

Application for the SSB Transfer of Taxonomic Expertise Award

The Siphonophora (Cnidaria)

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Background

The siphonophores are a monophyletic group of colonial, pelagic hydrozoans. They are pan-oceanic and have been collected at all depths, though they are rarely found in coastal waters. Siphonophores are among the most abundant members of the macroplankton, and play a major role in the ecology of the open ocean. 160 valid species have been described, and more than 50 await description based on material already deposited in various museums.

Siphonophores are gelatinous in consistency, and their delicate construction has made it difficult to collect specimens in good condition. Their systematics are consequently quite confused, though there are several syntheses that are invaluable to any student of the group. Many common species are prone to misidentification due to regional variation in diagnostic characters. At least several recognized families are not natural groups, and the relationship of taxa within the three most inclusive clades is unclear. In the past twenty years, important advances have been made in the ability to collect siphonophores from the midwater (these include the use of submarines equipped with hydraulic samplers and the implementation of protocols for SCUBA diving from ships in the open ocean). These technologies have resulted in a need for information about the systematics of siphonophores that does not exist, and also present an opportunity to vastly improve the state of the field through investigation of specimens of unprecedented quality. However, only one systematist, Phil Pugh of the Southampton Oceanography Centre in the UK, is dedicated exclusively to siphonophores. The amount of work required now far exceeds what one person is capable of.

I have had the pleasure of working with Phil Pugh at sea, and now seek support to visit his lab to improve my understanding of siphonophore systematics in general, to collect character data that are directly relevant to my thesis work, and to collaborate on basic systematic projects that are important in their own right. As I routinely have the opportunity to collect siphonophores using modern sampling methods, I will be able to immediately put my knowledge of siphonophore systematics to work on new material.

Proposed Work

Phil Pugh has agreed to host me in his laboratory at the Southampton Oceanography Centre for a six week period in the early part of 2004. Together, we have established several specific objectives for the visit:

Review the genera Nanomia and Cordagalma: *Nanomia* are commonly encountered but often misidentified, and there are undescribed species of *Cordagalma* that currently require attention. In both cases new material must be examined in order to sort out the status of species and clarify their diagnosis.

Confirm the identification of specimens used for molecular analysis: In collaboration with Phil Pugh and Steve Haddock (Monterey Bay Aquarium Research Institute), I have begun to estimate a siphonophore phylogeny based on molecular data. Together, Phil Pugh and I will examine voucher material for all of the specimens we have included in our phylogeny to confirm that they have been properly identified.

Organizing specimens and describing zooid order: During my visit I will assist Phil Pugh in organizing the siphonophore collection at Southampton Oceanography Centre. He will be retiring in June of 2004, and all material will be moved to the British Natural History Museum. In helping organize his collection, I will have a chance to make first hand observations on most described species. Among other character data that are important for diagnostic purposes, I will record data on colony structure that are directly relevant to my thesis work. A major part of my thesis consists of describing the arrangement of the functionally specialized zooids (polyps and medusae) that make up siphonophore colonies. These zooids are arranged in highly regular species-specific patterns, making siphonophores some of the most complex and highly organized of all colonial animals. These data were not available for most species until recently because colonies dissociated when collected by net. I have recorded these data for all species I have been able to collect myself, but an examination of the Southampton collection will improve my species sampling several fold. These data will be analyzed in a phylogenetic framework to assess patterns in the evolution of colony-level structure.

Budget

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| Airfare (round trip New York to London) | \$ 600 |
| Ground transportation | \$ 200 |
| Board in Southampton | \$ 1200 |
| Reagents (sorting fluid, mounting media) | \$ 400 |
| Dissecting materials (Sylgard, pins, forceps, dishes, blades, tungsten wire) | \$ 250 |
| Shipping costs (voucher specimens) | \$ 200 |
| Total | \$ 2850 |