

Hessler R R & Sanders H L. Faunal diversity in the deep-sea.

*Deep-Sea Res.* 14:65-78, 1967.

[Woods Hole Oceanographic Institution, Woods Hole, MA]

Deep-sea benthic samples gathered with a new collecting device revealed high within-community species diversity, disproving the classical conception of a depauperate deep sea. The traditional view was based on samples biased by small size and winnowing. [The SCJ® indicates that this paper has been cited in over 130 publications, one of the 10 most-cited papers published in this journal.]

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February 14, 1985

I have always liked this paper because it upset one of our most entrenched ideas on what life was like on the deep-sea bottom. Deep-sea communities were supposed to be depauperate; all our samples had shown that, and it made such good sense. This was, after all, one of the "harshest" environments on Earth, so of course only a few species could prevail there. Then Howard Sanders and I used a new tool, the epibenthic sled, and obtained samples containing great numbers of individuals and yielding a species richness reminiscent of tropical communities.

As is so common, when the study started, we did not suspect where it would finally take us. I was interested in deep-sea isopods and became convinced that our first deep-sea sampler, an anchor dredge, was systematically missing the epifaunal portion of the isopod fauna. So with Rudy Scheltema and George Hampson, I designed the epibenthic sled to catch it. Divine benevolence made the first sea trials a perfect cruise: calm seas,

full moon, a good cook, compatible shipmates, and wonderful samples every time. Our good fortune bemuses me, for on subsequent cruises the device worked terribly. It was years before we solved its problems. What would have happened had the first cruise been like the others? Possibly we would have abandoned the sled and, as a result, missed seeing this high diversity.

Nevertheless, the phenomenon is so spectacular that it was just a question of time before someone noticed. Evidence of it already existed in other samples but was obscured by small sample size or winnowing artifacts, and, because the idea of a depauperate deep-sea fauna was so entrenched, nothing short of a blatant demonstration of reality was going to catch our attention.

Initially, the paper was merely intended to describe the sled as an extraordinarily successful tool. The analyses of numbers of individuals and species were compiled to document this. I remember how puzzled I was as the evidence for high diversity began to appear on my data sheets. It was Howard who suggested the importance of sample size in biasing past conclusions. An equally important insight came from an anonymous reviewer who we later learned was Fred Grassle. He suggested that small sample size could also have resulted from winnowing, and reevaluation of our samples bore him out.

This paper received so much attention for two reasons. The first is that it announced the discovery of a surprising, fundamental property of deep-sea communities. Ironically, subsequent studies have shown that the northwestern Atlantic, where this discovery was made, has a relatively low diversity compared to other areas in the deep sea. The second is that, as a result of this work, Howard wrote his enormously influential interpretation of the meaning of high diversity<sup>1</sup> that was a focus of a debate that spread throughout ecological circles for over a decade. See reference 2 for recent work in this field.

1. Sanders H L. Marine benthic diversity: a comparative study. *Amer. Naturalist* 102:243-82, 1968. (Cited 460 times.)

2. Rex M A. Geographic patterns of species diversity in deep sea benthos. (Rowe G T, ed.) *Deep sea biology: the sea*. New York: Wiley, 1983. Vol. 8. p. 453-72.