

Benthic Foraminiferal baselines for the southern Great Barrier Reef: a foundation for future ecological research

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Abstract

Effective environmental management and monitoring has become increasingly important as anthropogenic processes increasingly impact natural ecosystems. One locality that is under direct threat due to human activities is the Australian Great Barrier Reef (GBR). Marine benthic foraminifera represent an abundant and readily applicable tool that can be used in environmental studies to investigate an array of ecological parameters and assist in understanding ecosystem dynamics and influence management protocols. Initially, baseline knowledge of the taxonomic composition within the region must be established to facilitate comparative studies and monitor change to maximise understanding and management efficacy. A detailed taxonomic assessment is provided of 133 species of benthic foraminifera in 76 genera from Heron Island, One Tree Island, Wistari and Sykes Reefs, which form the core of the Capricorn Group (CG) at the southern end of the GBR. Of these 133 species, 46% belong to the order Miliolida, 34% to Rotaliida, 7% to Textulariida, 5% to Lagenida, 3% to Lituolida, 3% to Spirillinida, 1% to Loftusiida and 1% to Robertinida. Samples were collected from a variety of shallow shelf reef environments including reef flat, lagoonal and channel environments. This work establishes a platform from which future investigations can stem.

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ecological research

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Effective environmental management and monitoring has become increasingly important as anthropogenic processes increasingly impact natural ecosystems. One locality that is under direct threat due to human activities is the Australian Great Barrier Reef (GBR). Marine benthic foraminifera represent an abundant and readily applicable tool that can be used in environmental studies to investigate an array of ecological parameters and assist in understanding ecosystem dynamics and influence management protocols. Initially, baseline knowledge of the taxonomic composition within the region must be established to facilitate comparative studies and monitor change to maximise understanding and management efficacy. A detailed taxonomic assessment is provided of 133 species of benthic foraminifera in 76 genera from Heron Island, One Tree Island, Wistari and Sykes Reefs, which form the core of the Capricorn Group (CG) at the southern end of the GBR. Of these 133 species, 46% belong to the order Miliolida, 34% to Rotaliida, 7% to Textulariida, 5% to Lagenida, 3% to Lituolida, 3% to Spirillinida, 1% to Loftusiida and 1% to Robertinida. Samples were collected from a variety of shallow shelf reef environments including reef flat, lagoonal and channel environments. This work establishes a platform from which future investigations can stem.

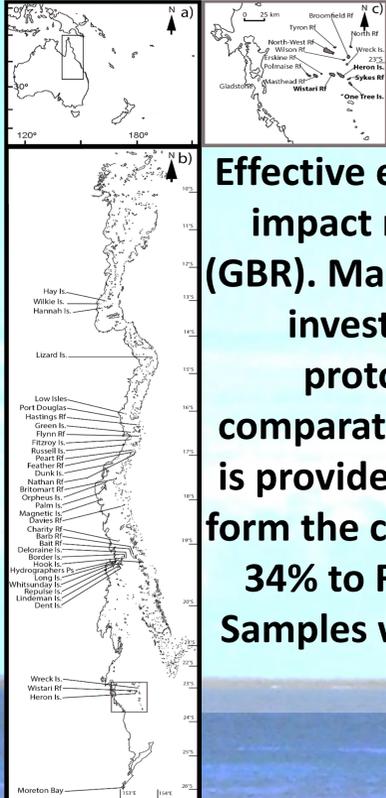
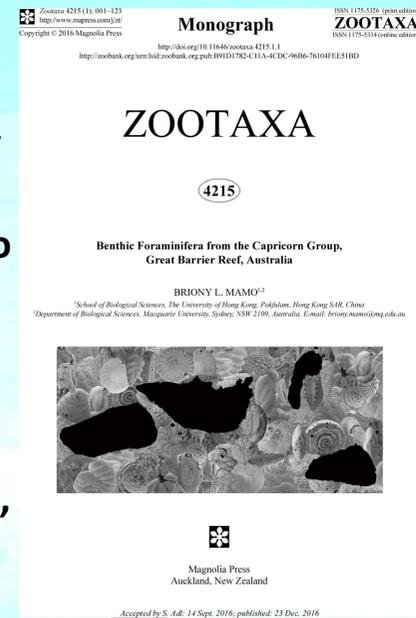


FIGURE 1 (ABOVE). a) Location of the GBR in the Southwest Pacific Ocean. b) North-South coastline of the GBR labelled with the localities of previous foraminiferal research indicated. c) Southernmost GBR including the Capricorn Group (shaded).

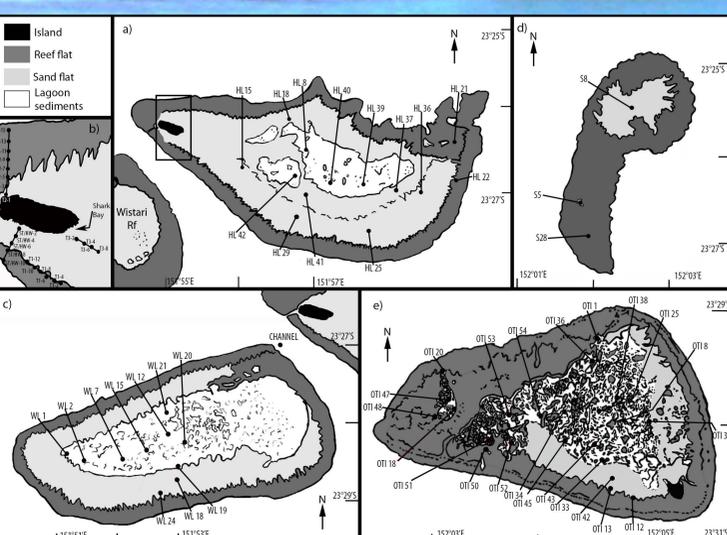


FIGURE 2. Heron Reef (a), Heron Reef flat (b), Wistari Reef (c), Sykes Reef (d) and One Tree Reef (e) illustrating lagoon location, substrate type (Patrick 2008) and sample sites.

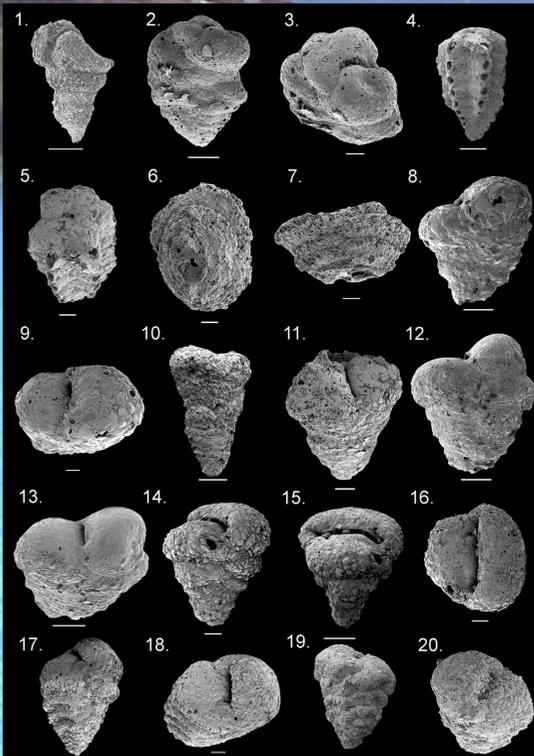


FIGURE 3. 1-3. *Rudigaudryina minor* (Chapman, 1902). 4-5. *Siphoniferoides siphonifera* (Brady, 1881). 6-7. *Sahulia barkeri* (Hofker, 1978). 8-13. *Textularia agglutinans* d'Orbigny. 14-16. *Textularia candeiana* d'Orbigny, 1839. 17-20. *Textularia jparkeri* n. sp.

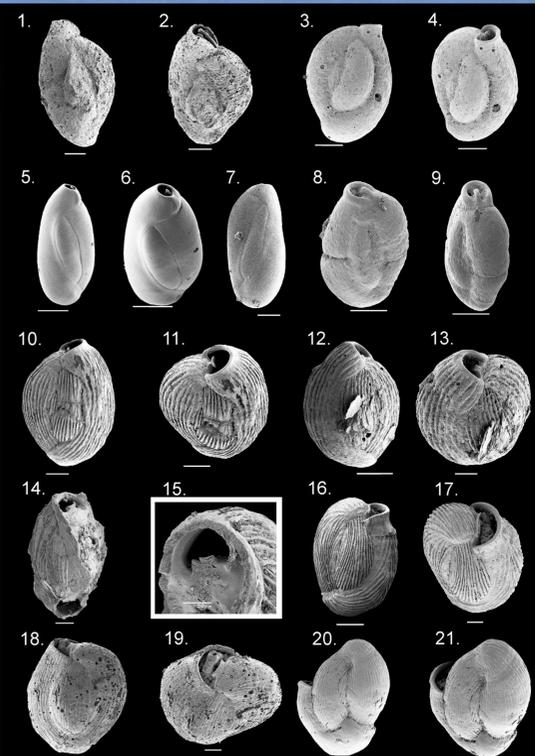


FIGURE 4. 1-2. *Quinqueloculina* cf. *Q. agglutinans* d'Orbigny, 1839. 3-4. *Quinqueloculina baccaerti* n. sp. 5-7. *Quinqueloculina bosciiana* d'Orbigny, 1839. 8-9. *Quinqueloculina latidentella* Loeblich & Tappan, 1994. 10-21. *Quinqueloculina neostriatula* Thalmann, 1950.

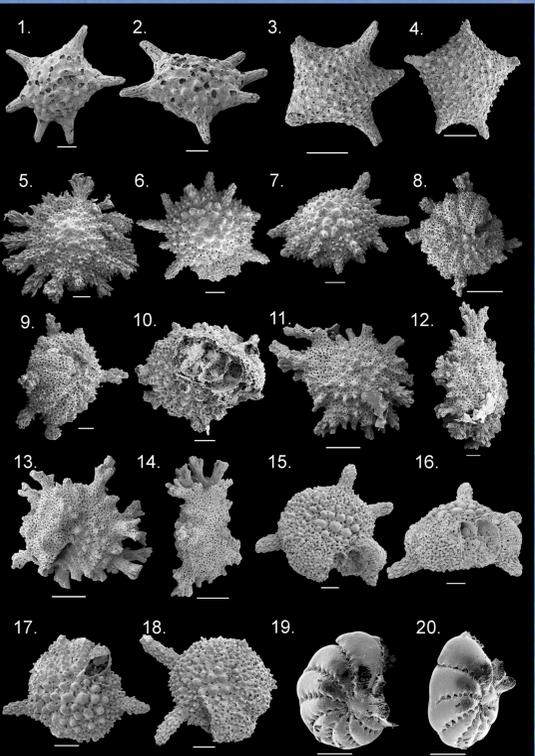


FIGURE 5. 1-4. *Baculogypsina sphaerulata* (Parker & Jones, 1860). 5-14. *Calcarina capricornia* n.sp.. 15-18. *Calcarina mayori* Cushman 1924. 19-20. *Criboelphidium* cf. *C. excavatum* (Terquem, 1875).

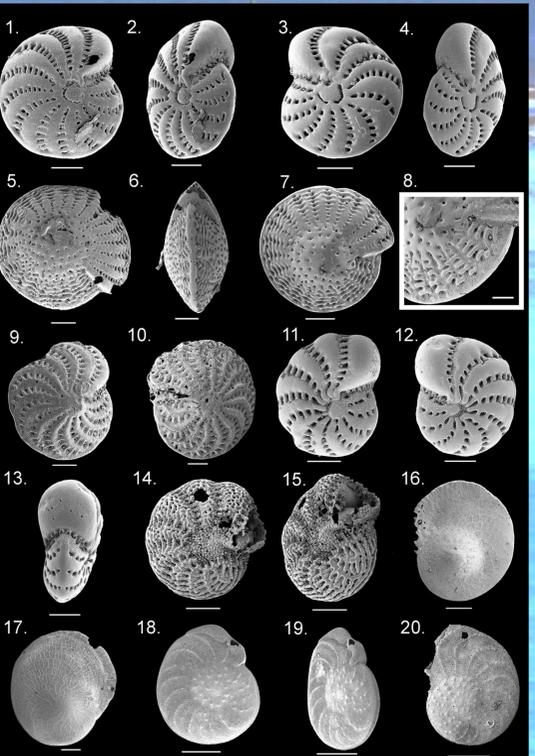


FIGURE 6. 1-4. *Elphidium advenum* (Cushman, 1922). 5-8. *Elphidium craticulatum* (Fichtel & Moll, 1798). 9-10. *Elphidium macellum* (Fichtel & Moll, 1798). 11-13. *Elphidium maorium* Hayward, 1997. 14-15. *Elphidium milletti* (Heron-Allen & Earland, 1915). 16-17. *Heterostegina depressa* d'Orbigny, 1826. 18-20. *Operculina? ammonoides* (Schröter, 1783).