



NASA ASTROBIOLOGY INSTITUTE
ANNUAL REPORT YEAR
 [July 2002 - June 2003]



Focus Groups: Impacts

Focus Group:	<i>Impacts</i>
Project Title:	<i>Biological Consequences of Impacts</i>
Chairs:	<i>Peter Ward , Frank Kyte</i> [view project member list]

Project Progress

The impact of asteroids, comets, and other objects must play a fundamental role in the origin, evolution, and extinction of life. Impacts are a primary mechanism of planetary accretion and are responsible for the delivery of water and organic matter to young planets. Large-body impacts may inhibit the formation of life in the early history of planetary development. Once life has taken hold, impacts can play an important role in the path followed by evolution, such as the mass extinctions that are now known to be coincident with the Chicxulub impact event at the Cretaceous–Tertiary boundary. This is not just a terrestrial problem. If life exists on Mars, Europa, or other planets outside our solar system, impacts must have played a fundamental role there as well. Impact may even play a role in transporting organisms between planetary objects.

The NAI Impact Focus Group can aid in coordinating the research in this field. Understanding the processes that relate impacts to the origin and evolution of life is an inherently interdisciplinary problem that requires expertise in diverse fields ranging from astronomy to paleobiology. The Impacts Focus Group can play an important role in bringing these experts together, developing collaborations, coordinating research, and organizing meetings and field trips for research and educational purposes. We believe that this can best be accomplished with a series of workshops that will be aimed at bringing participants together in an interactive setting for the purpose of identifying specific problems and achievable goals, followed up by actual sample collection and analysis. This is still a very new focus group. Our plan is to organize a workshop of interested parties on an annual basis to develop these collaborations.

Focus Group Description & Activities

In February, 2002, a workshop on the topic of "Impacts and the Origin, Evolution, and Extinction of Life." This was organized by Frank Kyte and Peter Ward and held at UCLA (abstracts and program at <http://www.ess.ucla.edu/rubey/index.html>). About 30 distinguished scientists, half of whom were members of NAI, discussed their research. Also in attendance were about 70 scientists and students who were either active in

this field or interested in learning about it. This workshop highlighted the very diverse interests of the participants, but it also showed that we could work together and identify areas of common interest and important goals. At least four areas of immediate need were clearly identified: 1) more detailed samples and analyses of old extinction horizons (e.g., the Triassic/Jurassic boundary), 2) better age dating of known terrestrial impact craters for correlation to the stratigraphic record, 3) better models of the physical effects of impacts, and 4) protocols for blind samples and tests of controversial results, such as reports of fullerenes and ^3He in Permian/Triassic sediments. Several papers generated by this workshop were published in the Spring 2003 issue of *Astrobiology* (edited by Frank Kyte) and are available free at <http://www.liebertpub.com/ast>. A direct result of this workshop was the formation of the Impact Focus Group. We have now organized sample collection of the Triassic/Jurassic boundary, an important mass extinction with a reported possible connection to asteroid impact. We are also in the early planning stages of obtaining samples for blind testing of key Permian/Triassic boundary samples.

Highlights

- Papers from the Rubey Colloquium on "Impacts and the Origin, Evolution, and Extinction of Life" were published in the Spring 2003 issue of *Astrobiology*.
- A Field expedition was made to collect Triassic/Jurassic (T/J) samples.
- Focus Group Members Don Lowe and Gary Byerly organized a field conference on Archean Surface Processes in Barberton, South Africa. Although this conference focused mainly on processes of the early Earth, it included examination of the oldest known impact deposits on Earth (3.2 to 3.5 Ga).

Roadmap Objectives

- [**Objective No. 1.1:** Models of formation and evolution of habitable planets](#)
- [**Objective No. 4.3:** Effects of extraterrestrial events upon the biosphere](#)
- [**Objective No. 6.2:** Adaptation and evolution of life beyond Earth](#)

Field Expeditions

Field Trip Name: Triassic/Jurassic sampling

Start Date: 4/8/03	End Date: 4/11/03
Continent: North America	Country: USA
State/Province: Nevada	Nearest City/Town:
Latitude:	Longitude:
Name of site(cave, mine, e.g.): New York Canyon	Keywords:

Description of Work: Collection of fossils and samples for geochemical analysis at a classis [PLS VERIFY SPELLING] Triassic/Jurassic boundary section

Members Involved:
