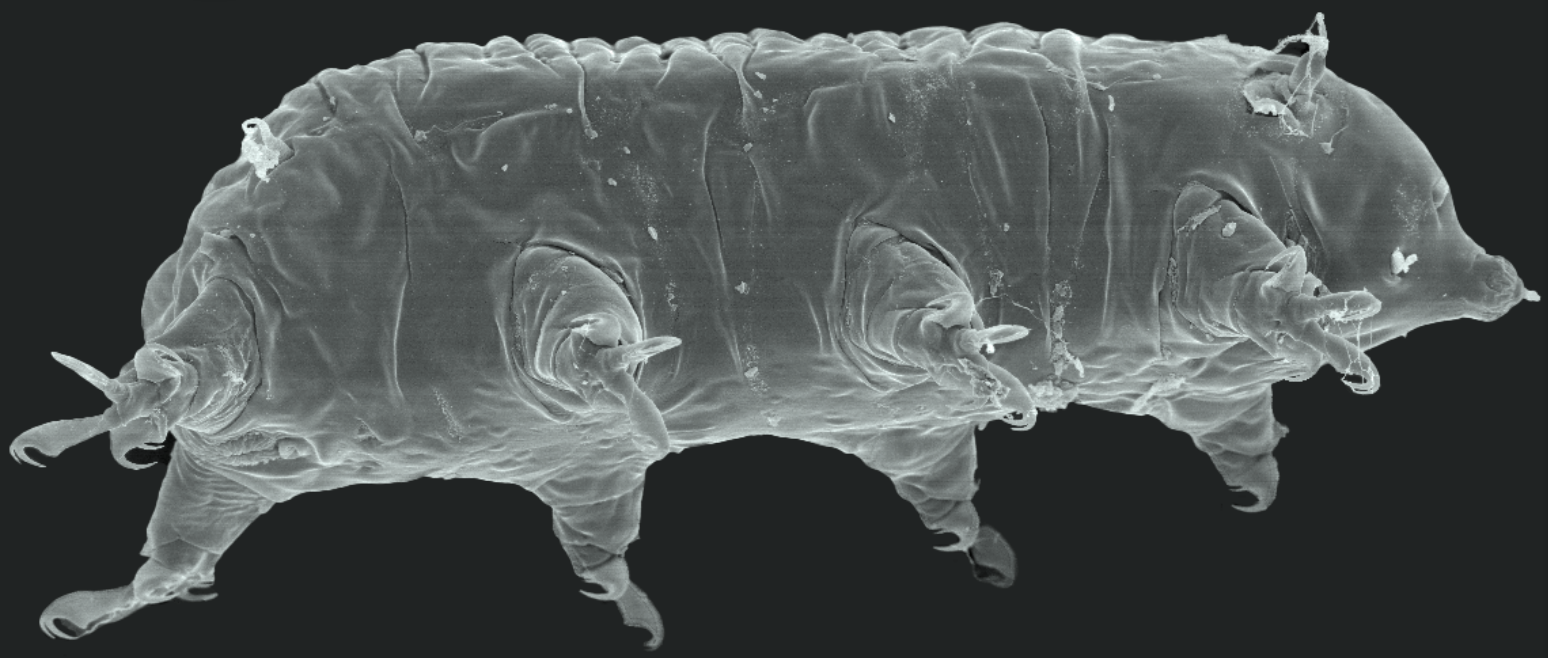
the Marine Biota of Aotearoa New Zealand



26

Kingdom Animalia, phylum Tardigrada

marine tardigrades

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CHAPTER 26

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26 Kingdom Animalia, phylum Tardigrada (marine tardigrades)

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Summary

Since the checklist of Horning *et al.* (2010), which included five marine species, no further tardigrade records have been obtained from Aotearoa New Zealand waters (Table 26.1; Fig. 26.1). The New Zealand marine tardigrade fauna remains poorly explored, with mainly unpublished records. Available data show that at least five families are represented in New Zealand seas, i.e., Archechiniscidae, Echiniscoididae, Halechiniscidae, Styraconyxidae and Tanarctidae. A checklist of New Zealand Tardigrada is provided.

Introduction

Tardigrades are micrometazoans with bilateral symmetry occurring in terrestrial, limnic, and marine habitats throughout the world (Fig. 26.1). Presently, >1400 species are described globally (Guidetti and Bertolani 2005; Degma and Guidetti 2007; Degma *et al.* 2020). Compared to their terrestrial and limnic relatives, marine tardigrades are poorly surveyed worldwide (Bartels *et al.* 2016; Fontoura *et al.* 2017), with less than 250 species currently described (Guidetti & Bertolani 2005; Degma & Guidetti 2007; Degma *et al.* 2020; Bartels *et al.* 2015b). Marine tardigrades inhabit ecosystems from intertidal to abyssal zones (Hansen & Kristensen 2020). While some species are found on supralittoral lichens, tidal algae and other tidal invertebrates, the majority of species are interstitial. Ecological studies suggest that ecosystems with calcareous sediments and low concentration of organic matter can support a high diversity of marine tardigrades (Accogli *et al.* 2011).

A juvenile specimen of *Styraconyx kristenseni* Renaud-Mornant, 1981 was recorded from Leigh, near Cape Rodney on the east coast of the North Island, by Kristensen & Higgins (1984). In addition, Horning *et al.* (2010) listed *Archechiniscus marci* Schulz, 1953, *Echiniscoides sigismundi* (M. Schultze, 1865), *Halechiniscus* sp. [also listed by Horning *et al.* (1978)], and *Tanarctus* sp., all records of which originated from personal communications by L.W. Pollock and R.M. Kristensen.

Tardigrade taxonomy has significantly changed over the past decade due to the implementation of DNA barcoding. Many terrestrial species, e.g., *Macrobiotus hufelandi* C.A.S. Schultze, 1834, *Paramacrobiotus richtersi* (Murray, 1911), *Mesobiotus harmsworthi* (Murray, 1907), previously considered widely distributed, are now considered species complexes.

Table 26.1. Summary of marine Tardigrada diversity in the Aotearoa New Zealand region expressed as total numbers and percentage change. Data for 2000 are derived from Horning *et al.* (2010: p. 35). OTU = Operational Taxonomic Unit.

	Heterotardigrada		% change
	2000	2023	
Total species diversity	5	5	0
Described extant species	3	0	−100
Undescribed extant species (OTU)	2	5	150
Described endemic extant genera	0	0	0
Described endemic extant species	0	0	0

Although applied to a much lesser degree, DNA barcoding has also identified species complexes in marine tardigrades (Faurby *et al.* 2011, 2012; Møbjerg *et al.* 2016; 2020). Consequently, the species identification of *Archechiniscus marci* and *Echiniscoides sigismundi* from Dunedin, and *Styraconyx kristenseni* from Leigh, which have been attributed to the New Zealand fauna, must now be considered doubtful as they now belong to species complexes (Bartels *et al.* 2015a; Faurby *et al.* 2011, 2012; Møbjerg *et al.* 2016, 2020). They should therefore be listed as *species indeterminata* until further investigation.

Knowledge gaps, research progress and future priorities

Marine tardigrade diversity has been only sporadically studied in regions close to New Zealand. The interactive maps of marine tardigrades of Bartels *et al.* (2015b) and Kaczmarek *et al.* (2015) show 62 records of 35 marine tardigrade species from Australia and New Caledonia. A similar diversity is likely to occur in New Zealand coastal and deep-water environments.

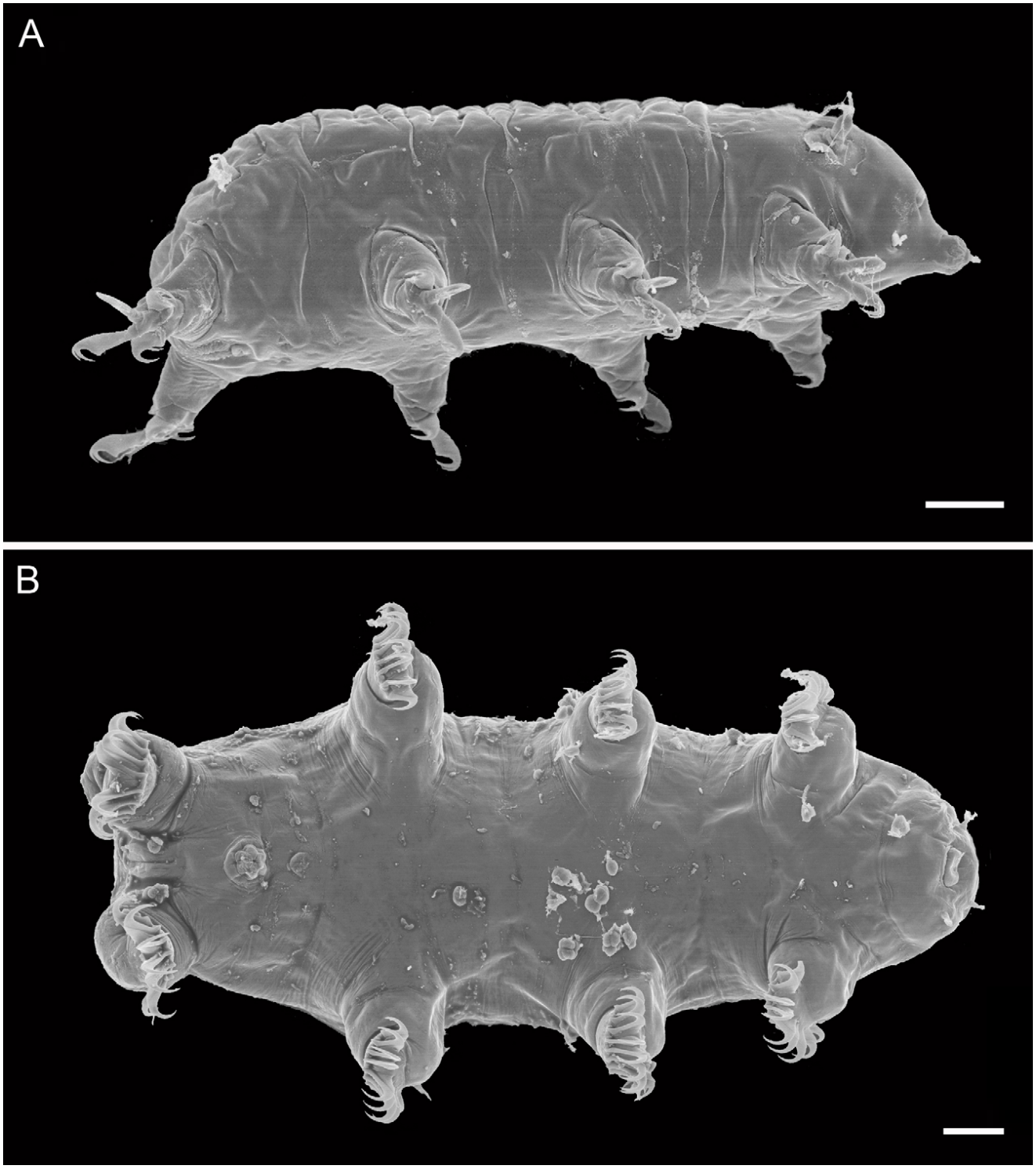

Figure. 26.1 Examples of marine Tardigrada: **A.** *Archechiniscus* sp., scale = 10 µm; **B.** *Echiniscoides* sp., scale = 10 µm. Image **A** courtesy of co-author Jesper Guldberg Hansen (JGH) and Abril Anguas-Escalante. Image **B** courtesy of JGH. Both images reproduced with permission from JGH.

Despite the great potential for new discoveries, the outlook for future marine tardigrade research in New Zealand is poor, as there are currently no resident New Zealanders who possess the necessary expertise, nor other international experts working specifically on the New Zealand marine tardigrade fauna. Any future advancement in the knowledge of marine tardigrades of New Zealand depends on initiatives to promote local training or international collaboration.

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Checklist of extant marine Tardigrada known from the New Zealand EEZ

The checklist is arranged according to the currently accepted systematics and classificatory scheme employed by the *Actual checklist of Tardigrada species* (2009–2020, 38th Edition: 18-08-2020) (Degma *et al*. 2020; Guidetti and Bertolani, 2005; Degma and Guidetti, 2007).

Phylum TARDIGRADA
Class HETEROTARDIGRADA
Order ARTHROTARDIGRADA
Family ARCHECHINISCIDAE
Archechiniscus sp. indet.

Family HALECHINISCIDAE
Halechiniscus sp. indet.

Family STYRACONYXIDAE
Styraconyx sp. indet.

Family TANARCTIDAE
Tanarctus sp. indet.
Order ECHINISCOIDEA
Family ECHINISCOIDIDAE
Echiniscoides sp. indet.

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