



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>Bonnie R. Lei</b>	<b>Project Number</b> <b>S0415</b>
<b>Project Title</b> <b>Cryptic Species and Synonyms: A Reclassification of the Tropical Spurilla Genus</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Populations of <i>Spurilla neapolitana</i> and <i>S. sargassicola</i> in the tropical Eastern Pacific and Western Atlantic are assessed through genetic and morphological analyses of specimens to determine whether any cryptic species of <i>S. neapolitana</i> exist and conclude whether <i>S. sargassicola</i> is a synonym of <i>S. neapolitana</i>.</p> <p><b>Methods/Materials</b> <i>S. neapolitana</i> specimens from 5 Pacific locations and 2 Atlantic ones were compared with <i>S. sargassicola</i> specimens. Partial 16S rRNA and H3 histone coding genes were extracted from non-cerata tissue using Chelex, then amplified in PCR. Cleaned and diluted PCR products were sequenced then analyzed using computer programs Geneious, CLC Free Workbench, and MacClade. Diagnostically reliable features including the radulae, jaws, reproductive organs, and external morphology were compared through the use of SEM micrographs and camera lucida.</p> <p><b>Results</b> Maximum likelihood trees (1000 bootstrap replicates) constructed from 16S and H3 sequences both demonstrate that the Stocking Island, Bahamas population of <i>S. neapolitana</i> is an exclusive clade. 16S tree shows that <i>S. sargassicola</i> groups with all other <i>S. neapolitana</i> specimens. Morphological data corroborates these findings. The Bahamas <i>S. neapolitana</i> population has significantly (<math>P=0.01</math>) longer and slimmer lateral denticles and central cusps in the radula than all other specimens. The convoluted bursa copulatrix structure of the reproductive system was also identical for all Atlantic specimens, except Bahamas <i>S. neapolitana</i>. The jaws and external morphology are proven to be inefficacious as differentiating characteristics.</p> <p><b>Conclusions/Discussion</b> With the presented data it is certain that <i>S. sargassicola</i> is a synonym of <i>S. neapolitana</i> and should not retain its separate species name. Also, the Bahamas population of <i>S. neapolitana</i> is identified as a highly likely cryptic species which will be verified once fresh specimens of other <i>Spurilla</i> species are obtained to serve as accurate outgroups. These results provide crucial insight into the understanding of biodiversity in this genus and thus are key to future conservation efforts.</p>	
<b>Summary Statement</b> Genetic and morphological analyses are utilized to determine whether any cryptic species of circumtropical aeolid <i>Spurilla neapolitana</i> exist and conclude whether similar species <i>S. sargassicola</i> is a synonym of <i>S. neapolitana</i> .	
<b>Help Received</b> Used lab equipment at California State Polytechnic University, Pomona under the mentorship of Dr. Angel Valdes.	