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Introduction to the Symposium: Advances in Antarctic Marine Biology

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Our forbears of Antarctic marine biology faced many significant challenges. Equipped with only the most rudimentary of sampling gear, naturalists on Scott's British Antarctic Expedition (1901–1904) cast their nets into the sea from ship decks awash with frozen slush and brine, and through narrow cracks along icy shores. With the greatest of tenacity they managed to complete the first year-round collections of Antarctic marine organisms. Over the next few decades, observations of marine life were furthered by naturalists participating in Antarctic expeditions led by Shackleton, Borshgrevink, Bruce, Mawson, Charcot, De Gerlache, and Nordenskjold (reviewed by Fogg 1992). The pinnacle of early 20th century Antarctic marine biological studies belongs to the British Discovery Oceanographic Expeditions (1925–1939). Here, repeated forays into the Southern Ocean facilitated intensive spatial and temporal sampling of marine life from both the benthic and the pelagic realm. We owe a large debt of gratitude to these early Antarctic marine biologists, for it was their observations that first revealed an Antarctic marine flora that is rich, diverse, but unique (Arntz et al. 1994, Clarke and Johnson 2003, Knox 2006).

Antarctic marine life has evolved for at least the past few million years under constant low temperature and a highly seasonal photoperiod, and many species have life histories that are closely linked to the annual rhythms of the pack ice. All are nourished, directly or indirectly, by nutrient-rich waters upwelled from deep circumpolar currents. Marine biological studies in Antarctica have long since transcended basic descriptive studies. Experimental research has yielded insights into how species are physiologically adapted to their environments, how nearshore benthic communities are structured, and how dynamics of the water-column and the production of sea-ice define trophic structure and influence ecosystem stability. Such studies have also laid a foundation for assessing the physiological and ecological impacts of anthropogenically induced climatic changes currently underway in western Antarctica and especially along the Antarctic Peninsula (Aronson et al. 2007, Ducklow et al. 2007, McClintock et al. 2008).

The present symposium extends a decadal sequence of symposia that have provided a national forum highlighting advances in Antarctic marine biology. McClintock and Pearse (1991) organized and hosted the first of these symposia at a meeting of the American Society of Zoologists (ASZ) held in December 1988 in San Francisco, California. A subsequent symposium was hosted by McClintock et al. (2001) at a meeting of the SICB (formerly ASZ) held in January 2000 in Atlanta, Georgia. Both symposia yielded a suite of review-oriented publications in the *American Zoologist* (now *Integrative and Comparative Biology*) that have been, and continue to be, widely cited in the literature.

The program for the 2010 society-wide symposium was designed around topical rather than taxonomic groupings and included coverage of important advances in physiology (Marsh et al., Moran & Woods, O'Brien & Mueller, Dietrich et al.) biogeography (Halanych), ecology (Steinberg et al., Arrigo, DeMaster et al., McClintock et al., Crocker et al., Kim et al.), and evolution (Marsh et al., Moran & Woods, O'Brien & Mueller, Dietrich et al.). Eleven papers were presented during the day-long symposium and these progressed generally from lower to higher trophic levels. The symposium was

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The papers presented were:

- The changing ecosystem of the West Antarctic Peninsula. Steinberg DK, Schofield OME, Fraser WR, Stammerjohn SE, Martinson DG, Doney SC, Montes-Hugo M, Ducklow HW.
- Marine microalgae in Antarctic sea ice. Arrigo KR.
- Evidence for a benthic food bank in West Antarctic Peninsula sediments: Radiochemical and benthic biological approaches. Demaster DJ, Smith CR, Thomas CJ.
- An overview of the chemical ecology of marine macroalgae and benthic invertebrates along the Antarctic Peninsula. McClintock JB, Amsler CD, Baker BJ.
- Environmental imprinting (epigenetics) and adaptation in Antarctic marine invertebrates. Marsh A, Kendall L, Guida S.
- Temperature, oxygen, and body size in the Southern Ocean: Why might they be giants? Moran AL, Woods HA.
- Phylogeography, larval dispersal and recent history of Antarctic continental shelf fauna. Halanych KM.
- Pumping without iron: The unique architecture of cardiomyocytes in the hemoglobinless Channichthyids. O'Brien KM, Mueller I.
- Genome enablement of the Antarctic notothenioid fishes: Strategies and resources for analysis of an adaptive radiation. Deitrich III HW, Stuart A, Schoenborn M, Parker SK, Methe BA, Amemiya CT.
- Climate change and habitat selection of seals in the Western Antarctic Peninsula. Costa DP, Crocker DE, Goebel ME, Fedak MA, McDonald BI, Huckstadt LA.
- Community dynamics in a polar ecosystem: Benthic recovery from organic enrichment in the Antarctic. Kim S, Thurber A, Hammerstrom K.

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