

Antarctic Biodiversity: Previous "Insights" Overlooked

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Brandt, Gooday et al.¹ assert that the benthos of the Weddell Sea are no less diverse than the tropics. Their claims for high species diversity in the Antarctic Southern Ocean (SO), however, are overstated. Previous isopod data show that the SO has depressed diversity compared to the tropics. Moreover, their evidence^{1,2} has inconsistencies and errors³ that weaken their case

Although BG claims that "little is known" about the SO deep sea, this region has received much attention during the last century⁴⁻⁶. BG also reports high numbers of species new to science, but any newly investigated deep sea region will yield many new species, as implied by discoveries in recent decades⁷⁻⁸.

BG argue that "Our findings challenge suggestions that deep-sea diversity is depressed in the Southern Ocean," based a single high value of $E(S_{100})=55$. BG's supplementary data², in light of previous isopod data⁹, shows different picture (http://www.australianmuseum.net.au/invertebrates/pdf/wilson_fig-1.pdf). BG's epibenthic sledge ("sledge") does not collect material like an epibenthic sled ("sled"), which removes the surface layers of sediment¹⁰. The sledge, by capturing suspended surface material, collects cleaner samples that require less processing; thus fewer specimens may be lost by the sledge and more species recovered per lowering. Because the sledge may collect more individuals and species than the sled, BG's species numbers cannot be directly comparable.

Moreover, $E(S_{100})$ values from BG are sufficiently variable (http://www.australianmuseum.net.au/invertebrates/pdf/wilson_fig-1.pdf) that their inferences are suspect. While most sled results⁹ are above $E(S_{100})=10$, the sledge values¹¹ range from 1-55, with ~25% below 10. Three sled samples^{5, 12} that have more than 100 specimens and were identified to species⁹, average 23, near BG's mean of 19. In Equatorial Western Atlantic¹³ (EWA), $E(S_{100})$ values are consistently above 20. If BG's observed range were applied to EWA then it could easily exceed 55 (~64). Below 4000m depth, most BG values are below 20, whereas most sled values are higher. These observations suggest that the Weddell Sea may have depressed diversity below 4000m, and lower diversity at all depths compared to the tropics. Conversely, EWA shows higher species diversity at all depths. Nevertheless BG's results cannot be compared directly with previous studies owing to the use of different samplers. Based on the internally consistent epibenthic sled results⁹ alone (http://www.australianmuseum.net.au/invertebrates/pdf/wilson_fig-1.pdf, bars 1 & 3), BG's assertions cannot be supported, and their findings *do not* "challenge the idea that deep-sea diversity is depressed in the Southern Ocean."

1. Brandt, A., Gooday, A. J., *et al.* *Nature* **447**, 307-311 (2007). "BG" in text, tables, and Figure 1 (http://www.australianmuseum.net.au/invertebrates/pdf/wilson_fig-1.pdf).
2. Supplementary Information, *doi*:10.1038/nature05827.
3. http://www.australianmuseum.net.au/invertebrates/pdf/wilson_note_3.pdf
4. Clarke, A. & Johnston, N. M. *Oceanogr. Mar. Biol., Ann. Rev.* **41**, 47-114 (2003); Gage, J. D. *Deep-Sea Res. Part II-Top. Stud. Oceanogr.* **51**, 1689-1708 (2004).
5. Rankin, J. S., Clark, K. B. & Biernbaum, C. W. *Antarct. J. U.S.* **4**, 97 (1969).
6. http://www.australianmuseum.net.au/invertebrates/pdf/wilson_note_6.pdf

7. Hessler, R. R. & Sanders, H. L. *Deep-Sea Res.* **14**, 65-78 (1967).
8. Grassle, J. F. & Maciolek, N. J. *Am. Nat.* **139**, 313-341 (1992).
9. http://www.australianmuseum.net.au/invertebrates/pdf/wilson_note_9.pdf
10. Sanders, H. L., Hessler, R. R. & Hampton, G. R. *Deep-Sea Res.* **12**, 845-867 (1965);
Gage, J. D. & Tyler, P. A. *Deep-Sea Biology: A Natural History of Organisms at the Deep-Sea Floor* (Cambridge Univ. Press, 1991).
11. Some of these may not be $E(S_{100})$ values³.
12. Institute of Oceanography Dalhousie, Canada; Expedition "Hudson 1970."
13. The eastern South Atlantic has lower isopod diversities, relating to upwelling off West Africa: Sanders, H. L. in *Diversity and Stability in Ecological Systems* (eds. Woodwell, G. M. & Smith, H. H.), 71-81 (Brookhaven National Laboratory, New York, 1969).

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