

New data on the amphipod fauna of the hydrothermally active submarine Piip Volcano (Bering Sea)

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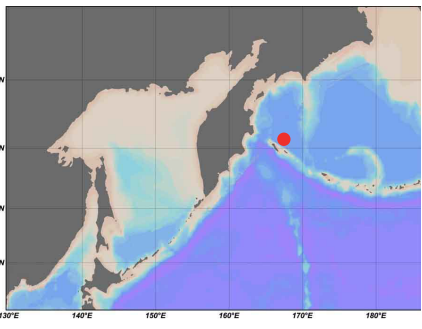
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INTRODUCTION

The submarine Piip Volcano (southwestern Bering Sea, 368–495m) hosts the northernmost hydrothermal vents in the Pacific region. The Piip Volcano is characterized by the presence of anhydrite or carbonate chimneys emanating hydrothermal fluids with recorded temperatures up to 132 °C with methane predominance (up to 98%) and elevated heavy metal concentration.

Among the 131 species recorded on the volcano, there were at least 12 amphipod species (11 genera) from 10 families (Rybakova et al., 2023). Amphipod species were among the most common animals in the vent communities, some of which formed dense aggregations in bacterial mats.



MATERIAL and METHODS

Benthic hydrothermal vent communities were explored during the two cruises of the RV *Akademik M.A. Lavrentyev* using the ROV *Comanche 18* (June 2016 and 2018). The samples were collected using the slurp-gun, net or mechanical arm of the ROV.

Morphological analysis was performed using stereomicroscope Nikon SMZ25, microscope Axio Imager.A2 and SEM Zeiss Sigma 300 VP.

Nine lysianassoid and two *Byblis* specimens were used for genetic analysis. Partial sequences of mitochondrial cytochrome c oxidase subunit I (COI) for *Byblis* specimens and COI, 16S and 28S rRNA gene sequences for lysianassoid specimens were obtained. Phylogenetic trees were generated using Bayesian inference in *MrBayes* v. 3.2 and Maximum Likelihood in IQ-TREE software for 28S matrix of lysianassoid species.

RESULTS and DISCUSSION

New data revealed that the three most abundant amphipod species are potentially new to science.

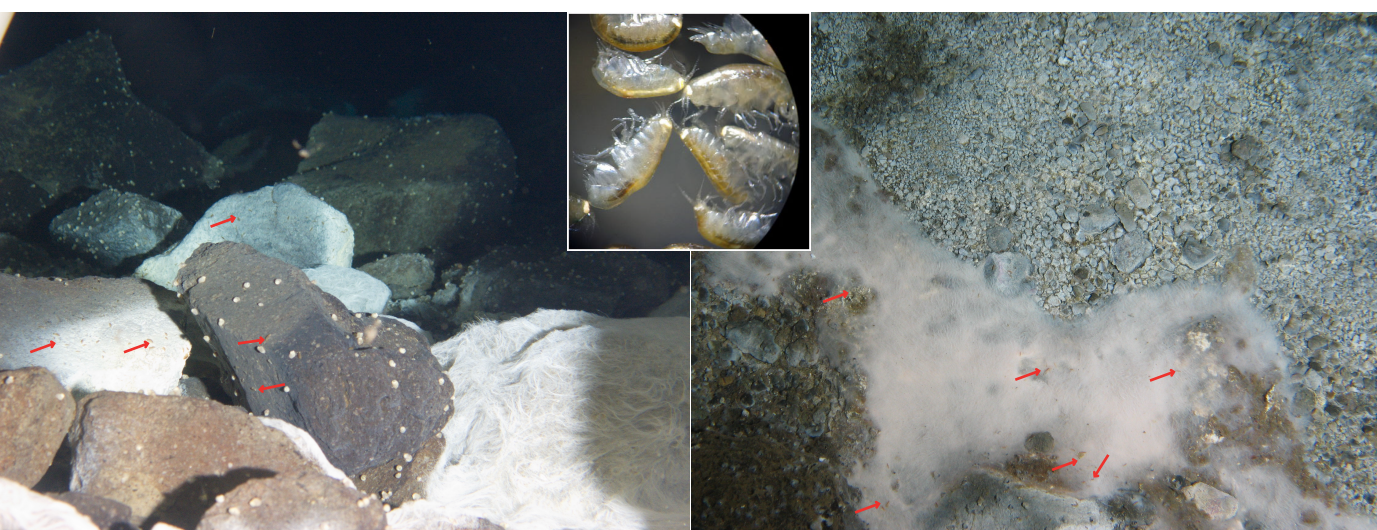
Lysianassoidea gen. nov.

Two closely related species of amphipods occurred exclusively on thick-layer bacterial mats, forming local aggregations, estimated using laser-scale, up to 10000 ind/m².

Morphology and phylogenetic analysis based on three molecular markers (CO1, 16S and 28S) suggests that these species belong to a new genus of the superfamily Lysianassoidea Dana, 1849.

The tentative new genus morphologically combines features of two families, Tryphosidae Lowry & Stoddart, 1997 and Uristidae Hurley, 1963, by the structure of mandible and maxilla 1.

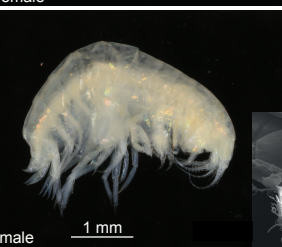
According to the phylogenetic analysis of 28S data, the new genus appeared sister to recently described *Liuiuristis* Wang & Sha, 2024 (Uristidae) from hydrothermal vents on the Okinawa Trough. The clade of Lysianassoidea gen. nov. + *Liuiuristis* was sister to *Onisimus* although this clade was poorly supported. The new genus cannot be assigned to any of the known families because both Tryphosidae and Uristidae appeared polyphyletic and revision of the Lysianassoidea is required (Havermans et al., 2010).



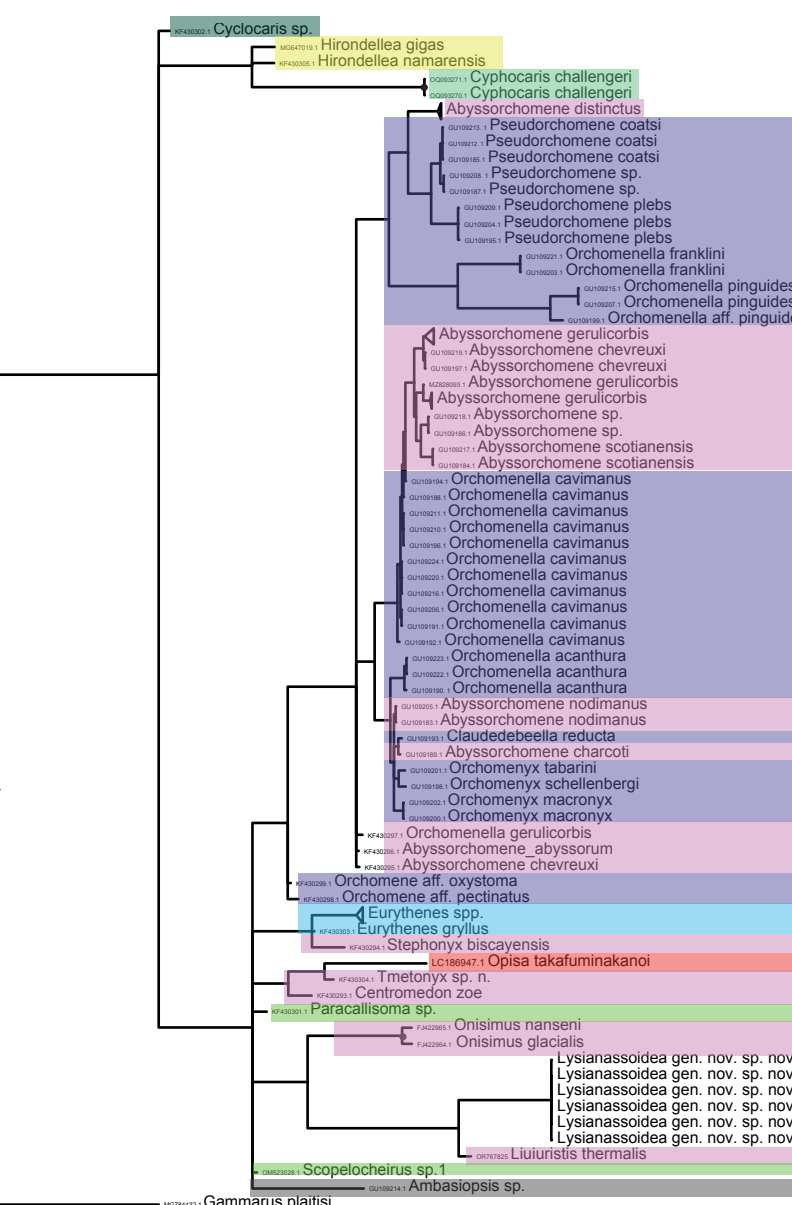
Lysianassoidea gen. nov. sp. nov. 1

Lysianassoidea gen. nov. sp. nov. 2

Two species differ from each other in their mouthparts (armament of Maxilla 1 and Maxilliped), form of interantennal lobe, armament of gnathopods, uropods and telson, form of epimeral plate 3 and other characters as well as by CO1 and 16S markers.



Both species are characterized by sexual dimorphism. Males differ from females by the presence of calceoli (*Calc*) on the antennae (*An*).



Legend for the phylogenetic tree:
 Cyclocarididae (green), Hirondeleidae (yellow), Cyphocarididae (light green), Uristidae (pink), Tryphosidae (purple), Eurytheneidae (blue), Opisidae (red), Scopelocheiridae (light blue), Lysianassoidea incertae sedis (grey)

Bayesian phylogenetic tree inferred from 28S rRNA sequences of lysianassoid species. ● nodes with PP=1, SH-aLRT ≥ 95% and Fboot = 100%

These three amphipod species perhaps obligate for reducing habitats increase the general number of obligate species of the Piip volcano up to 11, belonging to 6 taxonomic groups (bivalves, gastropods, polychaetes, isopods, leptostracans and amphipods). The lysianassoid species maybe adapted to more pronounce reducing conditions than *Byblis* sp. Lysianassoid amphipods are diverse in Pacific hydrothermal vents and abundant in some of them.

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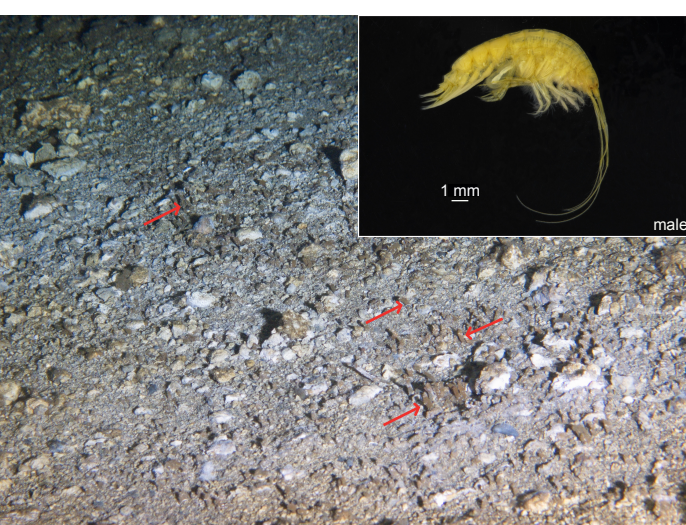
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Byblis sp. nov. (Ampeliscidae Krøyer, 1842)



The third abundant species, tube-building *Byblis* sp. nov. (Ampeliscidae), was recorded on *Calyptogena* beds, bacterial mats and some sites without visible vent manifestations.

Byblis sp. nov. belongs to the group of species with dendritic gills, not pleated (Dickinson, 1983). Morphologically and genetically it most similar to species *Byblis millsii* Dickinson, 1983 of this group, but differs by few characters. For instance, in *Byblis* sp. nov. antennae 1 are long, while in *B. millsii* the length of antenna 1 is short, not exceeding the length of peduncle of antenna 2.

