, E. (1914) Die Isopoden der Deutschen Südpolar Expedition 1901-1903. *Deutsche Südpolar Expedition 15, Zoologie*, 7 (4), 447–598.

Wiedicke, M., Kuhn, T., Rühlemann, C., Schwarz-Schampera, U. & Vink, A. (2012) Marine mineralische Rohstoffe der Tiefsee - Chance und Herausforderung. *Commodity Top News*, 40, 1–10.

Wilson, G.D.F. (2008) A review of taxonomic concepts in the Nannoniscidae (Isopoda, Asellota), with a key to the genera and a description of *Nannoniscus oblongus* Sars. *Zootaxa*, 1680, 1–24.

Wolff, T. (1962) The systematics and biology of bathyal and abyssal Isopoda Asellota. *Galathea Report*, 6, 1–320. [19 tables]