The Systematics and Phylogeography of Stygobiotic Paramelitidae (Amphipoda; Crustacea) from the Pilbara region of Western Australia

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BACKGROUND

- The Pilbara region of Western Australia is rich in iron ore and also a globally important region for stygofauna including a large diversity of subterranean amphipods.[6]
- Subterranean amphipod family Paramelitidae, is dominant in the Pilbara but poorly defined and lacking in major, modern systematic studies,[1,4] yet is a target group for environmental assessment and monitoring.
- Five Paramelitid genera known (Fig. 1).[2,3,4,5] This project focuses on *Pilbarus* and *Chydaekata*.
- Recent molecular studies[4] including a preliminary phylogeny (King *et al.* unpublished) has indicated that the current number of species does not reflect the true diversity present.

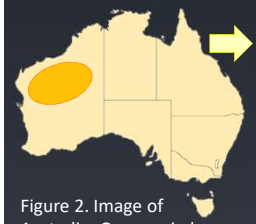

Figure 2. Image of Australia. Orange circle highlights the Pilbara region where samples have been collected from.

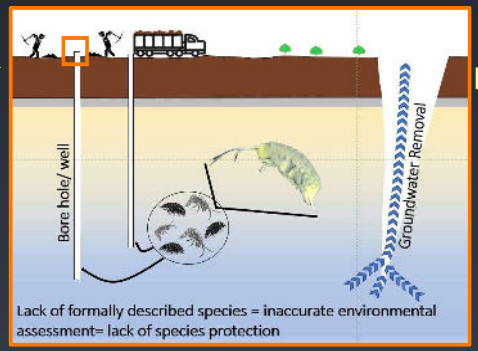

Figure 3. Diagram of subterranean environment, stygofauna location and groundwater removal caused by mining in the Pilbara.

Figure 4 & 5. Images of groundwater sampling in the Pilbara.
Photos taken by Michelle Guzik.

Genera	No. of Species described	Species	Image
Pilbarus	1	*Pilbarus millsi*	
Molina	1	*Molina pleobrachos*	
Chydaekata	15	*C. acuminata* (Image), *C. nudula, C. dolichodactyla, C. breviclava, C. transvera, C. diagonalis, C. carscutica, C. gyraspis, C. simulate, C. tetraspis, C. ovatodetoda, C. anophelma, C. scopula, C. scuticara, C. brachybasis*	
Kruptus	1	*Kruptus linnaei*	
Maarrka	2	*Maarrka weeliwollii* *Maarrka etheli*	

Figure 1 . Literatures current understanding of species per family of subterranean Pilbara Paramelitids. *Pilbarus* (blue) and *Chydaekata (*Red) images are highlighted as they are the focus genera for this project.

Pilbarus

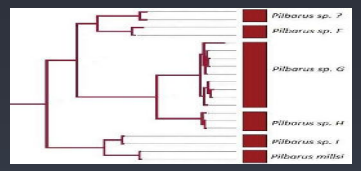

Fig. 6 Segment of the preliminary phylogeny by King *et al.* unpublished using *COI* and *H3* indicated there are more species.

Chydaekata

- Described using morphological data only with few specimens.
- Recent molecular analyses suggests only 2 species are valid, instead of 15. Formal taxonomic changes have not been made

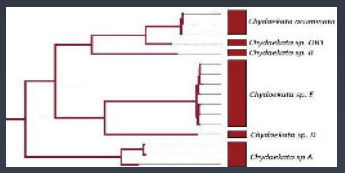

Fig. 7 Segment of the Preliminary phylogeny produced by King *et al.* unpublished indicating new species of *Chydaekata*.

AIMS

- Produce a robust molecular phylogeny of Pilbara Paramelitids using analyses of whole mitochondrial genome data.
- Describe new species belonging to *Pilbarus* and *Chydaekata,* revise each genus and their current described species using analyses of molecular lineages, suites of morphological characters and biogeographical information.
- Investigate the biogeographical relationships and distributions of Pilbara Paramelitids
- Create molecular and morphological identification tools for Paramelitid amphipods in the Pilbara and contribute to ALA, AFD and Taxonomy Australia's species description goal.

METHODS

- Specimens obtained from environmental consultancy agencies and museums
- Specimens will have 2 legs for DNA extraction. Whole body will be mounted for morphological analyses and drawing
- Specimens will be sequenced for *COI* and *H3* genes. Specimens too degraded and/or key genus taxa will undergo Genome skimming (Whole-Genome Shotgun sequencing).
- New species will be identified using a integrative approach of molecular and morphological data.

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