16. KEYNOTE TALK

Invertebrates in modern WA terrestrial and inland-water environments

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Invertebrates constitute the vast majority of multi-cellular life on Earth with an estimated 7–10 million species, the majority of which are undescribed. They are important components of virtually every ecosystem and are essential for a wide range of ecosystem services. Terrestrial and inland-water ecosystems are dominated by arthropods such as insects, arachnids and crustaceans, as well as soft-bodied groups like nematodes. Western Australia's environments include tropical vine thickets, deserts, gibber plains, sand plains, heathland, woodland, mesic forests, subterranean ecosystems, freshwater and saline wetlands and waterways. The region was largely blanketed by mesic forests until the formation of the Antarctic Circumpolar Current cooled and dried the region, particularly during the Neogene. Alternating wet and dry cycles drove ongoing diversification of the biota, and many invertebrate taxa have been shown to have radiated since the Miocene. While a lack of dated molecular analyses for most taxa precludes rigorous comparisons, we note that there is evidence of: (a) Mesozoic relicts such as onychophorans, some arachnids and fish; (b) Late Gondwanan clades such as freshwater crayfish; and (c) Late Tertiary clades such as some spiders and insects. Their age is often consistent with their occurrence in certain relictual habitats, with older lineages usually restricted to the high-rainfall south-west zone. Other taxa have made their way into Australia via dispersal from Asia once the Australian continental plate drifted close enough to allow faunal exchange. Subsequent colonisation and adaptation to the increasing aridification of Australian environments is exemplified by several groups, including epigean and subterranean representatives. The conservation status of many invertebrate taxa is of major concern, but there is a dearth of rigorous taxonomic treatments, ecological studies, life-history knowledge, and assessments of threatening processes for most taxa. The ongoing human-induced sixth mass extinction crisis is likely having an inordinate impact on invertebrates in Western Australia, particularly the iconic south-western region due to the synergistic effects of numerous threats.

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