Research LAUNCHER Program

About You

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Short Bio: (250 words or less)

I grew up in Iowa, where I developed a childhood interest in paleontology and displayed my fossil collection at the state science fair. In doing so, I became acquainted with the curator at the University of Iowa, Harrell Strimple, a specialist in Pennsylvanian crinoids. I later graduated from the University of Iowa and received my M.S. degree there working under Strimple and Bill Furnish before completing my Ph.D. at the University of Texas at Austin, where I studied with Jim Sprinkle on Ordovician echinoderms. While at Texas, I developed an interest in modern analogues to ancient depositional systems and benthic invertebrate communities. After moving to Auburn University, Alabama, I began taking students to the island of San Salvador in the Bahamas and doing research there. Initially I studied living crinoids at San Salvador, but eventually my work switched to benthic foraminifera. For the last decade, I have been researching the systematics, distribution, and taphonomy of modern-day free and attached (encrusting) foraminifera found at this island. Now my work is spreading to other islands in an effort to examine similarities and differences in the distribution of encrusting foraminifera and to establish a model that will be useful in the interpretation of ancient shallow-water carbonates.

1. Name of project - **Distribution and Calcium-Carbonate Production Rates of Encrusting Foraminifera at the Outer Islands of the Bahamas.**

2. Brief synopsis/areas of geosciences or engineering (50-75 words)

The Bahamian platform is a classic locale for research on shallow-water carbonates, and benthic foraminifera have played a key role in sedimentary geology in general and hydrocarbon exploration in particular for decades. Yet many aspects of modern-day foraminifera are in need of study. The proposed research continues the author's work on benthic foraminifera across carbonate platforms with an emphasis on encrusting species as indicators of paleoenvironment and as contributors to the calcium-carbonate budget.

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3. Bullet list of 5-7 main outcomes/goals.

The outer islands of the Bahamas (Fig. 1) are relatively pristine with regard to the effects of human habitation, such as industrial pollution. Thus, the opportunity exists to conduct important baseline research in biologic systems. Our past research on San Salvador island has shown that species of foraminifera cemented to substrates such as coral rubble display an onshore-to-offshore zonation and play a larger role in reefal ecosystems than is currently recognized. Goals for the next 1-2 years are listed below:

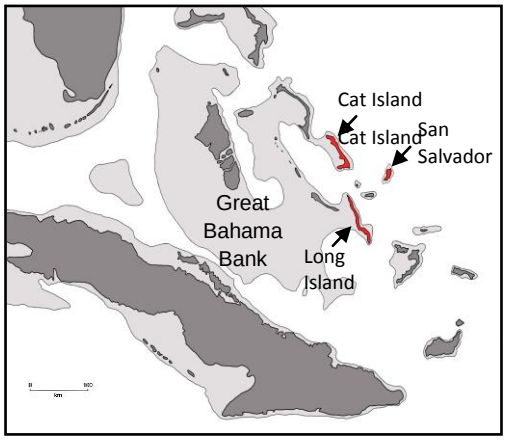

Figure 1. The outer islands of the central Bahamas.

(1) Complete the study of assemblages of encrusting foraminifera found at Cat Island. Compare and contrast them with assemblages from San Salvador.

(2) Do a comparable study at Long Island.

(3) Derive a conceptual model for the distribution of encrusting foraminifera on small, isolated carbonate platforms based on these 3 outer islands.

(4) Analyze the ecologic succession of species of encrusters based on (1) overlayering observed on cobble surfaces, (2) stratigraphic succession as seen in thin sections, and (3) sequence of settlement seen in experimental studies done in the natural habitat.

(5) Prepare and submit one or more studies of the morphology and classification of modern-day species of encrusting foraminifera, including light, SEM, and thin-section photographic images.

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4. In two or three sentences, describe why your research is important. Please mention who will benefit from your work.

Encrusting foraminifera are under-appreciated and under-utilized in the study of ancient shallow-water carbonates. Evidence of this includes the genera *Haddonia*, which was not recognized in the western hemisphere prior to our work, and *Nubecularia*, which is quite common, but not reported in other studies. Our work has shown a distinct onshore-to-offshore zonation of encrusting species on San Salvador island and a similar one on Cat Island; with additional funding, we intend to create a generalized model that will be useful for sedimentary geologists including those engaged in hydrocarbon exploration.

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5. Timeline with milestones (12 month/18 month).

November 2014 – Return to Cat Island with graduate student Christopher Smith to collect cobbles found on the seafloor off the northeast side of the island. Target environments are (1) lagoonal patch reefs, (2) outer bank barrier reefs, and (3) wall at the platform margin. Revisit the west-side of the island to discover the significance of the low growth of encrusters found there, which we suspect is due to the presence of offshore oolite shoals not previously described.

March 2015 – Complete Cat Island data collection and analysis, including laboratory study of cobbles and thin-section preparation and examination, as well as statistical analysis of all data.

April-May 2015 – Synthesis of Cat Island data and completion of Smith's M.S. thesis.

Fall 2014 and Winter 2015 – Previously travertine tiles were attached to concrete blocks and these were deployed in a range of subtidal habitats at San Salvador. Data from one transect showing growth at 3 and 6 months and after one year are already at press. Many more tiles we recovered from a wide range of settings are in need of study. Funds are needed for laboratory analysis by student assistants.

Summer-Fall 2015 – Establish research program at Long Island. This will entail finding lodging, ground transportation, and SCUBA facilities. As done previously at San Salvador and Cat Island, cobbles will be collected from a range of reefal environments from near-shore to the platform margin. With needed funding, this phase will support an as yet unnamed graduate student.

Fall 2014-Fall 2015 – Compile a conceptual model of distribution. Research and write one or more systematic descriptions of the foraminiferal species studied at San Salvador, Cat Island, and Long Island.

6. Funding amount needed to achieve first basic goals within 12 months. Please provide a brief summary overview of your budget. List costs of 5-10 main items.

Field Work: Cat Island: $3,000.00 Long Island: $3,000.00
Graduate Student research assistantship (one year): $15,000.00
Field and laboratory expenses, thin sections: $2,000.00
Student stipend for laboratory analysis of tiles: $2,000.00
TOTAL: $25,000.00

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7. In the process of gaining background knowledge in the field of your proposed research, who did you find to be the top two or three researchers? What are the main concepts that are being explored? Please briefly describe.

Dong Ryong Choi and **Robert Ginsburg** examined encrusting organisms including foraminifera from the South Florida, and Choi examined ecologic succession by using the stratigraphic approach with sectioned cobbles. We intend to follow his example.

Eberhard Gischler also worked with Robert Ginsburg and later wrote an important summary paper.

William (Bill) Martindale did a study of encrusting organisms at Barbados in 1992. Water depth, degree of illumination, and water turbulence were the main factors controlling distribution in his study. However, his study was done in a locality with a narrow shelf and a nearly continuous reef from shore to shelf edge; this differs considerably from the settings we are examining. Martindale describes *Gypsina plana* as being found at all depths and in illuminated environments as well as shaded ones; this is unlike what we have seen so far.

REFERENCES

Choi, D. R., and Ginsburg, R. N., 1983, Distribution of coelobites (cavity dwellers) in coral rubble across the Florida reef tract: Coral Reefs, v. 2, p. 165–172.

Choi, D. R., 1984, Ecological succession of reef cavity-dwellers (coelobites) in coral rubble: Bulletin of Marine Science, v. 35(1), p. 72-79.

Gischler, E., 1997, Cavity dwellers (coelobites) beneath coral rubble in the Florida Reef Tract: Bulletin of Marine Science, v. 61(2), p. 467-484.

Gischler, E., Hauser, L., Heinrich, K., and Scheitel, U., 2003, Characterization of depositional environments in isolated carbonate platforms based on benthic foraminifera, Belize, Central America: PALAIOS, v. 18 (3), p. 236-255.

Martindale, W., 1992, Calcified epibionts as palaeoecological tools: Examples from the Recent and Pleistocene reefs of Barbados: Coral Reefs, v. 1992(1), p. 167-177.

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8. Please provide a photo of yourself and a photo related to your proposed project. It will be very helpful in publicizing your project and potentially securing funding.

Lewis (center) with students on San Salvador island.

Above: Concrete block with travertine tiles attached.

Right: One 10 cm^2 quadrat from a tile deployed for one year. Surface is completely covered by encrusting foraminifera.

9. Who will benefit? _____Sedimentary geologists in general, including those engaged in hydrocarbon exploration, will benefit from the description of taxa and from the generalized model for foraminiferal distribution we will generate. In addition, the data provided will aid in biodiversity studies and will establish a baseline for future studies of the consequences of climate change.

AAPG Research LAUNCHER supporters receive

The opportunity to work directly with you and receive reports, information, and findings, depending on the level of support.

The Deal

The researcher agrees to:

- Develop a brief public presentation on the research to be made available to AAPG
- Share an annotated bibliography and review of relevant published articles
- Present research findings on project at an AAPG Forum, GTW, or Research Symposium
- Write a detailed report on the results of your research to be made available to LAUNCHER supporters
- Write a extended abstract on the results of your research to be made available to AAPG

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Thank you for submitting your research proposal to the AAPG Research LAUNCHER Program. Your proposal will be reviewed and upon acceptance you will be contacted by AAPG Education/Research. If your proposal is accepted, we will publicize your proposal and encourage funders to contact you directly. AAPG does not guarantee funds nor have any connection with the success or failure of the endeavor. The goal is to support scientific research in the petroleum geosciences and engineering and launch the next generation of geological advances.

___**Ronald D. Lewis**_____	___**June 30, 2014**_____	_____	_____
Research Candidate (print)	Date	AAPG Education/Research (print)	Date
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Research Candidate (sign)	Date	AAPG Education/Research (sign)	Date

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