Honors Research Project Proposal Form

Submission: An electronic copy of this form must be *emailed to* honors@calpoly.edu with a copy to salpteki@calpoly.edu by **5:00 PM** on **Monday, November 6, 2006.**

Project Title:	Drugs from the Sea: Medicinally Active Compounds from Marine Sources.
Contact Info:	Name: Jennifer A. Carroll Phone Number: 6-1654 Email Address: jacarrol@calpoly.edu
Department:	Chemistry and Biochemistry
College:	Science and Mathematics
Description of the project:	The field of Marine Natural Products has aided in the development of a number of new treatments for human disease. The National Cancer Institute has developed an excellent screen for anti-cancer compounds, which has led to the discovery of highly bioactive components in marine organisms. Among these are discodermolide,[i] eleutherobin,[ii] dehydrodidemnin B,[iii] bryostatin 1,[iv] dolastatin 10,[v] and ecteinascidin 743.[vi] The deep water Bahaman sponge, *Discodermia dissolute*, yielded the cytotoxic polyhydroxylated discodermolide,[vii] which was determined to have microtubule stabilizing effects.[viii,ix] The primary objective of this project is to identify novel compounds from marine invertebrates which show activity against human diseases. Samples of marine sponges and tunicates will be collected by SCUBA and returned to the Cal Poly campus for workup. At Cal Poly each extract will be tested for cytotoxicity by simple and inexpensive bench-top disease bioassays such as the Artemia sp. lethality test and the potato disk assay. Samples will also be submitted to collaborators at the University of Mississippi, National Center for Natural Products Research (NCNPR) for extensive bioassay screening in anti-cancer, anti-microbial and anti-malarial assays. The workup of samples will include microanalysis by high performance liquid chromatography coupled with mass spectroscopy (HPLC-MS) to obtain UV and molecular weight data. This data will be used to search the literature, and therefore identify known compounds. Priority will be given to extracts that contain compounds that are both active and novel. These will be purified by liquid-liquid extraction with solvents of differing polarity, followed by High Performance Liquid Chromatography (HPLC) utilizing a Photo Diode Array detector to obtain pure compounds. Initial characterization of crude extracts and will be performed on the 300 MHz NMR located within the Cal Poly chemistry department. Identification of new and known compounds will be facilitated by the use of marine literature databases such as Marin Lit. Complete compound characterization of novel structures will be

	performed at the NMR facility at UC Santa Cruz.
Description of the interdisciplinary nature of the project:	This project is highly interdisciplinary and combines three main STEM areas The main fields are as follows: • Chemistry; in the isolation of compounds and the elucidation of novel structures, • Biology; in the taxonomy of marine invertebrates, • Biomedical Science/Pharmacology; in the development and running of disease based assays
Number of Honors students needed, and their majors:	1-3 majors in Chemistry, Biology or Biomedical Engineering SCUBA experience is a plus, but not necessary
Links:	none

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[v] Pettit, G. R.; Kamano, C. L.; Herald, C. L.; Tuinman, A. A.; Boettner, F. E.; Kizu, H.; Schmidt, J. M.; Baczynskyj, L.; Tomer, K. B.; Bontems, R. J. *J. Am. Chem. Soc.* **1987**, *109*, 6883-6885.
[vi] Rinehart. K. L.; Holt, T. G.; Fregeau, N. L.; Stroh, J. G.; Keifer, P. A.; Sun, F.; Li, L. H.; Martin, D. G. *J. Org. Chem.* **1990**, *55*, 4512-4515.
[vii] Gunasekera, S. P.; Gunasekera, M.; Longley, R. E.; Schulte, G. K. *J. Org. Chem.* **1990**, *55*, 4912-4915. Correction: *Ibid*. **1991**, *56*, 1346.
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