

PRELIMINARY CRUISE REPORT

U.S. Dept. of State CRUISE No.:	State File # 2009-025
SHIP NAME:	R/V Sorcerer II
OPERATING INSTITUTE OR AGENCY:	J. Craig Venter Institute
PROJECT TITLE:	Marine Microbial Diversity Study
CRUISE DATES (INCLUSIVE):	July 26 thru July 29, 2009

CHIEF SCIENTIST:	
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CLEARANCE COUNTRIES:	Norway
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DESCRIPTION OF SCIENTIFIC PROGRAM (include page-sized chartlet showing cruise track):
<p>The J. Craig Venter Institute recently completed a global voyage of discovery to study marine microbial biodiversity. Many of the sampling locations on the global circumnavigation were in the open ocean, far from population centers. The European seas have been influenced by substantial human activity for centuries. The Venter Institute is now undertaking a two-year sampling expedition (2009-2010) that will include transects in the Baltic, North, Mediterranean, Adriatic, Aegean, and Black Seas.</p> <p>A sampling expedition traversing the North Atlantic and the major water bodies of Europe will both significantly increase scientific understanding of how ocean ecosystems function and greatly expand the known universe of genes and proteins.</p> <p>The charts below report the locations that we sampled in Norway and the prevailing oceanographic conditions measured at the time of sampling. Biological samples have been sent back to our laboratories for analysis, but have not yet begun. We will report further progress when sequencing results become available.</p> <p>Microorganisms are responsible for most of the chemical transformations that occur within the major biogeochemical cycles vital to life on earth. However, microorganisms are the least well</p>

understood groups of species on the planet, especially within the oceans. Bacteria lack morphologically distinct characteristics that allow species to be differentiated visually, and the vast majority (> 95%) cannot be grown in the laboratory. Most recent estimates of diversity have relied on analysis of a single conserved gene (16S rRNA)—an enormous advance over previous methods, but one that still has significant limitations. 16S rRNA sampling techniques may hint at the extent of diversity, but they tell us nothing about the role that each species plays in the environment. For this, we must delve deeper, and examine the full gene complement of the community using a shotgun sequencing approach. Not only do we want to know what species are present, but what potential roles they play and functions they provide within the complex marine ecosystem. One can think not only of a community of microorganisms, but the community of those organisms' genes that enable them, for example, to capture energy from the sun, remove carbon dioxide from the air, use organic carbon from other organisms, and cycle nitrogen through the ecosystem in its several forms. Such information is vital, for example, for understanding how carbon is cycled between the atmosphere and the ocean, a key question for understanding climate change. In addition to microorganisms' effect on the carbon cycle, many microorganisms affect other geochemical cycles of importance. In 2003, we initiated a research expedition circumnavigating the globe, called the Sorcerer II Global Expedition. We sampled approximately every 200 miles as we transited the globe, with additional sampling programs designed for coastal areas based on differences in marine nutrient regimes, human impact, concurrent studies, and/or uniqueness of habitat (Rusch et al. *PLoS* 2007).

Our program has the following goals:

- Inventory the vast legion of unseen microorganisms and their gene complement that live in our oceans
- Better understand overall species diversity
- Discover and characterize new bacterial and viral species
- Evaluate the ecological roles that dominant (but generally unculturable) microbes play in the ecosystem
- Establish a freely shared, global environmental genomics database that can be used by scientists around the world

SCHEDULE OF DATA DELIVERY:	
Data Description	Date of Expected Delivery to Dept. of State
Raw and annotated genomic data	December, 2010
Cruise summary report	December, 2010

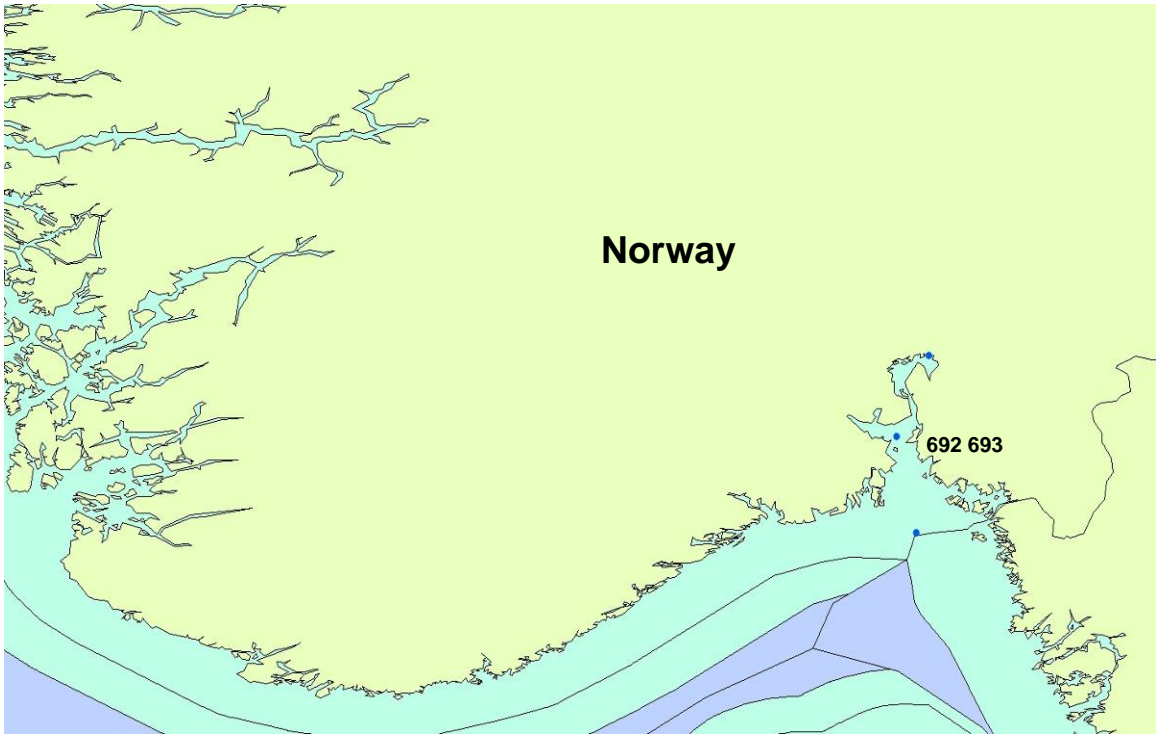


Figure 1. Chart showing general cruise path through Norwegian waters. Two (2) samples were taken at one (1) site.

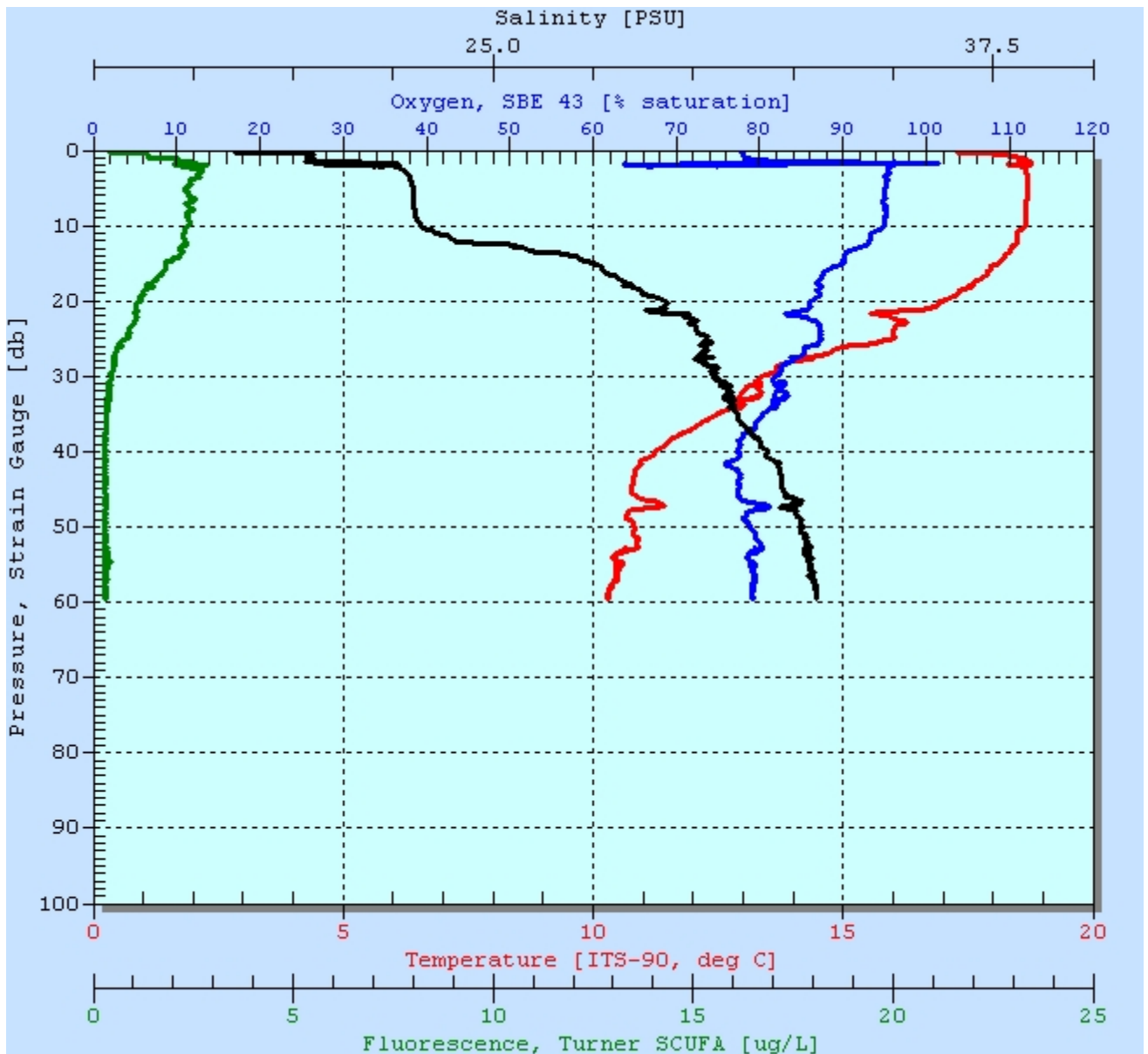


Figure 2. Preliminary CTD raw data from samples taken in Norway please reference GOS 692 and 693.

GOS*	LOCATION	DATE	LATITUDE	LONGITUDE	TEMP	O2 % sat.	pH	Fluoresc. (µg/l)
692	Oslo Fjord: Shallow Sample 0.3 M	July 29	59°27'6.237"N	10°32'5.821"E	18.7	5.7	8.5	2.2
693	Oslo Fjord: Deep Sample 55 M	July 29	59°27'6.237"N	10°32'5.821"E	10.5	6.3	8.2	0.36