

**Infusion of Astrobiology-Based Concepts in the Teaching Curriculum at Spelman College.** J.-M. D. Dimandja<sup>1</sup> and J. B. McQuilla<sup>2</sup>, <sup>1</sup>Department of Chemistry and Biochemistry, Spelman College, 350 Spelman Lane SW (Box 279), Atlanta, GA 30314, <sup>2</sup>Department of Biology, Spelman College, 350 Spelman Lane SW (Box 762), Atlanta, GA 30314.

**Introduction:** The introduction of Astrobiology-based concepts in undergraduate chemistry courses poses several problems at Spelman College. The primary problem is the fact that the students are on a tight schedule of courses that need to be completed for a timely graduation. The regular chemistry curriculum includes core courses in general chemistry (freshman year), organic chemistry (sophomore year), analytical and physical chemistry (junior year) and biochemistry and inorganic chemistry (senior year), which have been accredited by the American Chemistry Society (ACS). Currently, the only realistic option for the inclusion of novel astrobiology/astrochemistry material would be the development of a one-semester course that the students would be able to take as an elective in their senior year. However, this new course would be competing with several other more established senior-level electives, and would also miss the opportunity to introduce the students to a potentially exciting field that they should consider for their professional careers.

In order to incorporate some concepts of astrobiology a little earlier in the curriculum, an alternative approach is being developed that is based on the infusion of material wherever possible in the existing curriculum. This approach involves two primary components: 1) The development of research-laboratory projects that involve students that are selected from freshman or sophomore-level courses, and 2) The development of course content that can be disseminated in the current curriculum as examples of application areas in which the fundamentals of conventional chemistry are applied. The overall goal of this approach is to incorporate important elements of the diverse astrobiology field into the curriculum and gauge the interest of the students to this material at the same time. As the interest in the topic grows, so will the ability to add to the material and the possibility to develop a lower-level interdisciplinary course that may involve other STEM disciplines.

**Research Laboratory Infusion:** In this portion of the project, high-performing sophomore students were invited to join the research laboratory to work on projects associated with the development of new analytical tools for the qualitative and quantitative analysis of samples of astrobiological interest. As one of the leading laboratories in the emerging separation science technology of comprehensive two-dimensional gas chromatography with time-of-flight mass spectrometry detection (GCxGC/TOF MS), the students were given

a project in which they need to generate a large amount of data that will be relevant to the optimum separation of compounds such as amino acids, sugars, polyaromatic hydrocarbons, nucleobases, etc. The students were genuinely interested in the project because the compounds were similar to organic molecules they have just covered in their organic chemistry courses. The data that is generated is also publishable because it incorporates a novel approach for column selection in GCxGC/TOF MS that will help elucidate difficulties encountered in other applications as well. In addition to sample preparation, sample analysis, and data processing tasks, discussions with students also involve coverage of the current literature advances in the field of astrobiology.

**Teaching Laboratory Infusion:** In this portion of the project, laboratory activities have been developed for the evaluation of novel sample preparation techniques that are being investigated with respect to the analysis of the same set of organic molecules listed in the previous section. The techniques are consistent with current methods that are taught in the junior-level analytical chemistry course, but the application area is highlighted in the course material so that the students can independently gather background information on the astrobiological context of their work. Class discussions and course evaluation responses have revealed a keen interest from students in the topic that is encouraging to us as we plan for improvements/revision in the test laboratory modules.