

SOUTHEASTERN BIOLOGY



Volume 58

January, 2011

Number 1

ASB **ASB 72ND ANNUAL MEETING** *ASB*
APRIL 13-16, 2011

ASB University of Alabama, Huntsville *ASB*

ASB *ASB*

See Page 3 and Consult Website
<http://www.sebiologists.org>



ASB *The Official Publication of* *ASB*
The Association of Southeastern Biologists
ASB <http://www.sebiologists.org> *ASB*

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All contributions, inquiries about missing back numbers and other matters should be addressed to the Journal Editor. News items should be sent to the News Editor. Send books to be reviewed to the Book Review Editor.

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PURPOSE

The purpose of this association shall be to promote the advancement of biology as a science by encouraging research, the imparting of knowledge, the application of knowledge to the solution of biological problems, and the preservation of biological resources. The ASB has representation in Section G Committee of the AAAS. Varying types of membership are available to individuals and institutions. See inside back cover.

TIME AND PLACE OF FUTURE MEETINGS

2011 April 13-16: Hosted by the University of Alabama, Huntsville, Alabama. Meeting site is the Von Braun Convention Center adjacent to the Embassy Suites Hotel, Huntsville, Alabama.
2012 April 3-7: Hosted by the University of Georgia, Athens, Georgia. Meeting site is the Georgia Center on campus.
2013 April 10-13: Hosted by Marshall University, Huntington, WV. Meeting site is the Charleston Convention Center, Charleston, WV.
2014 April: Spartanburg, SC (TBA); 2015 April: Alabama (TBA); 2016 April: TBA; 2017 April: Spartanburg, SC (TBA).

IMPORTANT INFORMATION FROM THE PRESIDENT

Thank each of you who participated in the recent survey concerning changes to ASB publications. Based on your responses, 89% would like to see *Southeastern Biology* change to an online journal. Starting with Volume 58: No. 1, January 2011, you will be receiving *SEB* via the ASB website (which is undergoing a major facelift and the new version should be coming online very shortly)....

Questions 2 and 3 requested your permission to allow the Executive Committee to pursue or investigate potential new membership benefits by providing you access to *Southeastern Naturalists* and a proposed new Cell/Molecular journal. Over 89% of you were interested in *SEN* as a benefit and 70% were in favor of the new Cell/Molecular Journal. You will be informed as soon as decisions are made by the Executive Committee concerning these proposed added benefits.

If you have questions or comments, please don't hesitate to contact me (e-mail and phone numbers are below).

The Association of Southeastern Biologists (ASB) has a new website (<http://www.sebiologists.org>). Our new web editor, Ashley Morris (web_editor@sebiologists.org), has been working to update both the design and content of the association's site. Please contact her directly if you have any comments or questions.

With our new website comes several exciting changes for our members. First, this will be the first year for online abstract submission for our annual meeting. Soon, we will make available a link for this process on the main page of our new website. Second, we no longer will publish paper copies of *Southeastern Biology*. Beginning with the January issue of *SEB*, we will publish as a PDF online (<http://www.sebiologists.org/SEB.html>).

To take advantage of all that our new site has to offer, please be sure to bookmark the new address (<http://www.sebiologists.org>), as well as change any links that you may have to our site from other websites (e.g., your personal or institutional sites). We have a temporary redirect page at the old ASB web address, but we will remove this in early 2011. Also, be sure to check the current job postings (<http://www.sebiologists.org/jobs.html>). For some of these jobs, the review process has started or will do so soon. Finally, if you have images from the field or lab that you would like to include in the design of our site, please let our web editor know (web_editor@sebiologists.org).

We also have joined the realm of social media! ASB is now on Facebook and Twitter, with links on our new website for each of these pages.

We look forward to seeing you on the web!

Sincerely, Pat

Patricia B. Cox Ph.D. -- President, Association of Southeastern Biologists
Botanical Specialist/Tennessee Valley Authority
Biological Permitting and Compliance
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Southern Appalachian Botanical Society

75th Anniversary Celebration and Symposium

***Held in conjunction with the 72nd annual meeting of the
Association of Southeastern Biologists***

Meeting Site:

***The Von Braun Center, Huntsville, Alabama
April 13-16, 2011***

The Program will include the following events:

A symposium with featured speakers: "A Thread of the Past, the Present, and Future Botanical Research"; A Breakfast meeting and photo-display of SABS history; A current group photograph and a display of past group photographs; Special recognitions of important contributors; An updated presentation of "And Who Will Weigh the Mountains;" 75th anniversary commemorative memorabilia; Field trips; A special commemorative issue of *Castanea*.





University of Alabama-Huntsville

is proud to host the

72nd Annual Meeting of the Association of Southeastern Biologists April 13-16, 2011-Huntsville, AL Embassy Suites & Von Braun Center

This four-day event brings together approximately 1000 biologists from across the southeastern United States. The meeting features a distinguished plenary speaker, special symposia, field trips, oral and poster presentations, workshops, networking and social events, and more.

The Annual Meeting provides you with the exclusive opportunity to showcase your products and/or services to this large and important audience of faculty, students, researchers, conservation workers, military and government personnel, and business professionals with a common interest in biological issues. Interests are diverse, and range from genetics and molecular biology, to physiology and population biology, to community and ecosystem ecology and systematics.

About ASB: The Association of Southeastern Biologists (ASB) was established in 1937 by biologists concerned with the quality of biological research in the southeastern United States. Today, ASB is the largest regional biology association in the country, and is committed to the advancement of biology as a science by the promotion of science education, research, and the application of scientific knowledge to human problems.

ASB Web Site: Many thanks to Dr. Ashley Morris, University of South Alabama for maintaining ASB's web site. Please visit our new and exciting web site www.sebiologists.org. Many new features have been added, register on-line for our Annual Meeting, join or renew your membership, view photos, inquire about career opportunities and more.

University of Alabama-Huntsville

The University of Alabama in Huntsville (UAH) is a public co-educational, state-supported research university within The University of Alabama System. UAHuntsville was founded as part of the University of Alabama in 1950 and became an autonomous campus within the UA System in 1969.

Administration

The University is governed by The University of Alabama System Board of Trustees that vests authority in the campus president to lead the university. The president is assisted by the provost and executive vice president for academic affairs; the vice president for research; the vice president for finance and administration; the vice president for university advancement; the vice president and chief of staff; and the vice president for student affairs. The vice presidents, together with the president, the executive assistant to the president/director of government relations and the director of university relations function as the university's executive committee.

Student body

Total enrollment is about 7400, including about 1500 graduate students; approximately 50 percent women, 50 percent men. UAHuntsville incoming freshmen score an average of 25 on the ACT examination, among the highest among Alabama's public universities.

Academic offerings

UAHuntsville offers 61 degree-granting programs that meet the highest standards of excellence, including 30 bachelor's degree programs, 18 Masters' degree programs, and 13 Ph.D. programs through its five colleges: Business Administration, Liberal Arts, Engineering, Nursing, and Science.

Research

The University received about \$65 million in external funding for active research projects during 2007-2008. Research sponsors include federal and state agencies; academic institutions; industry and private foundations. Research is conducted within the individual colleges or through UAHuntsville's 17 independent research centers, laboratories and institutes. Major interdisciplinary research thrusts include: applied optics; propulsion; space plasma and aeronomics; space physics and astrophysics; earth system science; information technology; management of science and technology; microgravity and materials; modeling and simulation; rotocraft systems; systems engineering; structural biology; and automation and robotics.

Accreditation

UAHuntsville is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS) to award bachelor's, master's and doctoral degrees. Many UAHuntsville programs are also accredited by their respective accrediting agencies, including the American Chemical Society, ABET, Inc., the Association to Advance Collegiate Schools of Business (AACSB), the Commission on Collegiate Nursing Education (CCNE), the

Computer Sciences Accrediting Board (CSAB), Accreditation Council for Cooperative Education (ACCE), National Council for Accreditation of Teacher Education (NCATE), National Association of Schools of Art and Design (NASAD), and the National Association of Schools of Music (NASM).

Faculty

UAHuntsville has more than 330 full-time faculty members; 92 percent have terminal degrees in their fields. The FTE student/faculty ratio is 16:1.

Library

The M. Louis Salmon Library has more than 412,000 books, along with collections of U.S. government documents, sound recordings, microform and microfiche. There are also subscriptions to 2,766 periodicals.

Academic recognition

U.S. NEWS & WORLD REPORT ranks UAHuntsville among the 150 best national doctoral universities – a distinction shared by only seven percent of the more than 2,000 four-year colleges in America. UAHuntsville's academic reputation has been consistently recognized by other respected national publications. BARRON'S PROFILES OF AMERICAN COLLEGES lists UAHuntsville as "very competitive," the only public university in Alabama to achieve this ranking. UAHuntsville also was highlighted as being among "Top Colleges for Top Students" by PETERSON'S COMPETITIVE COLLEGES. The university has been recognized by America's 100 Best College Buys for eleven consecutive years for providing students a high quality education at a competitively low cost.

Location

Located at the southern edge of the Appalachian Mountains, Huntsville is a national center of aerospace and high technology research and development. It is home to NASA's Marshall Space Flight Center, and major U. S. Army research and development centers at Redstone Arsenal including the U. S. Army Aviation and Missile Command (AMCOM), and the U.S. Army Space and Missile Defense Command (SMDC). UAHuntsville is the anchor tenant in Cummings Research Park, the second largest research park in the United States and home to more than 225 high technology and research companies with more than 23,000 employees.

Academic calendar

UAHuntsville is on the semester system, offering a full program of undergraduate and graduate day and night classes throughout the year, including the summer.

Mailing address: The University of Alabama in Huntsville, Huntsville, Ala. 35899.
Telephone: 256.824.6120 or 1-800-UAH-CALL.

You will have an unforgettable experience in Huntsville at the Annual ASB Meeting April 13-16, 2011. Don't miss it!

PAPERS & ABSTRACTS

You must attend and present your paper/poster to be published in the July issue of SEB. Please visit the ASB web site for the latest listing of papers and posters for the Asheville meeting! www.sebiologists.org

The Abstract Deadline is Friday, January 28, 2011.

For questions concerning posters and paper submissions, please contact Dr Nicole Welch, MUW, office: (662) 329-7243 or e-mail: nwelch@as.muw.edu

PLENARY SPEAKER

DR. GARY E. MACHLIS

Canon Professor of Conservation, Department of Cooperative Ecosystem Studies Units Network, University of Idaho, and Science Advisor to the Director, National Park Service, Washington, DC.

Scenario-Building during the Deepwater Horizon Oil Spill

In September 2009, Gary was appointed the first Science Advisor to the Director for the National Park Service. He is playing a key role in advancing science within the NPS, advising the NPS director on science policy and programs, and working with the Department of the Interior leadership, NPS managers and stakeholders as well as the scientific community. Machlis received his B.S. and M.S. in forestry at the University of Washington, and his Ph.D. in human ecology at Yale University. He is Professor of Conservation at the University of Idaho, where he has taught courses in protected area management, human ecology, and science policy since 1979. From 1995-2003 he served as the NPS Visiting Chief Social Scientist, and from 1998-2006 as the National Coordinator of the Cooperative Ecosystem Studies Unit (CESU) Network. He also helped establish and lead the National Parks Science Scholars Program, with over \$9 million in scholarships to doctoral students in North, Central, and South America. In addition to research on national parks, he has worked internationally on a range of ecological issues—including giant panda conservation in China, wildlife management in Kenya, tourism impacts in the Galapagos archipelago and the ecology of warfare. His recent research has been published in journals as varied as *Science*, *Climatic Change*, *Society and Natural Resources*, *BioScience*, and *Conservation Biology*. He has written several books on conservation, and his next book, *The Structure and Dynamics of Human Ecosystems*, will be published by Yale University Press. He is the lead scientist for the Department of Interior's Strategic Sciences Working Group, which has developed scenarios for response and recovery for the Deepwater Horizon oil spill, and leads an international effort on rebuilding Haiti's science and science education capacity. Gary is an elected Fellow of the American Association for the Advancement of Science (AAAS) and a member of its National Committee on Opportunities for Women and Minorities in Science.

We welcome Dr. Machlis to the 72nd Annual Meeting of the Association of Southeastern Biologists.



Dr. Gary E. Machlis

Social Events

Wednesday Night Mixer: Immediately following the Plenary Session, there will be a social mixer with LIGHT hors d'oeuvres, a cash bar, and live music. The mixer is a long tradition at ASB meetings and is a great time to renew old acquaintances and make new ones. Be sure to sign up for this FREE event on the registration form.

Thursday Night Social: "Sweet Home Alabama"

Some say that a meeting is judged by the success of the Thursday Night Social. We hope to maintain a longstanding tradition of music, dancing, and entertainment that will give you a break from the work of the meeting.

The Social will be located in the center of downtown Huntsville, and adjacent to the Embassy Suites. An easy one-minute walk from the Embassy Suites or Holiday Inn to the event. A great local band is returning for another fantastic performance. The **Midnighters**, specializing in a great mix of 60's through today's rock and roll dance music, will entertain you! Did someone say dance? Yes, dance music....so bring your dancing shoes for a night of great food, music and networking with friends alike!

Interactive, high energy and fun for everyone! You will not want to miss this!

Friday Night Awards Banquet: The culmination of the annual meeting is the ASB Awards Banquet, where we honor the accomplishments of members and students. Delicious beef, chicken and vegetarian options are available. Following dinner, awards will be presented. Remember that long speeches are no longer a part of the banquet. (A reminder: those competing for ASB awards must register for the meeting and be present at the banquet in order to receive the award.)

Activities for Guests

Attendees and family members will find many interesting places to visit in the Huntsville area. Visit the Huntsville website to learn more details about the following:

- ✓ US Space & Rocket Center
- ✓ Huntsville Botanical Garden
- ✓ Burritt On The Mountain
- ✓ Alabama Constitution Village
- ✓ Historic Huntsville Depot
- ✓ Huntsville Museum of Art
- ✓ Harrison Brothers Hardware Store
- ✓ North Alabama Railroad Museum
- ✓ Veteran's Memorial Museum
- ✓ Sci-Quest
- ✓ Early Works Children's Museum
- ✓ Weeden House Museum
- ✓ Harmony Park Safari

Conference Badges

You will receive your meeting badges when you arrive in Huntsville. Simply proceed to the Registration Area at the Von Braun Center (Convention Center) to receive your badge. Guests of conference participants should ask for guest conference badges at the registration desk. **YOU MUST WEAR YOUR BADGE TO ALL FUNCTIONS, INCLUDING SOCIAL EVENTS!**

ASB 2011 Field Trips and Symposia

These items will be listed in the April, 2011 issue.

SABS Student Awards!

The Southern Appalachian Botanical Society is pleased to announce two awards for students: the *SABS Outstanding Student Poster Award* and the *SABS Outstanding Student Contributed Paper Award*. These will be presented for the first time at the Association of Southeastern Biologists meeting in Huntsville, AL, in April 2011. SABS convenes as one of the affiliate organizations at this meeting. The posters and talks will be assessed by anonymous judges. Each award includes an honorarium of \$150.00, and the winners will be announced at the ASB banquet.

Qualifications: A nominee must be a current undergraduate or graduate student in good standing and must be a current member of SABS. A student will nominate his/her poster or oral presentation when registering for the ASB meeting and submitting the abstract. The instructions for nomination are on the ASB Website.

Commercial Workshops/Special Sessions

Commercial Workshops/Special Sessions will also be available for all registered attendees! These workshops presented by exhibitors will allow you to learn about the latest tips from the experts. The fee for each workshop will be \$10 each, and you may register to attend one or more workshops during the Annual ASB Meeting. To register, and to read about the workshop descriptions, go to www.sebiologists.org and click on Attendee Registration & Information. Space is limited and you must pre-register for them, so don't delay! All workshops will be held at the Von Braun Center (Convention Center).



Workshop Form

2011 Association of Southeastern Biologists
April 13-16, 2011 Huntsville, AL

Workshop Description: All commercial workshops will be conducted during the meeting on a first-come first-served basis. Classroom style seating will be provided at no additional charge to the presenter. Each classroom will be set for a minimum of 50 participants. A screen, laptop and LCD Projector will be provided for each room. **One workshop per application please. Please complete the entire form!**

Company/Organization _____

(Please list company name as you wish it to appear on printed materials)

Presenter _____ Email Address: _____

Contact Address: _____

Telephone: _____ Fax: _____

Web site: _____

Workshop Title: _____

50 Word Workshop Description: **Please e-mail description to**
A2ZConvention@gmail.com _____

(Description will appear on Web site and Registration Form)

Please indicate which time slot you prefer below:

Pre-Conference Workshop: Wed 4pm-5:30pm _____

Thurs 8:30am-10am ___ Thurs 10:30am-12noon ___ Thurs 1:30pm-3pm ___
Thurs 3:30pm-5pm ___ Fri 8:30am-10am ___

Deadline for workshop submission is 31 January 2011

Hold Harmless Clause

The workshop presenter assumes all responsibility and liability for losses, damages and claims arising out of injury to the presenter's display, equipment and other property brought upon the premises of the convention facilities and shall indemnify and hold harmless the association agents, servants and employees as well as the ASB organization from any losses, damages and claims.

Upon acceptance by ASB, this signed application and Workshop Contract form becomes the contract for the 2011 ASB Annual Convention. Workshop presenter will be notified of their acceptance by letter no later than 15 Feb 2011.

Signature _____

Date _____

Return Workshop Form by **January 31, 2011** to: Scott Jewell, ASB Meeting Coordinator, PO Box 1088, Mebane, NC 27302; A2ZConvention@gmail.com, 336/213-7373 cell, 336/421-0034 office, 336/421-3425 fax.



Industry Partners Form

2011 Association of Southeastern Biologists
April 13-16, 2011 Huntsville, AL

 Yes I Would Like To Partner With ASB And Participate
In the Industry Partners Program!!

Send no money now, please complete form and return to address shown below

Company/Organization _____
(Please list company name as you wish it to appear on printed materials)
 Representative: _____ Email _____
 Address: _____
 City, State, Zip: _____
 Telephone: _____ Fax: _____

*Special Recognition at the Thursday Night Social, Friday Night Awards Banquet, signage at the Convention Center and a listing in Final Program of Southeastern Biology!

Qty	Item	Amount
_____	Wed Night Cash Bar (4 Opportunities)	\$500/opportunity
_____	Coffee Breaks (8 Opportunities)	\$500/opportunity
_____	Cyber Café & Marketing Survey	\$750/opportunity
_____	Thurs Night Social (4 Opportunities)	\$900/opportunity
_____	Fri Night Banquet Cash Bar	\$850
_____	Yes I wish to present a workshop	See Workshop Form
_____	24 Hour Exhibit Hall Security	\$1,000
_____	ASB Executive Committee Breakfast	\$350
_____	Yes I would like to Donate an Item to the Silent Auction to help with Student Travel	See Silent Auction Form
_____	ASB Web Site Hot Link to Your Company (12 months)	\$375

 Signature Date

 Title e-mail

Return Form With Check or Credit Card Information by **March 15, 2011** to: Scott Jewell, ASB Meeting Coordinator, PO Box 1088, Mebane, NC 27302; A2Zconvention@gmail.com, 336/213-7373 cell, 336/421-0034 office, 336/421-3425 fax.



Advertise With The Association of Southeastern Biologists

Reach Your Target Audience and Promote your Products and Services Throughout the Year!!

Advertise in Southeastern Biology!! And on ASB's NEW Web Site!

Advertise in Southeastern Biology and reach over 5,000 people from 42 states and 9 countries. ASB publishes four issues of Southeastern Biology per year and an on-site Program for the Annual Meeting. Choose either or both of these opportunities to increase your marketing exposure. Promote your products and services throughout the year!

Ad Sizes

¼ Page Ad	1½" x 1"
½ Page Ad	3" x 2"
Full Page Ad	7½" x 4 ¾"



ADVERTISING ORDER FORM

_____ Ad in all 4 issues of Southeastern Biology (check choice)

_____ ¼ page = \$200, _____ ½ page = \$325, _____ full page = \$425

_____ Ad in Final On Site Program (check choice)

_____ ¼ page = \$175, _____ ½ page = \$225, _____ full page = \$275

*All ads are black and white and must be submitted in pdf.
All ads will be posted on the NEW ASB Web Site!

Signature Date

Title phone e-mail

___ Visa ___ MasterCard ___ Discover ___ AMX ___ Check

CC# _____ Exp ___/___ 3 digit code on back of credit card ___/___/___

Name As It Appears On Card _____

Credit Card Billing Address

*Last Name _____ *First Name _____

*Company/Organization _____

*Address _____

*Line 2 _____

*City _____ *State _____ *Postal Code _____

*Phone _____

Office Use Only
Paid with check # _____ on Date _____ Rec'd by: _____
Paid with credit card # _____ on Date: _____ Rec'd by _____
Confirmation Sent on Date: _____ via _____

Return form with check or credit card information to: Scott Jewell, ASB Meeting Coordinator, PO Box 1088, Mebane, NC 27302; A2ZConvention@gmail.com, 336/213-7373 cell, 336/421-0034 office, 336/421-3425 fax.

Annual Meeting Registration Information

ONLINE REGISTRATION WILL OPEN MARCH 1, 2011

A downloadable and printable registration form will be available online www.sebiologists.org on March 1, 2011 for those who desire to mail in or fax their registration form. Online Registration will close on April 7th, 2011. We encourage everyone to register early and save money. ASB offers 3 options for registration: 1) On-line @ www.sebiologists.org; 2) US Mail sent to A2Z Convention Services, PO Box 1088 Mebane, NC 27302; 3) Fax the form directly to A2Z Convention Services 336-421-3425. Details of the options follow on the registration form. Mail in registration must be postmarked by April 1, 2011. After April 1, 2011 postmark, you will be charged on-site registration pricing, no exceptions.

ASB 2011 Hotel Information

- **Please use the ASB approved and sponsoring hotel(s).**
- **ASB will receive exclusive benefits for using the ASB sponsored hotel.**
- **Experience comfortable convenience! An easy 2-3 minute walk to the Convention Center!**
- **Park your car at the hotel and leave it until the end of the convention.**
- **All conference events will be held at the Von Braun Center adjacent to the Embassy Suites via catwalk and across the street from the Holiday Inn.**

ASB has secured the following hotels at a discounted rate for exhibitors and attendees. Please remember to ask for the special **ASB discounted rate when making reservations**. The following hotels are providing additional services to accommodate ASB. Please make your reservations as soon as possible. The Embassy Suites is our Headquarters Hotel and has been secured for Exhibitors and ASB attendees. There is a small daily parking fee at the Embassy Suites but not at the Holiday Inn for personal vehicles and vans. Please make your reservations as soon as possible. Please visit their web sites for directions to their property or use your "lady in the box" (GPS). **THE LAST DAY TO RESERVE A ROOM AT THE DISCOUNTED RATE IS MIDNIGHT 3/4/2011.**

Headquarters Hotel: Embassy Suites-Huntsville, AL**Each 2-room suite includes the following:**

- Daily Complimentary Breakfast
- Daily Evening Managers Reception-Light Hors d'œuvres, beer and soft drinks.
- Microwave
- Sofa Bed
- Refrigerator
- 2 Large Flat Screen TV's
- Coffee Maker
- Complimentary High Speed Internet (Normally \$9.95/day)
- Free Airport Shuttle, Free Shuttle to Downtown Attractions
- Business Center
- Indoor Swimming Pool and Hot Tub
- On Site Ruth's Chris Steakhouse
- State-of-the-Art Fitness Center
- On-Site Day Spa: "Spa Botanica"

HOTEL RESERVATIONS FOR REGULAR ATTENDEES AND EXHIBITORS

To Make a Reservation at the Embassy Suites, and discover additional information about the hotel please use the following personalized ASB link or call the hotel directly and use code ASB-(Assn of Southeastern Biologists) for the special Rate:

ASB Discounted Room Rates are as follows:

Single/Double: \$149, Triple \$159, Quad \$169

http://embassysuites.hilton.com/en/es/groups/personalized/HSVESES-ASB-20110408/index.jhtml?WT.mc_id=POG

Group Name: ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
Group Code: ASB
Hotel Name: [Embassy Suites Huntsville - Hotel & Spa](#)
Hotel Address; 800 Monroe Street
Hotel Address: Huntsville, Alabama 35801
Hotel Phone: 256-327-7809

HOTEL RESERVATIONS FOR STUDENTS ONLY--2 OPTIONS

Student Option 1

Embassy Suites – Huntsville

Special Note: A **LIMITED** NUMBER OF ROOMS ARE AVAILABLE FOR STUDENTS ONLY, AT A SPECIAL STUDENT RATE. THESE ROOMS ARE FIRST-COME, FIRST-SERVED BASIS ONLY. USE THIS LINK TO ACCESS THE STUDENT RATE: This rate is \$129 for a limited number of rooms only. http://embassysuites.hilton.com/en/es/groups/personalized/HSVESES-ASF-20110408/index.jhtml?WT.mc_id=POG

Note: If you call the hotel directly, use code ASF for this special rate only.

ASB Discounted Student Room Rates are as follows:

Single (Until sold Out) \$129, Double: \$149, Triple \$159, Quad \$169

Group Name: ASSOCIATION OF SOUTHEASTERN BIOLOGIST (FIRST COME FIRST SERVE SINGLE OCCUPANCY RATE)
 Group Code: ASF
 Check-in: 08-APR-2011
 Check-out: 19-APR-2011
 Hotel Name: [Embassy Suites Huntsville - Hotel & Spa](#)
 Hotel Address: 800 Monroe Street
 Huntsville, Alabama
 35801
 Phone Number: 256.327.7809

Student Option 2

The Holiday Inn Huntsville-Downtown

Each room includes the following:

- Free Parking
- Complimentary High Speed Internet
- Free Airport Shuttle, Free Shuttle to Downtown Attractions
- Business Center
- Outdoor Swimming Pool and Hot Tub
- Fitness Center

ASB Discounted Student Room Rates are as follows:

Single \$119, Double: \$119, Triple \$129, Quad \$129

Holiday Inn Huntsville-Downtown

401 Williams Avenue SW
Huntsville, AL 35801
Hotel Reservations Phone: 256-533-1400
Toll Free Central Reservations: 800-Holiday or 888-465-4329

GETTING TO HUNTSVILLE IS EASY

Huntsville is less than a day's drive for almost one quarter of the nation. Interstate 565 is easy to access and will transport you directly to downtown Huntsville.

The Huntsville International Airport is 12 miles from downtown. The Embassy suites and Holiday Inn offer free hotel shuttle to/from the Huntsville airport. It is serviced with over 70 daily jet flights via Delta, American, American Eagle, Northwest, Comair, US Airways & Continental through hubs in Chicago, Dallas, Washington, Atlanta, Charlotte, Cincinnati, Houston and Memphis.

The Madison County Executive Airport features a 5,008' X 100' runway which allows corporate jets access to the airport. It is located 11 miles from downtown. Please call your hotel directly for complimentary shuttle service.

Silent Auction

ASB will again hold a silent auction next to the exhibitors. All of the proceeds will go towards supporting student travel to the Annual meeting. Come look at the items up for bid and help support our presenting students. Please use the form on the next page if you donate items.



Silent Auction

_____ **Yes**, I would like to contribute to the Silent Auction to help with student travel to the Annual Meeting. (100% of all proceeds to benefit student travel.)

Partial List of Items Donated at the 2009 Annual Meeting.

- | | |
|---------------------------------|--------------------|
| Dissection Set | Charts |
| Corporate Gift Certificates | Wine Gift Basket |
| Frog Model | Educational Charts |
| Dinner for Two | Microscope |
| Two Nights Hotel Accommodations | Books |

Description of item(s) to be donated:

Please check appropriate option:

_____ Please contact me at the convention to pick up donation.

_____ I will mail donation to Scott Jewell, ASB Meeting Planner, before March 15, 2011.

Signature	Date	phone
Title	e-mail	

Return form by **March 15, 2011** to: Scott Jewell, ASB Meeting Planner, PO Box 1088, Mebane, NC 27302; A2Zconvention@gmail.com, 336/213-7373 cell, 336/421-0034 office, 336/421-3425 fax.

LOCAL COMMITTEE ASSIGNMENTS FOR THE 72nd ANNUAL MEETING

Local Arrangements Co-Chairs:

<i>Program Committee:</i>	Nicole Welch nwelch@as.muw.edu	(662) 329-7243
<i>Field Trips:</i>	Joey Shaw joey-shaw@utc.edu	(423) 425-4265
	Randy Small rsmall@utk.edu	(865) 974-6207
<i>Social Events:</i>	Scott Jewell A2ZConvention@gmail.com	(336) 421-0034
<i>Volunteer Coordinators:</i>	Marilyn Pendley mpendley@cccti.edu	(828) 759-4685
<i>Tri-Beta Coordinators:</i>	Christi Magrath cmagrath@troy.edu	(334) 670-3626
	Don Roush dhroush@una.edu	(256) 765-4435
<i>Audiovisual Coordinator:</i>	Scott Jewell A2ZConvention@gmail.com	(336) 421-0034
<i>Silent Auction:</i>	Scott Jewell A2ZConvention@gmail.com	(336) 421-0034
<i>Meetings Coordinator:</i>	Scott Jewell A2ZConvention@gmail.com	(336) 421-0034

The Meetings Coordinator arranges/coordinates the Annual Meeting Budget, Commercial Exhibits & Workshops, Special Sessions, Advertising, On-Line Registration, On-Site Registration, Hotel Accommodations, and Transportation.

Affiliate Societies Meeting with ASB
APRIL 13-16, 2011

The following affiliate societies will be in attendance at the 2011 Annual Meeting. We anticipate an excellent diversity of paper and poster presentations. The societies and their contacts are listed below.

American Society of Ichthyologists and Herpetologists, Southeastern Division

Dr. Greg Fulling
E-mail: gfulling@geo-marine.com
Website: <http://www.asih.org>

Beta Beta Beta Southeastern District I

Dr. Steven J. Coggin
Department of Biology
Catawba College
Salisbury, NC 28144
(704) 637-4110
acoggin@catawba.edu

Beta Beta Beta Southeastern District II

Dr. Christi Magrath
Dept. of Biological & Env. Sci.
Troy University
Troy, AL 36082
(334)670-3622
e-mail: cmagrath@troy.edu

Botanical Society of America Southeastern Section

Dr. Lytton John Musselman
Mary Payne Hogan Professor of Botany and Chair
Department of Biological Sciences
110 Mills Godwin Building/45th St
Old Dominion University
Norfolk, VA 23529-0266
(757) 683 3595; Fax: (757) 683 5283
e-mail: lmusselm@odu.edu
<http://web.odu.edu/lmusselman>

Ecological Society of America Southeastern Chapter

Dr. Dean Cocking
Department of Biology
James Madison University
Harrisonburg, VA 22807
(540) 568-6566
Fax (540) 568-3333
cockingwd@jmu.edu

Society of Herbarium Curators

Dr. John Nelson
Department of Biological Science
University of South Carolina
Columbia, SC 29208
(803)777-8196
e-mail: nelson@biol.sc.edu

Society of Wetland Scientists South Atlantic Chapter

Dr. David Bailey
U.S. Army Corps of Engineers
CE-SAW-RG-L
69 Darlington Ave.
Washington, DC 28403-1343
(901) 251-4469
David.E.Bailey2@usace.army.mil

Southern Appalachian Botanical Society

Dr. Lytton John Musselman
Mary Payne Hogan Professor of Botany and Chair
Department of Biological Sciences
110 Mills Godwin Building/45th St
Old Dominion University
Norfolk, VA 23529-0266
(757) 683 3595; Fax: (757) 683 5283
e-mail: lmusselm@odu.edu
<http://web.odu.edu/lmusselman>

**Southeastern Society of
Parasitologists**

Dr. Vince Connors,
Secretary-Treasurer
Dept. of Biology,
University of South Carolina Upstate
800 University Way
Spartanburg, SC 29303
(864) 503-5780
email: vconnors@uscupstate.edu

Southeastern Fishes Council

Dr. Henry Bart
Tulane Museum of Natural History
Tulane University
Belle Chasse, LA 70037
Phone: (504) 394-1771
Fax: (504) 394-5045
E-mail: hank@museum.tulane.edu

Southeastern Microscopy Society

Cynthia S. Goldsmith
Secretary, SEMS
E-mail: csg1@cdc.gov
Website: <http://www.southeasternmicroscopy.org>

**National Association of Biology
Teachers**

Lisa Walker
Director of Conventions
walker@nabt.org

SPECIAL REMINDERS FROM THE JOURNAL EDITOR

ASB BANQUET ATTENDANCE

Please keep in mind that recipients of ASB awards must be present at the annual ASB banquet to receive the award. Therefore, all applicants for ASB awards must attend the banquet to insure the presence of the winners.

MEMBERSHIP AND REGISTRATION UPDATE

All applicants for ASB research awards must be ASB members in good standing, and be duly registered for the annual meeting. If necessary, check with the Treasurer for verification before you apply.

Please make sure your membership status is up-to-date amply before the deadline for abstract submission and for annual meeting registration. Please be aware that mailing a check or money order for membership renewal to the treasurer and then trying to register online or by mail for the annual meeting on the same day does not work. Moreover, trying to pay for membership renewal online in tandem with registering for the annual meeting online does not work well either.

EXTRA ABSTRACT SUBMISSION

Besides sending abstracts of papers and posters to the Program Committee by January 28, 2011, anyone wishing to be considered for an award must send an abstract to the respective award committee chairperson in order to be considered. An abstract must be sent to the chairperson by January 28, 2011.

Preliminary Presentation Instructions

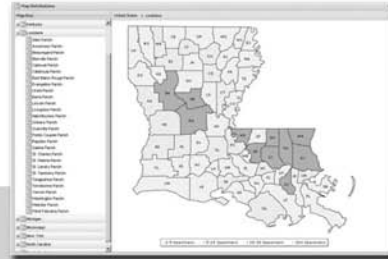
Paper (oral) presentations are allotted 15 minutes, must be in PowerPoint format, and must be brought to the meeting on a USB memory drive. Presenters will be required to load their presentations on the session's laptop computer at the beginning of the session. **Poster presentations** must fit in a 46" x 46" space and presenters should bring their own push pins for hanging their poster. Posters will hang for the entire day and presenters will stand with their posters for a designated one-hour period. More specific instructions for paper and poster presentations will be posted on the ASB website when abstract acceptance notifications are released.

Questions? Contact Program Chair, Nicole Turrill Welch, nwelch@as.muw.edu.

Silver BIOLOGY

A biodiversity informatics software development company that specialized in online products and custom solutions for biological and natural history collections.

- * Interactive Web Applications
- * Digital Archiving of Specimen Sheets
- * Distribution Maps
- * Custom Software Solutions



Silver COLLECTION

Web Portal Software for Biological & Natural History Collections

Search Specimen DB

Filters	Catalog #	Family	Genus	Species	State	Parish/County	Locality
Family: Asteraceae	Family: Asteraceae (100 Specimens)						
Genus:	17429	Asteraceae	Achillea	millefolium	Louisiana	Assumption Parish	Paincourtville
Species:	17430				Louisiana	Bienville Parish	unspecified
State:	17431				Louisiana	East Baton Rouge Par	Baton Rouge
Parish/County:	17432				Louisiana	East Baton Rouge Par	Plains
Locality:	17433				Louisiana	East Feliciana Parish	Clinton
Collector:	17434				Louisiana	Lincoln Parish	unspecified
Catalog #:	17435				Louisiana	Morehouse Parish	Bonita
	17436				Louisiana	St. Helena Parish	Greensburg
	17437				Louisiana	St. Helena Parish	Greensburg
	17438				Louisiana	St. Helena Parish	Greensburg
	17439				Louisiana	Vernon Parish	Leesville
	15907				Louisiana	East Baton Rouge Par	Ben Hur Woods
	27784				Louisiana	St. Martin Parish	Cypress Island Preserv
	13268				Louisiana	Ascension Parish	Brittany
	13269	Asteraceae	Ageratina	altissima	Louisiana	Ascension Parish	New River

SilverCollection is an interactive web portal for herbaria and other biological collections. It is a client-specific customized application for online access to specimen data. This application provides an interactive solution for curating, searching, and browsing your collection records. **More info at: collection.SilverBiology.com**

www.SilverBiology.com

contact@silverbiology.com

**ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
PROPOSED CHANGES IN THE BYLAWS AND CONSTITUTION
APPROVED BY THE EC AT THE INTERIM MEETING**

Statements written in ~~boldface~~ are to be deleted. Those written in **boldface/italics** represent additions. Voting will be conducted at the annual business meeting.

Article II - Election of Officers

Section 5. A President-Elect shall be elected every other year ~~and shall become President at the close of the next Annual Meeting, and serve a 1-year term, then a 2-year term as President, and a 2-year term as Past President.~~

Article III - Duties of Officers

Section 1. The President shall be the executive officer of the Association, **for a 2-year term, and** shall perform the duties usual to the office. **He/she** shall appoint, with the advice of the Executive Committee, regular committees, special committees authorized by the Executive Committee, and where appropriate, Association Representatives to other organizations. The President shall notify Emeritus members of their election. ~~In the second year of the term of office, he/she shall serve as Chair of the Nominating Committee.~~

Section 2. The President-Elect shall **serve a 1-year term during which he/she will keep in close contact with the President and Past President and in effect study the Presidency.** ~~organize the program for the plenary session of the Annual Meeting and serve as chair of the Resolutions Committee on alternate years.~~ In the event that the President-Elect cannot complete her/his term of office, the person who received the next highest number of votes shall become President-Elect. If this person is unable to serve, the Executive Committee shall nominate two candidates for the office, one of whom would be elected by the membership by mail ballots.

Section 3. The Past President **shall serve a 2-year term, and** in order to provide continuity in the governance of the Association, shall serve as advisor to the President on matters of past policy. He/She shall serve as Chair of the Resolutions Committee, Nominating Committee, and of the Past Presidents' Council. ~~He/she will continue service as Chair of the Past Presidents' Council in the year following her/his term of office.~~

Section 4. The Vice President **shall serve a 1-year term and** shall be the public relations officer of the Association. He/She shall organize the program for the plenary session of the Annual Meeting. ~~on alternate years when the office of President-Elect is not~~

~~occupied~~—In the absence of the President from any meeting, the Vice President shall discharge the duties of the office, and in the event that the President cannot complete her/his term of office, the Vice President shall become President of the Association.

Article VII - Standing Committees

Section 1. The following standing committees shall serve the Association:

A. – I Unchanged.

~~J. Patron Member and Exhibitor Committee~~

J. Place of Meeting Committee

K. Poster Awards Committee

L. Publications Committee

M. Resolutions Committee

N. Senior Research Awards Committee

O. Student Research Awards Committee

P. Microbiology Awards Committee

Q. Membership Benefits Committee

Section 2. Committee members, except for those who serve ex officio, shall be appointed by the President upon the approval of the Executive Committee. The composition and duties of the standing committees shall be as follows:

A. – I Unchanged

~~J. The Patron Member and Exhibitor Committee shall communicate with patron members and exhibitors, provide Local Arrangements Committees with information and recommendations regarding potential exhibitors, and promote an increase in the number of patron memberships and Annual Meeting exhibitors. The committee shall consist of a Chair (3-year term) appointed by the President with option to reappoint to successive terms, Vice Chair (3-year term) elected by the Executive Committee from its membership at the end of the first year of the Chair's term, the ASB Vice President, and the Past Chair of the Local Arrangements Committee.~~

K. The Poster Awards Committee may each year select a recipient of the Association's Poster **Award Prizes** for the meritorious presentation of original research by members at the Annual Meeting. The Committee shall consist of **six three** members appointed for terms of 3 years, with **two** members appointed annually and serving as **Co-chairs** in the third year.

Change in the Constitution as Required by the Bylaws Changes

Article III - Officers

Section 2. The term of office is 3 years for the Secretary and Treasurer, 2 years for the President **and Past President**, and 1 year for the other offices.

Additional Proposed Changes

**To be approved by the EC at the Annual Meeting
If approved, voting will be conducted at the Business Meeting**

ASB Constitution

Article IV - Executive Committee

- Section 1. The officers of the Association, six (6) Members-at-Large elected by the membership, the Journal Editor of *Southeastern Biology*, the Membership Officer, the Web Editor of ASB, and the Archivist of the Association shall constitute the Executive Committee. The Journal and Web Editors, Membership Officer, and Archivist shall be ex officio, nonvoting members with the right to discuss all issues and to propose motions. Members-at-Large shall serve terms of 3 years with two members elected each year.
- Section 2. The Executive Committee shall meet in the fall of each year and in the spring during the Annual Meeting of the membership. (Sections 1., 2, unchanged).
- Section 3. *The Executive Committee shall serve additionally as the Corporation's Board of Directors.***

ASB Bylaws

Article III - Duties of Officers

- Section 1. The President shall be the executive officer of the Association ***and chair of the Corporation Board of Directors***, for a 2-year term, and shall perform the duties usual to the office. He/she shall appoint, with the advice of the Executive Committee, regular committees, special committees authorized by the Executive Committee, and where appropriate, Association Representatives to other organizations. The President shall notify Emeritus members of their election. **Note the assumption: Other changes proposed for this section to the Executive Committee, April 13, 2011 will be adopted (See document "ASB C & B Changes-'11-3")**

Article VI – Executive Committee

Section 1-5 Unchanged

- Section 6. *Serving as the Corporation Board of Directors, the committee shall report to the North Carolina Department of State any changes in specific articles of the Constitution, viz., Article I, Section 2., Article VI, and Article VII that treat the Association's Purpose, Disposition of Property, and Incorporation, respectively. The Board may change its registered office or registered agent by notifying the North Carolina Department of State within 60 days after such change takes effect.***

**ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
EXECUTIVE COMMITTEE MEETING
WEDNESDAY, 7 APRIL 2010
ASHEVILLE, NORTH CAROLINA**

ATTENDANCE: 18 individuals attended the meeting

NAME	CAPACITY
Patricia Cox	President
Floyd Scott	Vice President
Nicole Turrill Welch	Secretary
Tim Atkinson	Treasurer
Terry Richardson	Membership Officer
Ron Dimock	EC Member-at-Large
Joey Shaw	EC Member-at-Large
George Cline	EC Member-at-Large
John Herr	Archivist
James Caponetti	Print Editor
Dennis Haney	Web Editor
Jennifer Davis	Human Diversity Committee, Chair
Scott Jewell	Meetings Coordinator
Ginger Bayless	Meetings Planner
Steve Coggin	Beta Beta Beta – Region I
Don Roush	Beta Beta Beta – Region II
Sean O'Connell	2010 LAC
Charles Faulkner	SSP

1. Call to Order and Welcome

President Patricia Cox called the meeting to order at 1:30 p.m. and welcomed everyone to Asheville, North Carolina.

2. Approval of the Executive Committee Meeting Minutes

Motion 1. Floyd Scott moved to accept the 19 September 2009 Executive Committee Interim Meeting. Terry Richardson seconded the motion and the motion passed.

3. Local Arrangements Committee Report – Asheville 2010

Sean O'Connell reported that the Asheville Local Arrangements Committee (LAC) scheduled more than 400 abstracts into paper (256 abstracts) and poster (188 abstracts) sessions; organized ten scientific field trips, a BioBlitz, and cultural activities; arranged for audiovisual support; coordinated the silent auction; recommended entertainment and refreshments for meeting social

events; and arranged for printing the meeting Schedule. These activities will support a large, scientifically engaging meeting. He also shared that Western Carolina University committed \$6,100 worth of resources to this Annual Meeting.

4. Officer's and Executive Committee Reports

Secretary's Note – The following report summaries were written by each respective Officer or Committee Chair and entered directly into these minutes.)

President – Patricia Cox

As President of ASB, I am very happy to work with such a wonderful group of folks who are great at what they do, which in turn makes my job so much easier. ASB was asked to write a letter of support for Louisiana Coalition for Sciences to oppose the teaching of creationism. Since I am a product of the Louisiana Educational System, I felt it was important to lend our support to this cause. To increase our national awareness, Tim Atkinson, Marilyn Pendley and I represented ASB at the Botanical Society of America Meetings in Snowbird, UT. We also brought information about several of our affiliate societies to pass out to attendees. I have also worked closely with the local arrangements committee, various ASB council members and provided a presidential "view from here" article for two issues of *Southeastern Biology*.

Vice President – Floyd Scott

Floyd Scott reported that he, working with Scott Jewell and other Executive Council members, had been involved in a number of tasks since the 19 September 2009 Executive Council meeting in Huntsville, Alabama. Among these were 1) providing the ASB Print Editor with a short vitae and photo of Dr. David Wagner, the 2010 plenary speaker, 2) communicating with Dr. Wagner concerning his travel arrangements and hotel accommodations for the 2010 meeting, 3) preparing and distributing the invitations for the Patrons and Exhibitors breakfast and 4) scheduling coverage of the ASB booth at the 2010 meeting.

Past President and Nominating Committee – Tom Wentworth

Tom Wentworth completed a variety of tasks during 2009-2010, including serving as Chair of the Nominating Committee, the Resolutions Committee, and the Past-Presidents' Council. Tom worked closely with President Pat Cox, Archivist John Herr, and others to ensure that tasks related to appointment of Dr. Edward O. Wilson as the first Fellow of the Association of Southeastern Biologists were completed. Tom also published his Past President's Address in the October 2009 issue of *Southeastern Biology*, and he contributed to an *ad hoc* committee charged with establishing guidelines and processes for the John Herr Lifetime Achievement Award.

Committee Chair Thomas Wentworth reported that the Nominating Committee secured nominees for the offices of President-Elect (two nominees: Donald Roush and R. Wayne Van Devender), Vice President (two nominees: Jennifer Davis and Ray Williams), Secretary (Conley McMullen and Terry Richardson), and Executive Committee Member-at-Large (four nominees: James Costa, Christi Magrath, Ashley Morris, and Alan Weakley). The election of officers will take place at the Annual Business Meeting, and results will be announced at the Awards Banquet, Friday, April 9, 2010.

Secretary – Nicole Turrill Welch

In this, my last year as Secretary, I worked with President Pat Cox on Association matters and communications, including minutes from the 2009 meetings of the Executive Committee and the Association, and Resolutions from the 2009 Annual Meeting. I coordinated submission of the 2009-2010 Officer and Committee Chair Reports using a new form requiring submitters to write their own summary for the minutes. I also prepared certificates and letters of thanks for outgoing Officers and Committee Chairs. Lastly, I created a check list and CD-ROM of important files and forms for the incoming Secretary. It has been a pleasure to serve ASB in this capacity for the past three years.

Treasurer, Business Manager – Tim Atkinson

Tim Atkinson completed numerous business-related tasks since the Fall 2009 Interim Meeting, including:

1. Ongoing maintenance of ASB PCI DSS & PA-DSS compliance.
2. ASB online membership database and registration system (Avecetra).
3. ASB financial accounts (Wachovia/Wells Fargo).
4. ASB e-commerce account (PayPal).
5. ASB Merchant Services account (Wachovia/Verisign).

The financial status of the Association is good, better than usual, for FY 1009. Membership dues are the best we have seen in years, and more than covered the printing of *Southeastern Biology*. Gross meeting revenues for 2009 totaled \$133,378.

Tim also encouraged all Executive Committee members to donate to the Enrichment Fund, as their year's challenge from an anonymous donor requires 100% participation of the Executive Committee before donations can be accepted from the Membership. The anonymous donor will match all donations up to \$5000.

Archivist – John Herr

The system category, "5.9, Files for Affiliate Societies" subdivided to provide separate folders for each affiliate society, was revised on July 31, 2009 so to have one folder for all affiliate society documents. Tri-Beta is the only affiliate

society to submit documents for the Archives. Archived items were last taken to Hargrett Library for storage on July 31, 2009. The Archivist engaged the services of one of the nation's very outstanding book binders, Ms. Dea Sasso, to design and construct the book entitled, "Fellows of the Association". John showed the book to us, as well as E.O. Wilson's entry to the book, our first.

Print Editor – Jim Caponetti

Allen Press continues to do an excellent job in printing each issue of *Southeastern Biology*. I thank Beverly Collins, Jonathan Horton, and Scott Jewell for supplying pictures which have appeared in the past three issues of the journal. The Darwin Symposium organizers requested that full manuscripts of the six presentations be published in *Southeastern Biology*. Since this would be too expensive, the Print Editor offered to publish summaries. These appear in the January, 2010, issue. This year's invited research paper is by Dr. John Herr, and it appears in the January, 2010, issue of *Southeastern Biology*.

Web Editor – Dennis Haney

Throughout the past year I have worked closely with Amanda Myrick, our web designer, in keeping the ASB web site up-to-date. During this year I recommended that we extend Amanda's contract through December 2010, a proposal accepted by the EC. Officers, committee, and membership information have been updated and information about the 2010 annual meeting has been posted as it became available.

Membership Officer – Terry Richardson

ASB's total membership of 1,257 as of March 3, 2010 remains relatively constant, up only 5 members from last year. We are, however, still some 118 members short of the 2008 total 1,375. While Student membership is up 34 from last year, Exhibitor membership fell by 22 compared to '09 helping to offset the gain in Student membership. Losses in Emeritus, Library, Complimentary and Contributing memberships also had losses in membership. The Life membership continues to creep slowly upward with 11 additional Life members for 2010.

The Membership Officer in coordination with the Membership Benefits Committee completed a membership survey to help identify programs and benefits the membership would like to see. These results were presented at the September 2009 interim EC meeting. One of the most notable conclusions of the survey was the call for our Association to have a peer-reviewed journal.

Motion 2. Terry Richardson moved that the nominations John M. Schmidt and Susan M. Schmidt for Emeritus Status be accepted. George Cline seconded the motion. The motion passed.

News Editor – Ricky Fiorillo

We did not have any news submissions since our April meeting. In the past, when I have sent out an email to the membership soliciting news, we have had much better success. For instance, our October 2008 issue had 6 full pages of 'News'. However, I do not have access to the ASB email database so typically I have emailed my news solicitation through Tim Atkinson. This year, for one reason or another, I did not do so. It is obvious that in order to generate news submission, I must again solicit news through email.

5. Committee Reports**Conservation – Danny Gustafson**

The ASB Conservation Committee (Danny Gustafson, Patricia Sellers, and Pete VanZandt) has finalized the Conservation Committee expert list and sent this information to Dr. Dennis Haney. We requested that Dr. Haney link this information to the official ASB website and (if possible) make it a searchable page rather than simply a pdf or excel format link. In order to keep the expert list current, we would like to recommend changes to the Conservation Committee's Leadership Guidelines. We would like the second most senior member on the Conservation Committee to have the responsibility for reviewing, updating, and expanding the Expert list annually.

Education – Irene Kokkala & Stephanie Songer

The education committee organized a workshop on teaching biology online. The workshop was composed of a series of mini presentations by members of the committee followed by discussion on the challenges of this issue.

Enrichment Fund Board – Mike Dennis

Committee Chair W. Michael Dennis monitored the activities of the Enrichment Fund during the past year. This included coordination with ASB Treasurer, Tim Atkinson, on the amount of funding from the previous Past President's fund raising challenge; securing a matching fund donor for this years Executive Committee fund raising challenge which was approved at the Fall Meeting of the Executive Committee; and arranging for the ASB Biology Teacher Award sponsored by the Enrichment Fund.

Graduate Student Support Award – Joey Shaw

The Graduate Student Support Award Committee received 20 valid applications, and the grand total of awards determined by the committee was \$5415.00. Award amounts for each student were based on lodging and meal requests, plus travel if their respective universities could not cover travel. Requests ranged from \$149 to \$499 and the average request was \$262.41. Letters informing the 20 applicants of their awards were mailed to them during the last week of March,

2010. Copies of the award amounts were sent to Mr. Atkinson so that checks will be ready for the students at the ASB table.

Joey raised the question of reimbursing students for the registration fee. The current language of the award reads "The awards are for lodging and meals only, including the ASB Banquet. Departments are urged to provide transportation for their graduate students." Discussion followed and it was suggested that students must report funding from other sources in their application.

Motion 3. Dennis Haney moved that we create a budget of \$7500 for 2011 Graduate Student Support Award for the Huntsville, Alabama Annual Meeting. Terry Richardson seconded. The motion was approved.

Human Diversity – Jennifer Davis

The Human Diversity Committee (Chair, Jennifer Davis, members Sharryse Henderson and Heather Griscom) has planned a luncheon/workshop event for Thursday, April 8, 2010. Dr. Kelly Ward, Professor of Higher Education, from Washington State University is presenting her research concerning managing an academic career and family. Her presentation title is "Academic Motherhood: Managing Work and Family". Full capacity participation of 50 can be accommodated.

Local Arrangements Committee 2011 – Huntsville, Alabama

Following the shooting tragedy of February 2010 where five members of the Department of Biology of the University of Huntsville were killed, Bruce Stallworth asked to step down as Chair of the 2011 LAC. Discussion followed that a local chair is necessary to arrange site-specific needs, such as graduate student volunteers, LCD projectors, laptops, etc. Terry Richardson volunteered to be a point of contact for the 2011 LAC.

Meritorious Teaching Award – Safaa Al-Hamdani

The ASB Meritorious Teaching Award Committee for 2009-2010 was chaired by Dr. Safaa Al-Hamdani, Jacksonville State University. The other members were Drs. Dwayne Wise, Mississippi State University, and Michael Baranski, Catawba College. Following the 2010 ASB Meeting, Safaa Al-Hamdani will retire from the committee, Dwayne Wise will become Chair, and Michael Baranski will remain as a member of the committee.

Dr. Dwayne Wise has been overseas on sabbatical assignment; therefore he could not participate in this year's evaluation processes. Dr. Ronald Dimock, Wake Forest University, was kind enough to agree in extending his participation in the committee for an additional year and served as the replacement member for Dr. Dwayne Wise. The Committee had six applications to choose from and the nominee for this year's award was unanimously selected.

Microbiology Research Award – Don Roush

Nine students clicked the radio button to apply for this award, but none sent their abstract to Don Roush, Chair of this Committee. The requirement of submitted the abstract to the Chair is clearly and thoroughly described in the award criteria, so none of these papers will be judged.

Past-President's Council – Tom Wentworth

Council Chair Thomas Wentworth reported that the Past-Presidents' Council will hold its annual breakfast meeting at the ASB Annual Meeting in Asheville, 7:00-8:30 AM on Thursday, April 8, 2010.

Place of Meeting – John Herr

The ASB Annual Meeting will be hosted in 2011, 2012, and 2013 respectively by the University of Alabama-Huntsville in Huntsville, the University of Georgia in Athens, and Marshall University in near-by Charleston, WV. The committee has discussed and recorded the changes in its role as well as changes in the role of the Local Arrangements Committee brought about by a shifting of the major responsibilities for the Annual Meeting to the ASB Meetings Coordinator.

Poster Award – Lathiena Manning

Since committee chair, Lathiena Manning, was unable to attend the meeting, Roland Roberts from Towson University took it upon himself to organize Poster Award judges.

Program Committee – Nicole Welch

I initiated contact with four companies who provide meeting abstract, program and registration management systems and received quotes ranging from \$1000 - \$4000 to handle a meeting the size of our Annual Meeting, approximately 800 presentations. Once I have more information from the Executive Committee on (1) what we are willing to spend for the services of a meeting management system, and (2) what services we seek, I will work closely with Tim Atkinson and Scott Jewel to obtain more detailed quotes and select a company to assist with the 2011 Annual Meeting in Huntsville, Alabama.

Publications – Ron Dimock & Randy Small

Our focus is the rising cost of publishing SEB. We are beginning to gather information on relative costs of maintaining our current publishing model vs. alternatives modes. Options might include the following: (1) maintain status quo; (2) reduce number of issues and/or size of SEB; (3) change format to "newsletter;" or (4) elimination of hard copy publication. Options 2-4 would require increased use of electronic dissemination (website/e-mail) which may incur additional costs. We request feedback from EC regarding these options. We also propose developing a membership survey to get feedback from membership regarding SEB.

Resolutions – Tom Wentworth

Committee Chair Tom Wentworth reported that the Resolutions Committee received no requests for resolutions during 2009-2010. The committee will create Resolutions of Appreciation for both the 2009-2010 Local Arrangements Committee and the two 2010 Annual Meeting host institutions (Western Carolina University and UNC-Asheville) for presentation at the upcoming Executive Committee Meeting on Wednesday, April 7, 2010. These resolutions will then be read at the Annual Business Meeting on Friday, April 9, 2010 for a vote by the ASB membership.

Senior Research Awards – George Cline

The committee received one application for consideration for the AAS Senior Research Award. The paper that was submitted was reviewed by the committee. The committee unanimously decided that the paper was excellent and should be considered for the Award. Upon verification that the applicant was a member in good standing with ASB, the decision was made to make the award.

Student Research Awards – Ricky Fiorillo

The committee received 5 abstracts before the January 15th deadline. Only 2 individuals submitted full papers to be considered for the ASB Student Research Award and the Brooke/Cole Award. Once the deadline for full submission had passed, I contacted those students that had not submitted full papers. Only two replied and stated that they were not aware of the additional submission requirement and asked to be withdrawn from the competition. After considering both submissions, the committee unanimously agreed that Mr. Steven J. Price should receive both awards for his paper titled 'Stage- and Species-Specific Responses of Stream Salamanders to Urbanization'

5. Affiliate Society Reports**NSCA – Alexander Krings**

Activities of the NSCA continue to benefit natural history collections and systematists associated with ASB in many ways, but particularly through emphasis on legislation to increase funds for systematics research from NSF and other agencies. In addition, NSCA and its many member institutions recognized that there exists a need for a strategic national policy structure to support the missions of systematic collections and in response launched a campaign for a Presidential Executive Order for the Preservation and Use of Science Collections. It is recommended that the ASB leadership also consider submitting a letter in support of this important campaign.

SABS – Conley McMullin

SABS had another successful year! Award winners included: Charlie Williams (Bartholomew Award); Michael Woods (Windler Award); Tianita Duke, Sarah

Gallihier, and Benjamin Hook (Core Award). Newly elected officers included: Lytton Musselman (President-Elect), Wendy Zomlefer (Council Member-at-Large), Michael Held (Membership Secretary), Ruth Douglas (Recording Secretary). John Pascarella became the new *Castanea* Editor-in-Chief. Charlie Horn (Treasurer) reported that our finances are in good order. The SABS archives housed on the campus of West Virginia University were updated. Donna Ford-Werntz is our archivist. Mike Baranski is chairing a committee that is making plans for our 75th anniversary.

SSP – Charles Faulkner

Charles shared that the majority of the SSP papers and poster to be presented at this meeting are graduate student research. SSP decided in approximately 1986 to meet every other year with ASB, and he expressed SSP's appreciation for our cooperation with this arrangement. Unfortunately, the SSP presentations were not included in the ASB Program for this Annual Meeting.

Beta Beta Beta – Regions I and II

Christi McGrath reported that student participation is good for this year, and shared details of the Tri-Beta activities planned for the 2010 Meeting.

7. OLD BUSINESS

Report from Ad Hoc Committee on Submission Guidelines and Qualifications for the John Herr Lifetime Achievement Award – Tom Wentworth

Tom shared that he recruited Ken Schull and Nicole Turrill Welch to this committee, and they worked to produce consensus, draft guidelines for this award. Tom distributed the criteria and discussion ensued, key points being the length of time a nominee must have been a member of ASB, and whether or not a nominee must have been an Officer of the Association. Suggestions were received, and the Committee will revise the criteria, and write a proposal for the 2010 Interim Meeting. Doug Raynor stressed that the award description needs to reflect the passion of its namesake for ASB.

Changes to the Leadership Guide for LAC and Place of Meeting Committee

John Herr suggested that members of the Executive Committee consider rewording descriptions of the Host Institution and Local Arrangements Committee to stress that Scott Jewell's company handles the vast majority of the meeting's organization. The Host Institution and Local Arrangements Committee are, simply, names and faces to represent the locale of each Annual Meeting.

8. NEW BUSINESS

Nomination for ASB Fellow – John Herr

John Herr suggested that Peter Raven, Missouri Botanical Garden, and Jane Goodall be considered for appointment of a Fellow of ASB.

Changes to the Committee Structure of the Student Research Award and Aquatic Biology Award

Ken Schull is concerned that the same student has won both the Student Research Award and Aquatic Biology Award five times in the last twelve years. Dennis Haney, who has served on this committee, said that these “double winners” clearly had excellent research and, by chance, were competing for both awards. Terry Richardson, who also has served on this committee, stated the obvious that if the Student Research Award winner does aquatic research, it makes sense that they also win the Aquatic Biology Award.

One-Day Registration at the Annual Meeting

An option of a one-day registration was discussed, and the Executive Committee decided that this was not a viable option for this Association. Joey Shaw suggested that the Host Institution be given a set number of passes to distribute to people who wish to attend a single event, or single day. Tim Atkinson did state that special circumstances have been made at meetings. Discussion concluded that these special circumstances should be brought to the Interim Meeting of the Executive Committee for consideration.

9. Announcements

There were no announcements.

10. Adjournment

Motion 4. A motion to adjourn was received at 5:20 p.m. President Pat Cox thanked everyone for coming and for their hard work during the year and meeting.

Respectfully submitted,

Nicole Turrill Welch, Secretary
1 September 2010

**ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
EXECUTIVE COMMITTEE MEETING
SATURDAY, 10 APRIL 2010
ASHEVILLE, NORTH CAROLINA**

ATTENDANCE: 18 individuals attended the meeting

NAME	CAPACITY
Patricia Cox	President
Don Roush	President-Elect
Jennifer Davis	Vice President
Tom Wentworth	Past President
Conley McMullen	Secretary
Tim Atkinson	Treasurer
Terry Richardson	Membership Officer
John Herr	Archivist
Ron Dimock	EC Member-at-Large
Randy Small	EC Member-at-Large
George Cline	EC Member-at-Large
Joey Shaw	EC Member-at-Large
Christi Magrath	EC Member-at-Large
Ashley Morris	EC Member-at-Large
James Caponetti	Print Editor
Dennis Haney	Web Editor
Scott Jewell	Meetings Coordinator
Jonathan Horton	2010 LAC

1. Call to Order

Patricia Cox called the meeting to order at 8:10 A.M., welcomed the new Officers and Executive Committee members, and thanked everyone for attending.

2. Report on Asheville 2010

Scott Jewell introduced and thanked Megan Kellogg, the official photographer for this year's Annual Meeting. Scott began his report with attendance figures for the Asheville meeting: total (1101, record number), Thursday evening social (549), Friday evening banquet (340). The workshops were well attended, and there was a better selection of commercial workshops this year. Most of the field trips were also well attended. A full financial report will be given at a later date. Scott mentioned that the next three Annual Meetings will be held in Huntsville, Alabama; Athens, Georgia; and Charleston, West Virginia. Contracts have been signed for each of these locations.

Discussion regarding the Asheville meeting followed. Patricia Cox mentioned that she had received many good comments on the meeting in general. There were mixed reviews on the Thursday evening social. Tom Wentworth said that the variety provided by two bands was a plus, and Scott Jewell stated that he was trying to work in more live music. John Herr pointed out the need for improved etiquette during talks, as there were too many persons entering and leaving rooms throughout presentations. Patricia agreed and suggested that perhaps we

can put together an information sheet on “talk etiquette.” Tom suggested that this be placed in the “blue program booklet” that is produced for each meeting. Terry Richardson mentioned that we should continue with an NSF grant-writing workshop.

Dennis Haney expressed his concern about the cost to students of the Friday evening banquet, and suggested that the price be lowered. Terry Richardson asked if we could mandate a \$15 charge for the student meal. Scott Jewell responded that this was something we can do. Don Roush backed the idea, but doesn't want to raise the registration fee, for example, to counter a decrease in the banquet price. Further discussion followed.

Motion 1. Terry Richardson moved that Scott Jewell handle the matter of the banquet cost for students. Jim Caponetti seconded the motion. Tim Atkinson suggested that the motion be amended such that Scott arranges the best possible cost for students. The motion, as amended, was carried.

Patricia Cox asked how many presenters were “no-shows” this year. The number was not immediately available. Discussion followed regarding the publication of abstracts for talks that weren't given. Jim Caponetti mentioned that last year perhaps 6-12 posters and/or presentations were not given.

3. Report on Huntsville 2011

Scott Jewell reminded everyone that next year's Annual Meeting will be held in Huntsville, Alabama. George Cline and Joey Shaw will be helping with field trips. Discussion followed on the potential pros (great recruiting tool, etc.) and cons (lack of sufficient meeting rooms, etc.) of the Alabama Academy of Science meeting at the same time and location as ASB.

OLD BUSINESS

4. Publications Committee

Randy Small reported on the cost of publishing *Southeastern Biology*, and on the efficiency of transferring information. Randy discussed the results of an initial poll of members, and proposed a follow-up poll. In essence, the poll would seek from members an answer to the following question: What do you want to receive from ASB and how do you want to receive it? Randy circulated a handout with five different possibilities and outlined the options. Discussion followed. Patricia Cox suggested that we keep *Southeastern Biology* as a newsletter, and use *Southeastern Naturalist* as a journal. Members would be able to receive one or both. Terry Richardson mentioned that a smaller *Southeastern Biology* would be better, and if we combined with *Southeastern Naturalist*, this would provide a major benefit to members.

John Herr warned against becoming too dependent on the internet, and observed that hard copy grabs persons' souls. Discussion followed. Ashley Morris mentioned that placing Society information on a flash drive is how to grab the attention of younger members. It was also suggested that part of our information could remain hard copy and part could be electronic. Dennis Haney stated that published abstracts are still important to some persons, even if only

published on our website. Terry Richardson asked Randy Small to provide him with a list of questions that he would send out to our members. Patricia Cox suggested that this poll be sent out as soon as possible. Tom Wentworth mentioned that there was great growth potential with persons in the cell and molecular biology areas. He suggested that ASB needs to go with these areas as well. Don Roush stated that perhaps we need a parallel journal for cell and molecular articles.

5. John Herr Award

Tom Wentworth reported that his committee had discussed this award and that members were supportive. The committee discussed whether candidates must have been an officer to receive the award, but they decided against this. Instead, it was suggested that the award should be given to a person who has dedicated a substantial amount of time to ASB, without making the number of years required overwhelming. Tom reported that the committee will go forward with this and will be ready to move by September. Brief discussion followed. Dennis Haney suggested that we not specify a time limit for service, and George Cline suggested that individuals receiving the award should exhibit "long-standing contributions to ASB." Tim Atkinson mentioned that this should include an endorsement from Past Presidents.

6. ASB Fellow Nominations

John Herr asked that the EC take action on the committee's nomination of Peter Raven as ASB Fellow. John reported that a second nominee was Jane Goodall. The question of whether a nominee should be required to have a connection with ASB was raised. Discussion followed. The question of why we name Fellows was raised as well. John suggested that not only does it add prestige to our Society, but that it is entirely fitting to honor these individuals.

NEW BUSINESS

7. Past Presidents Council

Tom Wentworth reported that the Council had a good meeting. One topic of discussion was the nature of the Friday evening Awards Banquet. Concern was expressed that there is currently no element of the banquet that is of interest to the entire membership. The Council would like to see something of entertainment value (15 minutes or so) at each banquet. It was suggested that perhaps the current Past President could be responsible for developing this part of the program. A discussion followed, with Scott Jewell stating that he would investigate a few possibilities and make a report to the EC at the Interim Meeting in September. Dennis Haney and Tim Atkinson suggested that the remarks and awards part of the evening could proceed while the dinner is served. Patricia Cox encouraged Scott to proceed with his plan to provide some ideas in September.

8. Outstanding Biology Teacher Award

Motion 2. A motion was made that the name of the OBTA be changed to the Lucrecia Herr Award in recognition of her distinguished service in academics. Don Roush seconded and the motion carried.

Terry Richardson suggested that the first award go to Lucrecia Herr. Patricia Cox and Don Roush suggested that we give an award to Lucrecia, as well as to the host State's outstanding biology teacher. Ron Dimock mentioned that we should give the OBTA to the State representative and the first Herr Award to Lucrecia.

9. Announcements

Scott Jewell announced that the 2014 Annual Meeting will be held in Spartanburg, South Carolina, and that high on the list for 2015 is Mobile, Alabama. Patricia Cox announced that the Interim Meeting of the Executive Committee will be held on Saturday, September 11, 2010, in Athens, Georgia (University of Georgia at the Georgia Center). The meeting will begin at 7:30 a.m.

10. Adjournment

Being no further business, Patricia Cox thanked everyone for attending. Terry Richardson moved that the meeting be adjourned at approximately 10:00 a.m.

Respectfully submitted,

Conley K. McMullen, Secretary
14 May 2010

INVITED RESEARCH PAPER

Observations on Wall Surface Topography and Development in Ascospores of the Genera *Neurospora*, *Gelasinospora* and *Sordaria*

Lafayette Frederick¹, W. Lena Austin², Alice Walker¹, Cecilia Stewart¹ and Monde Imoh¹ – Department of Biology¹ and Department of Microbiology², College of Medicine, Howard University, Washington, DC

As lead author (LF) for this article, I have had the opportunity to be mentor to an extraordinary number of students over a period of sixty years of teaching and research. These students currently have or have had successful careers in various fields of the biological sciences. Their fields of specialization include mycology, plant pathology, plant anatomy, systematic botany, plant physiology, microbiology, and molecular biology. A main focus of my teaching and research endeavors, however, has been in the areas of general and medical mycology, and plant pathology. Research studies in these fields have been diverse. They include investigations on Dutch elm disease, the crown gall problem, conidiogenesis in coelomycetous fungi, systematics of myxomycetes, taxonomy of homothallic species of *Neurospora*, ascospore wall ontogeny in genera of the Sordariaceae, and currently studies on a novel bacterium with strong antifungal properties and probable biocontrol potential. A majority of these research endeavors have involved students, undergraduate and graduate. This article represents one of those collaborative efforts.

Key words: *Neurospora*, *Gelasinospora*, *Sordaria*, ascospore wall ontogeny, perisporium, episporium, endosporium

Introduction

In the family Sordariaceae (Ascomycota) the three best known genera are *Neurospora*, *Sordaria*, and *Gelasinospora*. They are generally regarded as closely related members of the family. In distinguishing between these three genera ascospore wall topography is a key diagnostic morphological feature. For example, *Neurospora* ascospores are longitudinally ribbed (Fig. 1), *Gelasinospora* ascospores have a pitted wall surface (Fig. 2), and the wall surface of ascospores of *Sordaria* is smooth (Fig. 3). *Neurospora* was erected as a genus in 1927 by Shear and Dodge (Shear & Dodge, 1927), Cesati & De Notaris erected *Sordaria* in 1863, and Dowding erected *Gelasinospora* in 1933 (Dowding, 1933).

The initial interest in wall surface topography of ascospores of these sordariaceous genera was prompted by an article of Sussman (1966) in which transmission electron micrographs (TEM) of dormant and germinating ascospores of *N. tetrasperma* were shown. The micrograph revealed that in

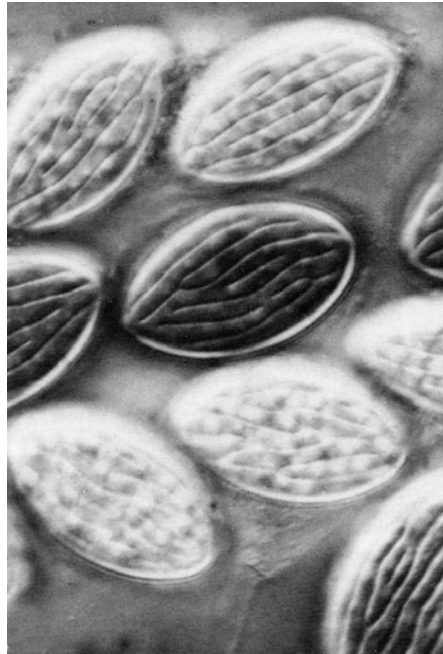


Fig. 1. LM of ascospores of *Neurospora dodgei* at different stages of development. – X1850 (after Frederick & Austin)

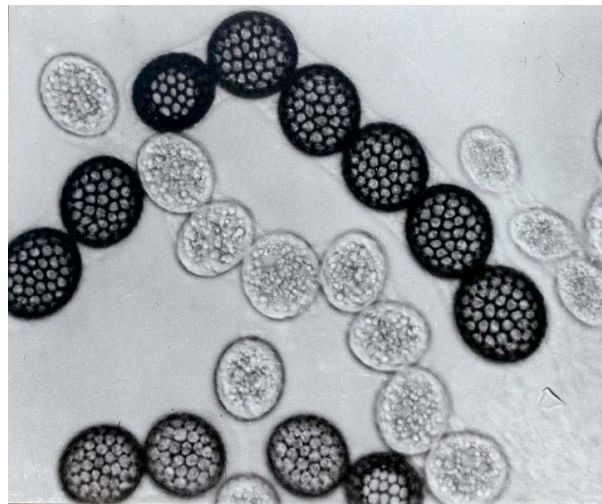


Fig. 2. LM of ascospores of *Gelasinospora reticulospora* (LM) - X1650

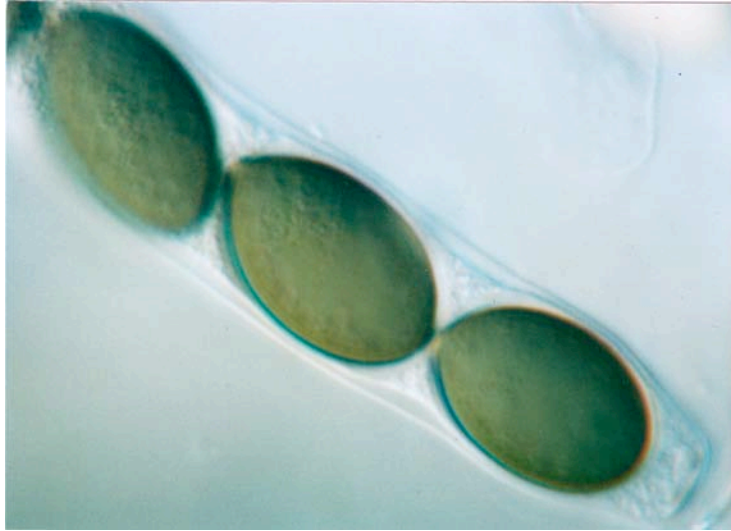


Fig. 3. LM of ascospores of *Sordaria fimicola*— X2800

dormant ascospores there was a paucity of mitochondria and no endoplasmicreticulum (ER). These elements were shown to be abundant in germinating ascospores and presumably were abundant in developing ascospores during the early stages of ascosporogenesis. Also, according to Sussman, dormant ascospores of *N. tetrasperma* had a low respiratory rate. Dormant *Neurospora* ascospores are known to be heat tolerant and can remain viable when exposed to temperatures of 60+ C for more than 3 hr (Lingappa & Sussman, 1959). Although the wall of ascospores of *Neurospora* is thick and multilayered, it appears that the heat resistance property of protoplasts of the ascospores is unrelated to wall structure. In fact, heat treatment of dormant ascospores has been shown to activate germination (Shear & Dodge, 1927) and may account for the natural common occurrence of *Neurospora* colonies on organic debris following forest fires. The micrographs of Sussman prompted the question as to whether internal structural changes that occur within the protoplasts during ascosporogenesis confer upon mature ascospores a capacity for heat tolerance. It is presumed that during ascosporogenesis ER and mitochondria are common organelles in the young ascospore. As indicated above, Sussman has shown that these cellular components appear in abundance at the onset of spore germination. The subjection of germinating ascospores to temperatures at levels which activate spore germination readily kills the germinating spore. For the *Neurospora* ascospore, the nature of the spore wall, its color and structure, is generally considered to be a key factor in imparting resistance to such environmental factors as desiccation, radiation, and heat resistance.

In order to determine whether a correlation existed between the low level of membrane and mitochondrial presence and the onset of dormancy during *Neurospora* ascospore maturation, a graduate student (WLA) began a TEM study of ascospore ontogeny of *Neurospora dodgei*, a homothallic species. Initial

stages of this investigation revealed the presence of numerous mitochondria and an abundance of ER and other membranous organelles in newly delimited ascospores (Fig. 4). However, the micrographs also revealed an unexpected developmental feature. Associated with the formation of the initial wall layer of young ascospores was the presence of uniformly spaced membrane profiles appressed against the inner surface of the spore plasmalemma. These profiles, which have now been termed “intrasporal membrane plaques” (IMP) by Austin (1974) and Frederick and Austin (1993), appeared to be the sporoplasmic determinants for the rib-vein wall surface pattern of mature ascospores. As a result of this observation the focus of the studies of WLA changed to a LM and TEM study of rib-vein development in the wall of *Neurospora* ascospores.

Ontogeny and Development of the Rib-vein Layer in *Neurospora* Ascospores

In their report on a new species of a homothallic *Neurospora*, viz. *N. lineolata*, Frederick et al. (1969) used as a key taxonomic character variations in the prominence and number of ribs in the ascospore wall surface to delineate species of homothallic *Neurosporas* with bipolar ascospores. A later SEM study by Austin et al. (1974) of ascospores of the homothallic *Neurosporas* further demonstrated the extent to which the rib-vein pattern differed among these species.

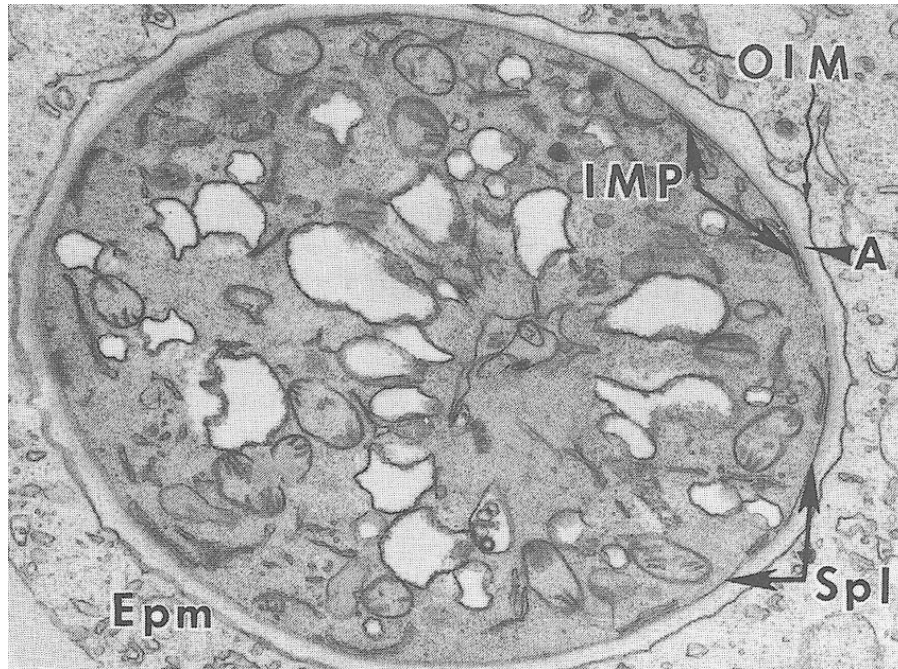


Fig. 4. Young ascospore of *N. dodgei* during formation of first wall layer. A – “A” layer; Epm – epiplasm; Spl – spore plasmalemma; IMP – intrasporal membrane plaque; OIM – outer investing membrane (after Frederick & Austin)

Earlier investigations on the nature and formation of the rib-vein layer in *Neurospora* ascospores misinterpreted the process. In their study of rib development of ascospores of *N. crassa*, a heterothallic species, Lindegren and Scott (1937) reported that ribs formed from special structures in the sporoplasm of the developing ascospore. These structures were termed "rib-forming" bodies. They stated that these bodies aggregated beneath the young spore wall in a central region and subsequently dispersed towards the polar ends of the spore giving rise to the ribs in the process. The report of Dodge (1957) on rib formation in ascospores of *N. tetrasperma* found general agreement with the claim of Lindegren and Scott. Dodge reported that rib formation in *N. tetrasperma* ascospores was due to the presence in young ascospores of discrete structures in the sporoplasm that assembled in linear fashion thus forming the ribs. Both Dodge and Lindegren and Scott's observations were based on light microscopy. A clarification of the process of rib formation in *Neurospora*, additional observations of ascospore wall structure in *Neurospora*, and results of similar studies on ascospore walls of *Gelasinospora* and *Sordaria* are presented in this report. As will be shown later, formation of ribs in the wall layer of *Neurospora* ascospores and the pitted walls of ascospores of *Gelasinospora* result from a novel process regulated by a system of intrasporal membranes. There is no evidence of similar intervention of sporoplasmic membrane elements in the formation of the surface wall layer of *Sordaria* ascospores (Mainwaring, 1972; Hackett and Chen, 1976)

Source of Cultures and Procedures

The results of three studies that have been conducted on rib formation in *Neurospora* ascospores are presented here. In the first study light microscopy (LM) and TEM observations were made on rib-vein ontogeny of ascospores of *N. dodgei* (Austin, 1974). Ascospores of *N. dodgei* were found to be the best model for studying rib-vein ontogeny since they form the most prominent ribs of all of the homothallic species thus far described (Frederick et al., 1969; Austin et al., 1974). In a second study by Walker (Walker, 1983) two strains of the heterothallic species *N. crassa* were used in order to determine the extent to which uniformity occurs in the genus relative to rib-vein ontogeny. In both studies observations were made first with light microscopy (LM) to correlate color changes in developing ascospores with rib formation. Subsequent TEM studies provided detailed information on rib-vein ontogeny of the ascospore wall at the ultrastructure level. In a third study Imoh (1997) conducted a LM and TEM investigation of the formation and structure of the additional wall layers of ascospores of *Neurospora*.

Cultures used in these studies were obtained from two sources. The original culture of *N. dodgei* was obtained from the American Type Culture Collection (ATCC No. 15509). Cultures of the two strains of *N. crassa*, wild type, 74A and 74a, and a white-spore mutant, 1434A and 1435a, were obtained from the Genetics Stock Center, Arcata, CA. The culture of *N. lineolata* was obtained from the stock culture collection of homothallic *Neurosporas* in the Howard University Biology Department. Cultures of *N. dodgei* and *N. lineolata* were grown on Difco corn meal agar (CMA) in standard Petri dishes under ambient light and temperature conditions of the laboratory. Cultures of the *N. crassa* strains were

maintained in test tubes on Vogel's medium N, for the wild type strain, and Vogel's medium Na for the mutant strain (Vogel, 1964). Perithecia began to form 7 days after subculture of the homothallic species and were collected daily over a period of 7 days. Preparations for LM observations were made by placing perithecia in sterile deionized water in a shallow depression microscope slide and squashing them with a flattened dissecting needle to release ascus rosettes. For LM observations rosettes (Fig. 5) were placed in sterile deionized water on microscope slides and a cover slip was added. These wet mounts were examined with a research grade microscope (Leitz Dialux 20) equipped with interference contrast (IC) and automatic photographic accessories. Additional observations on rib structure were made by placing discharged ascospores in a drop of 20% Clorox to expand the ribs and ultimately separate them from the main body of the spore.



Fig. 5. LM of ascal rosettes of *N. dodgei* – X650

N. crassa perithecia were obtained by crossing the two strains on Westergaard-Mitchell's medium (Westergaard and Mitchell, 1947). Cultures derived from conidia were grown at 25 C for 5 days after which opposite mating types were crossed. Perithecia appeared within 5 days following the cross and were collected daily over a period of 7 days. Wet mounts of ascal rosettes were prepared for LM observations as previously described.

Ejected mature ascospores were removed from the inside surface of Petri plate covers and placed in small vials containing sterile distilled water for scanning electron microscope (SEM) studies. Drops of the spore suspension were transferred by Pasteur pipette to the surface of a 12 mm nucleopore filter affixed by double-stick tape to a specimen stub. After spores were air dry they

were coated with gold-palladium in a Hummer Sputter Coater and examined with a Cambridge Stereoscan 200 in the Howard University Biology Department or with an ETEC Autoscan, Type U-1, in the laboratory of Dr. Lee V. Leak in the Howard University College of Medicine.

For TEM studies 4% buffered paraformaldehyde was used as the primary fixative. Perithecia were placed directly into the fixative, squashed to release ascus rosettes and fixed according to the procedures of Hammill (1971). They were post-fixed in 1% unbuffered potassium permanganate at room temperature. Additional details on the preparation of the specimens for TEM and freeze-etch procedures are included in the report of Frederick and Austin (1993).

Observations and Results

Only a summary of the observations made on rib-vein development in *N. dodgei* is included here. The results are presented in greater detail in the previously published report of Frederick and Austin (1993). Ascospores are first delimited from the ascus cytoplasm by the inner investing membrane of the ascus vesicle (Fig. 4). Following the terminology of Le Gal (1947) for ascospore wall structure, these authors designated the rib-vein layer as the perisporium but considered it to consist of two intimately related components, viz., a thin, translucent layer, as revealed by TEM, that first forms over the plasmalemma of the young ascospore (Fig. 4), and the inner, prominent, rib-vein component. An alphabet system has been used by Frederick and Austin in designating the two layers of the perisporium. The outermost layer and the first to form is designated as the "A" layer and the next layer, the rib-vein layer, that forms inside of the first layer (Fig. 6), is designated the "B" layer. This nomenclature reflects the order of deposition of spore wall layers during the genesis of the ascospore wall.

Light microscopy revealed information on early ascospore delineation, formation of the initial wall layer of the ascospore, color changes in the ascospore as the rib-vein layer developed, and the structural relationship of the rib-vein layer with other inner layers of the spore wall. As shown in Fig. 4 newly delimited ascospores contain diverse organelles. Tests with Sudan III have revealed the lipid nature of most of these bodies. As ascospore development progresses the smaller bodies coalesce into larger globules and vacuoles also appear in the sporoplasm (Fig. 7). Concomitant with this change in the structure of the sporoplasm is the initial appearance of the rib-vein layer. At this developmental stage ascospores are a faint gold color and rib markings, though present, are indistinct (Fig. 6). As spore maturation proceeds the color of the spores gradually changes to a full gold color and the ribs become prominent (Fig. 8). A fully formed rib-vein pattern signals the end of perisporium formation Fig. 8. Beneath the perisporium a melanized layer develops that gives the mature ascospore its characteristic black color. This layer is the episporium of the spore wall. Occasionally some highly vacuolate ascospores abort following the deposition of the rib-vein component and no additional wall layers form. Such empty spores have only a well-defined perisporium but no underlying layers (Fig. 9).

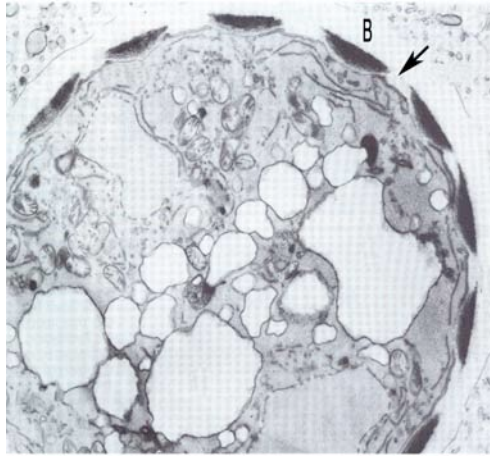


Fig. 6. TEM of young ascospore of *N. dodgei* with "A" layer (arrow) and developing "B" or rib layer. B – rib X34,000 (after Frederick & Austin)

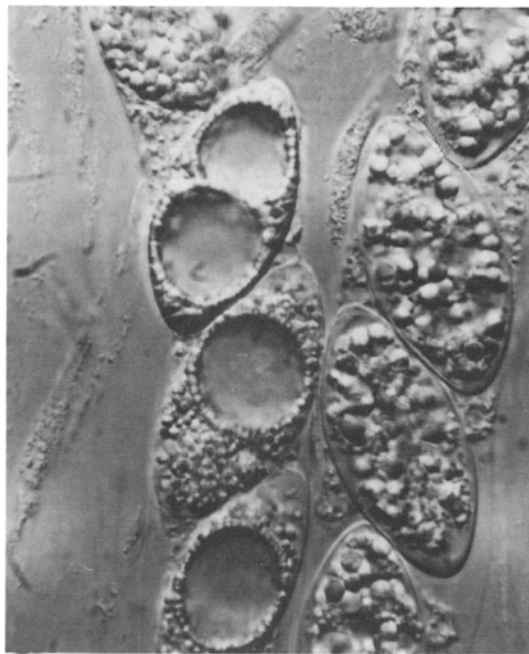


Fig. 7. Newly delimited ascospores in ascus with initial wall layer, X950, (after Frederick & Austin)

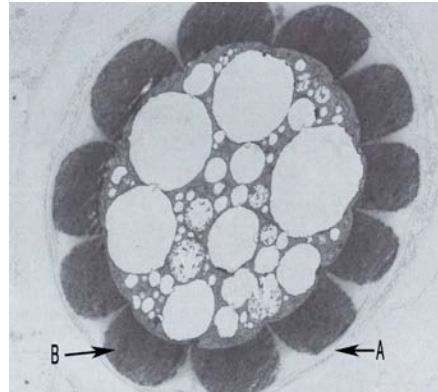


Fig. 8. Ascospore of *N. dodgei* showing fully developed perisporium. X48,000, A – “A” layer; B – rib-vein layer

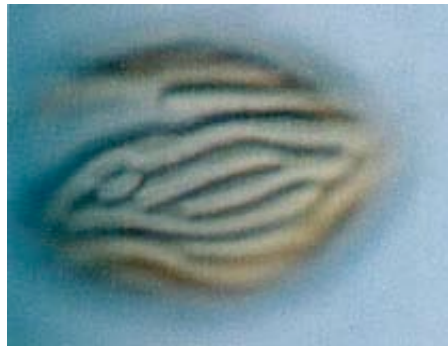


Fig. 9. LM of portion of fully developed rib-vein layer from aborted spore. X950

Evidence of the autonomy of the perisporium is further revealed when mature ascospores are subjected to a Clorox treatment (Fig. 10). When spores are placed in a Clorox solution (10% or 20%) the “A” layer of the perisporium is eliminated, rib pigmentation is removed, and a pronounced radial extension of the ribs occurs (Fig. 10). Width of the ribs is not affected, however, by the Clorox treatment. Continued exposure of spores to a Clorox solution ultimately results in the complete separation of the intact rib-vein layer from its underlying wall layer, the episporium.



Fig. 10. LM of *N. dodgei* ascospores after Clorox treatment X850 (after Frederick & Austin)

TEM observations on rib-vein ontogeny have revealed further details on the formation and structure of the perisporium. In newly delimited ascospores, as shown in Fig. 4, the "A" layer is present as a narrow, electron translucent area bordering the surface of the spore plasmalemma between the outer investing membrane of the ascus vesicle. At the time of deposition of this layer the sporoplasm of the young ascospore contains many small mitochondria, an abundance of endoplasmic reticulum (ER) profiles, and numerous granular bodies of various sizes (Fig. 6). This stage in the development of the ascospore is comparable to the LM micrograph shown in Fig. 7. Following "A" layer deposition cisternal elements of uniform width migrate and become appressed to the inner face of the spore plasmalemma in regularly spaced positions (Figs. 4, 6). As indicated previously these profiles have been termed intrasporal membrane plaques (IMP). As shown in Fig. 11 deposition of the rib matrix follows the positioning of the IMPs. The rib matrix is deposited in the space between the spore membrane and the "A" layer in places where there is no underlying IMP. Evidence from freeze-etch studies suggest that the rib matrix is transported to the spore membrane by vesicles (Fig. 12) that fuse with the membrane and deposit rib-forming materials on its outer surface. Continued vesicle activity results in a thickening of the ribs and an increase of the breadth of the area of the spore membrane beneath the ribs (Fig 13). There is no concomitant increase in

the width of the area of the membrane between ribs however and this ultimately causes concave to deep invaginations that become the vein region of the rib-vein layer (Fig. 14). An ascospore of *N. dodgei* with fully developed ribs, the “B” layer of the perisporium, is shown in Fig. 15. The “A” layer is continuous over the outer surface of the ribs. The rib-vein nature of the “B” layer of the perisporium is the feature that gives ascospores of the genus *Neurospora* their distinctive wall surface topography. A composite drawing showing stages in the development of the perisporium is presented in Fig. 16.



Fig. 11. TEM of peripheral area of developing ascospore of *N. dodgei* showing relationship between IMP and deposition of rib component (R) of perisporium. X254,000 (after Frederick & Austin)



Fig. 12. Freeze etch section of *N. crassa* ascospore showing wall structure and sporoplasmic organelles. X14000 (modified after Bryne). Pe – periascosporium; Epi – epiascosporium; Endo - endoascosporium

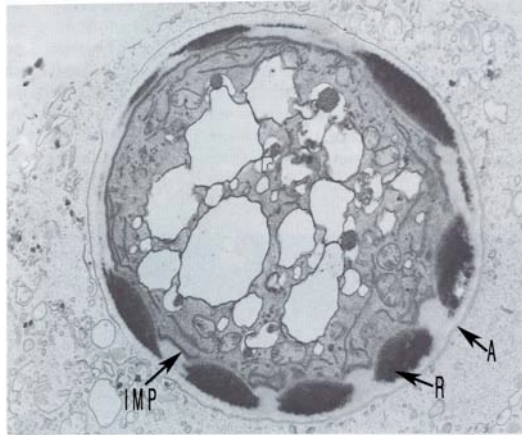


Fig. 13. TEM of *N. dodgei* transection of ascospore showing IMP and partial rib formation. A – “A” layer; IMP; R – rib. X47,200 (after Frederick & Austin)

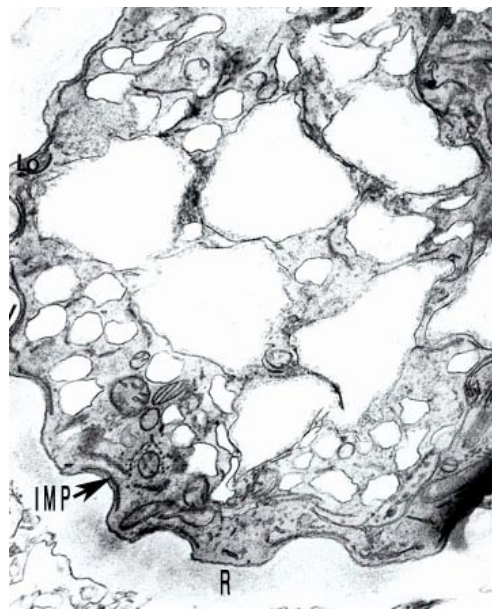


Fig. 14. TEM of young ascospore of *N. crassa* showing invaginations in plasmalemma of spore due to IMP effect. IMP; R – rib. X24,000

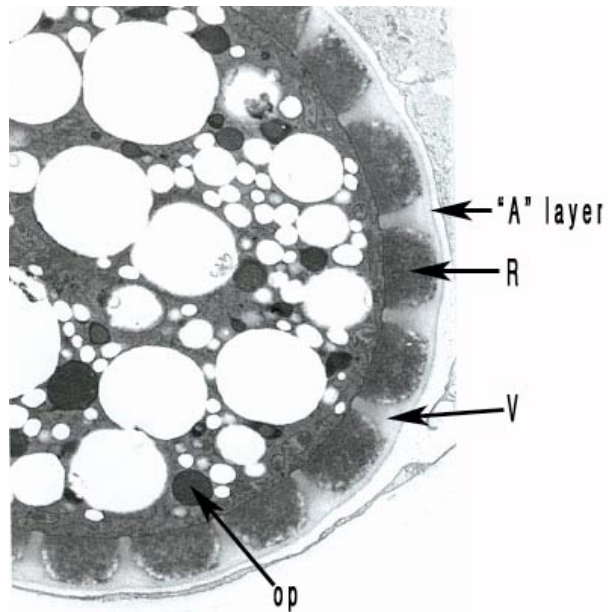


Fig. 15. TEM of *N. dodgei* ascospore with electron opaque inclusions that may be associated with deposition of episporium. R – rib; V – vein; op – opaque inclusion. X8500

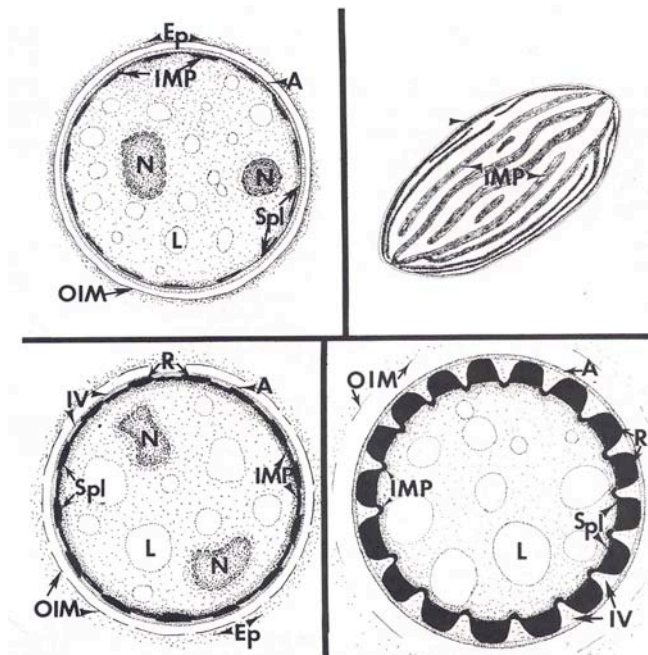


Fig. 16. Composite drawing of ontogeny of perisporium formation in ascospores of *N. dodgei*. (After Frederick & Austin)

Although these results have clearly elucidated the ontogeny of the perisporium and involvement of IMP in the delineation of the rib-vein pattern of ascospores of the homothallic *N. dodgei*, a need existed for a comparable study on a heterothallic species in order to determine whether ascospore wall-patterning is regulated in the same manner throughout the genus. To address this question Walker (1983) utilized two strains of the heterothallic species *N. crassa* to ascertain whether the rib-vein wall surface pattern of ascospores of this species, and presumably other heterothallic species, was also determined by a system of intrasporal membrane (IMP) elements. A TEM micrograph of a young ascospore of the wild type strain, shown in Fig. 17, reveals the presence of the "A" layer of the perisporium and the positioning of IMP along the inner surface of the spore plasmalemma. Deposition of the rib matrix follows the positioning of IMP and a TEM micrograph of an ascospore of wild type *N. crassa* with partially developed ribs and prominent concave vein regions is shown in Fig. 14. Walker's study has confirmed the role of IMP as the determinants of the rib-vein wall surface pattern in both heterothallic and homothallic species of *Neurospora*. Further details of Walker's study will be published elsewhere.

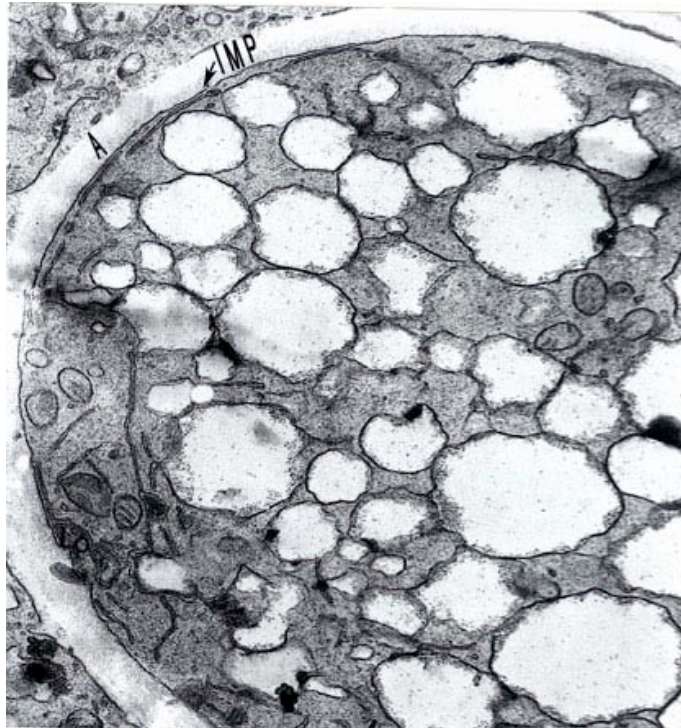


Fig. 17. Newly delimited ascospore of *N. crassa* showing IMP and indistinct "A" layer. X19,500

General Wall Structure of *Neurospora* Ascospores

In addition to the perisporium two other well-defined wall layers are present in ascospores of *Neurospora*. Other authors have reported the presence of additional wall layers and have generally followed the terminology of Le Gal (1947) in reference to these layers (Bellemere et al., 1992; Byrne, 1975; Lowry and Sussman, 1958, 1968). They have generally been identified as the episporium, the layer immediately underlying the perisporium, and the endosporium, the innermost layer. Frederick and Austin (1993) have proposed a modification of the nomenclature for *Neurospora* ascospore wall structure by recognizing perisporium, episporium, and endosporium as basic structural units of the spore wall with these unit layers and sublayers, where they occur, given alphabetical designations in order of their deposition or differentiation. As previously indicated these authors consider the perisporium to be comprised of two developmentally related layers, viz., an "A" layer, the first layer to form after the delimitation of the ascospore, and its underlying "B" or rib layer. As shown in Fig. 10, the perisporium can be separated as a unit from the mature ascospore when treated with a Clorox solution. Further evidence of the autonomy of the perisporium is provided by aborted ascospores that have a fully developed perisporium as their only wall layer (Fig. 9).

In the absence of any detailed reported studies on the structure and development of the two inner wall units of *Neurospora* ascospores, viz., the episporium and the endosporium, an investigation to elucidate the nature of these two layers was undertaken by Imoh (Imoh, 1997). In addition to *N. dodgei*, a second homothallic species, *N. lineolata*, was used in this study. The latter species was included because Hohl and Streit (1975) reported that ascospores of this species lacked one or more of the inner wall layers. As previously mentioned, ascospores of *N. lineolata* have a shallow, indistinct, rib-vein wall surface topography that is the least conspicuous of all known homothallic *Neurosporas*.

Imoh has found that episporium formation begins when deposition of the rib matrix component of the perisporium ends. Prior to episporium appearance TEM micrographs reveal the presence of a narrow electron opaque layer that is continuous over the inner surface of the "B" layer of the perisporium (Fig. 18). This layer binds the inner surface of the perisporium to the outer surface of the episporium as it forms and has been designated by Imoh (1997) cementing layer 1 (CM-1). With the appearance of the episporium the spore color changes from gold to black. Although a conclusive determination of the chemical nature of the pigments responsible for the gold color of ribs and the black color of the episporium is lacking, Gooday et al. (1974) have reported the presence of sporopollenin in the perisporium and according to Lowry and Sussman (1968) melanin is the pigment responsible for the black color of the episporium. When fully developed the episporium is a hard, rigid, unstratified layer of even width. It contributes to the dormancy capability of the ascospore and enables it to resist unfavorable environmental conditions over an extended period of time. A further indication of the resistant nature of the episporium has been the demonstration that ascospores may remain viable after the perisporium has been removed by Clorox treatment (Sussman, 1966). SEM images of *N. dodgei* ascospores,

following removal of the perisporium, reveals that its surface is etched by vein imprints from the rib-vein layer (Fig. 19). Once the episporium forms, chemical fixation of the ascospore protoplast is difficult due to its impervious nature. TEM of a fully formed episporium reveals a diagonally banded or striated layer (Fig. 20). It has been suggested however that these features are probably artifacts of sectioning due to the dense nature of the episporium (Frederick and Austin, 1993).

The episporium is perforated at the polar ends of the ascospore by a germ pore. Following full rib development and prior to the initiation of episporium formation, the young ascospore forms a nipple-like projection in the germ pore area at each polar end (Fig. 21). Although a thin portion of the perisporium covers this region the episporium is not continuous. Germ pores are distinct in ascospores that have formed an episporium when visualized by LM (Fig. 22).

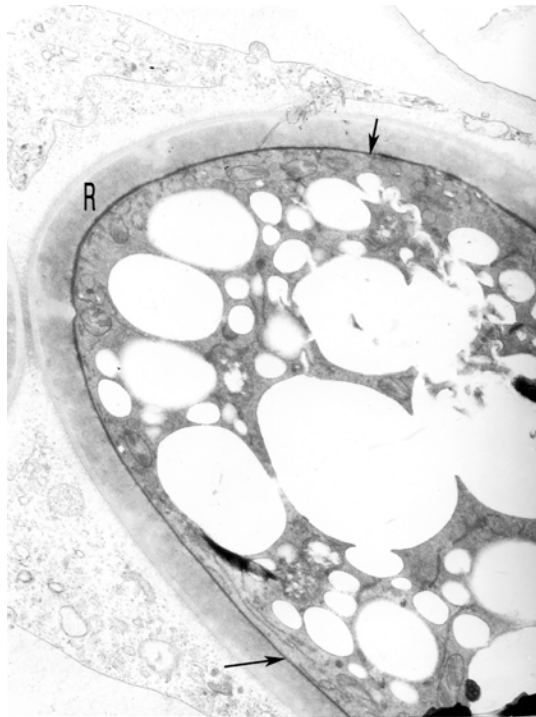


Fig. 18. Ascospore of *N. lineolata* showing R layer and underlying cementing layer (CM-I) –arrows. X8000

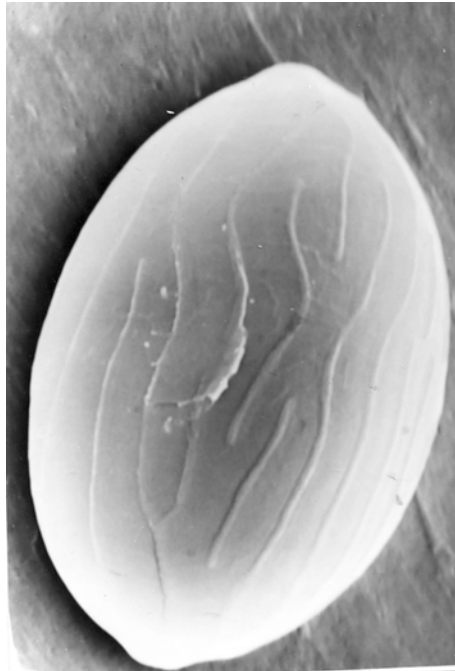


Fig. 19. SEM of surface of episporium of *N. dodgei* ascospore after removal of perisporium with Clorox solution. X7000

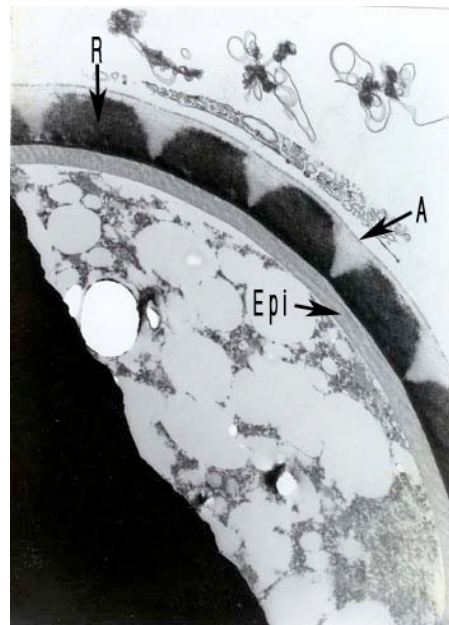


Fig. 20. TEM section of *N. dodgei* ascospore with perisporium components and underlying episporium. A - "A" layer; R - rib; epi-episporium. X5500

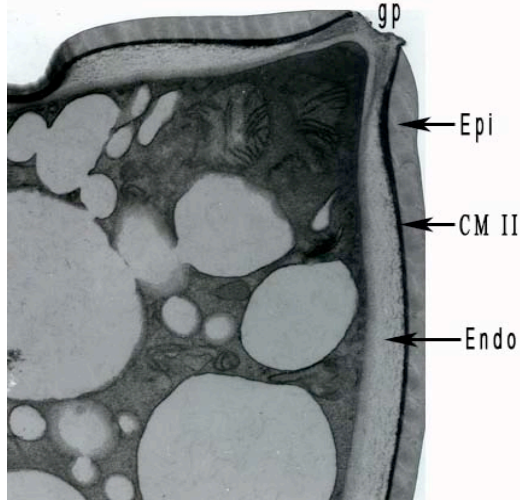


Fig. 21. TEM section through germ pore of mature ascospore of *N. dodgei* after perisporium removal. Endo – endosporium; Epi – episporium; CM II – cementing layer II; gp – germ pore. X11,000

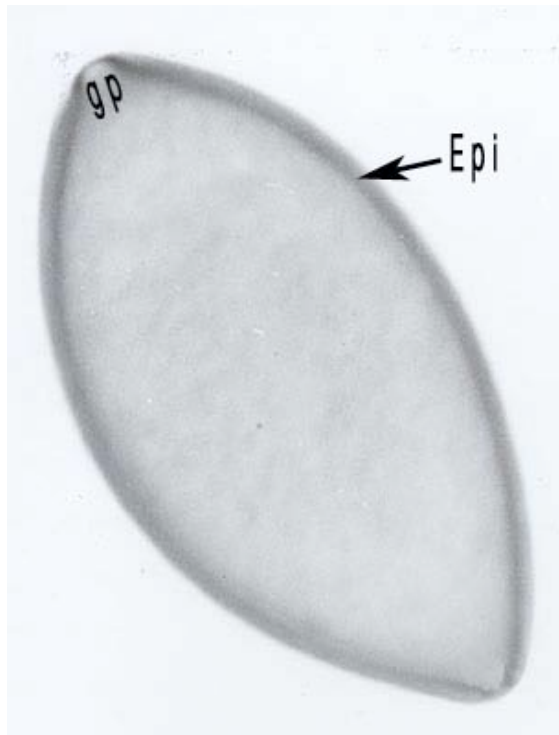


Fig. 22. LM of ascospore of wild type strain of *N. lineolata* with partially developed episporium and germ pores. Epi – episporium; gp – germ pore. X3000

Centripetal to the episporium and the last principal layer to form in a *Neurospora* ascospore is the endosporium. As revealed by TEM it is a slightly fibrillar electron transparent layer that is broader than the episporium. Unlike the episporium, however, it is continuous over the germ pore region (Fig. 21). A narrow electron dense layer, similar to the layer between the base of the perisporium and the outer face of the episporium, is present between the episporium and the endosporium. This layer, shown in Fig. 23, is referred to by Imoh (1997) as “cementing layer II” (CM-II) and binds the surfaces of the endosporium and the episporium to each other. The two cementing layers merge in the germ pore region (Fig. 21).

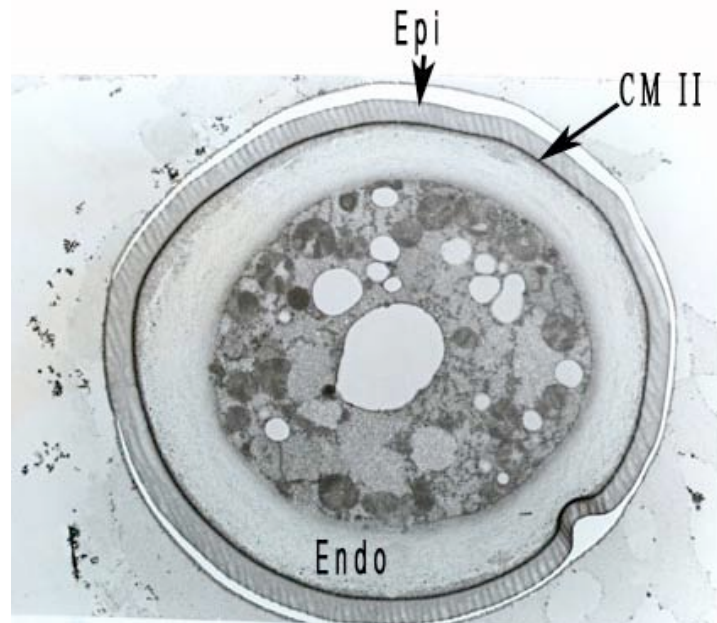


Fig. 23. TEM transection of mature ascospore of *N. dodgei* after removal of perisporium. Note episporium (epi), endosporium (Endo) and cementing layer II (CM-II). X3200

Summary of *Neurospora* Ascospore Wall Structure and Development

The wall of *Neurospora* ascospores, in both homothallic and heterothallic species consists of three main wall units, viz., the perisporium, episporium, and endosporium. The perisporium consists of two layers, an outermost, narrow, electron translucent layer, the first to form after spore delimitation and designated in this report as the “A” layer, and a prominent electron opaque inner layer, the rib-vein layer, which is referred to here as the “B” layer. The ribbed wall surface topography that distinguishes ascospores of the genus is due to this layer.

Cisternal elements in the sporoplasm of the developing ascospore determine the pattern of the rib-vein complex. These ER profiles, the IMP, become appressed against the inner surface of the plasmalemma of the young ascospore in evenly spaced positions. Deposition of the rib-forming matrix on the outer

surface of the spore plasmalemma is prevented from accumulating at those sites and results in the development of the rib-vein pattern characteristic of the ascospore wall.

Upon completion of the perisporium a narrow electron dense layer develops over its entire inner surface and this layer binds the perisporium to the underlying episporium as it forms. The episporium is a rigid, brittle, unstratified electron opaque layer that is perforated at the polar ends of the ascospore, the area that becomes the germ pore. Following episporium formation, a layer, similar to the one that binds episporium and perisporium, forms over the inner surface of the episporium and binds it to the innermost layer of the ascospore wall, the endosporium. The endosporium is a fibrillar electron transparent layer that surrounds the spore protoplast. It is continuous over the germ pore region.

Perisporium Development in the Genus *Gelasinospora*

Unlike the wall surface of *Neurospora* ascospores, the wall surface of ascospores of species of *Gelasinospora*, as previously indicated, is pitted. Since these two genera are considered to be closely related an MS thesis project was undertaken by Stewart (1983) to ascertain whether the pitted wall surface topography of species of *Gelasinospora* is also determined by intrasporal cisternal elements. LM, SEM, and TEM techniques were employed in this study. Two species were examined, viz., *G. calospora* whose ascospores are elliptical (Fig. 24) and *G. reticulospora*, whose spores are spherical (Figs. 2, 25). The procedures followed in this study have been indicated previously. A summary of Stewart's observations are presented here. Further details will be published elsewhere. Fig. 26 shows a TEM of a young ascospore of *G. reticulospora*. At this stage spores are hyaline and the protoplast contains numerous mostly uniform-size granular bodies. A later developmental stage is shown in Fig. 27. Spores at this stage are gold in color due to the deposition of the matrix that makes up the pitted or "B" wall layer of the perisporium (Fig. 28). TEM micrographs of spores at incipient "B" layer formation reveal the presence of IMP along the inner surface of the spore plasmalemma (Fig. 26).

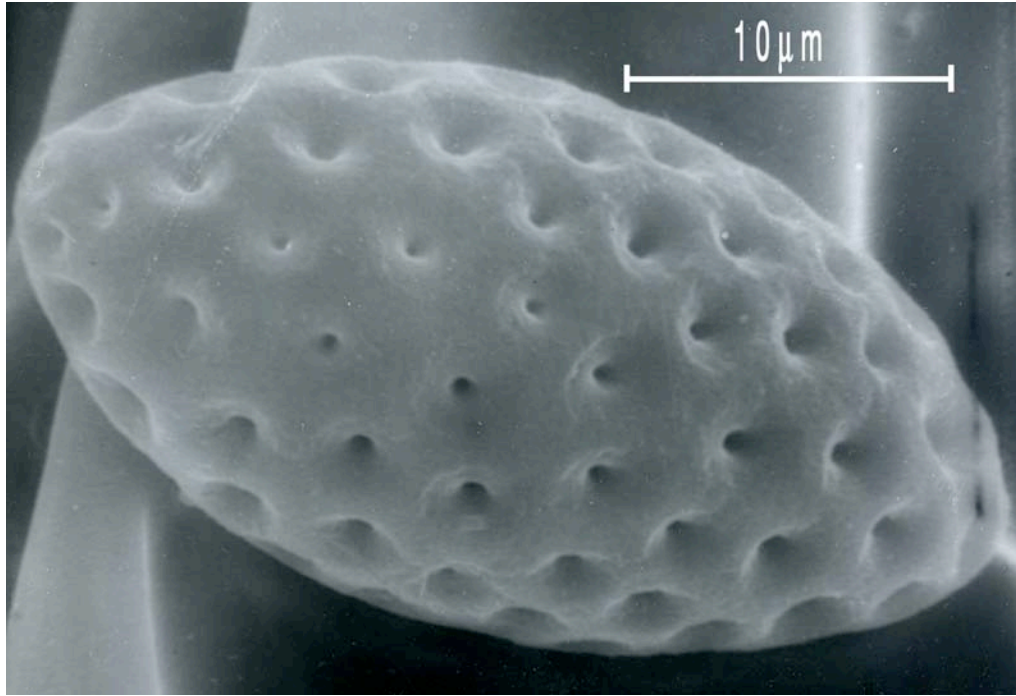


Fig. 24. SEM of ascospore of *Gelasinospora calospora*.

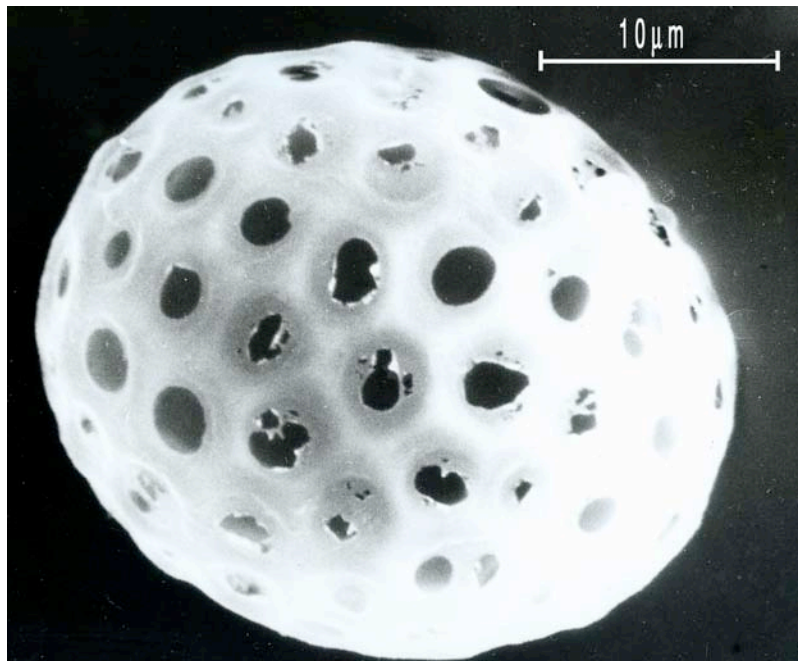


Fig. 25. SEM of ascospore of *G. reticulospora*.

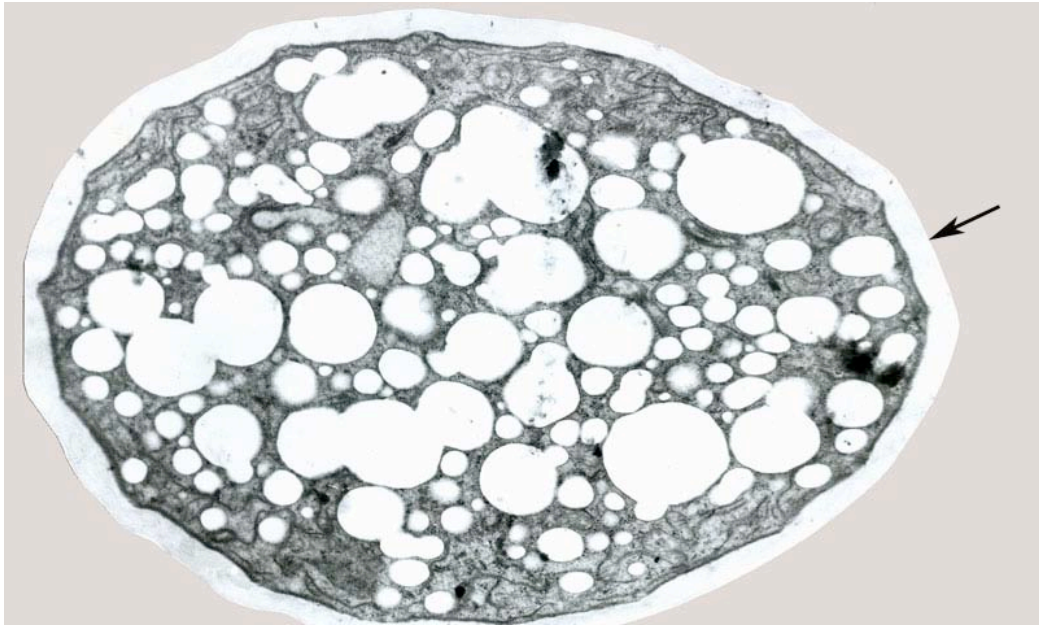


Fig. 26. TEM of young ascospore of *G. reticulospora* with partially developed 'B' layer (arrow). X11,500

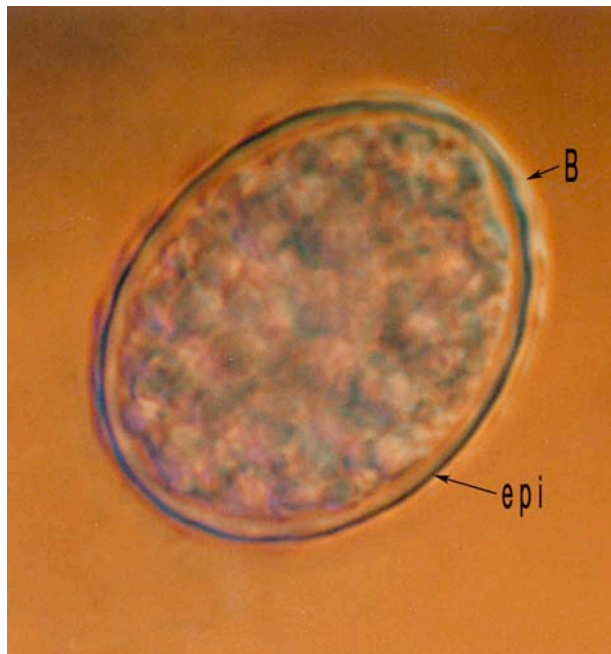


Fig. 27. LM of ascospore of *G. reticulospora* with outline of "B" layer (B) and incipient formation of episporium (epi). X580

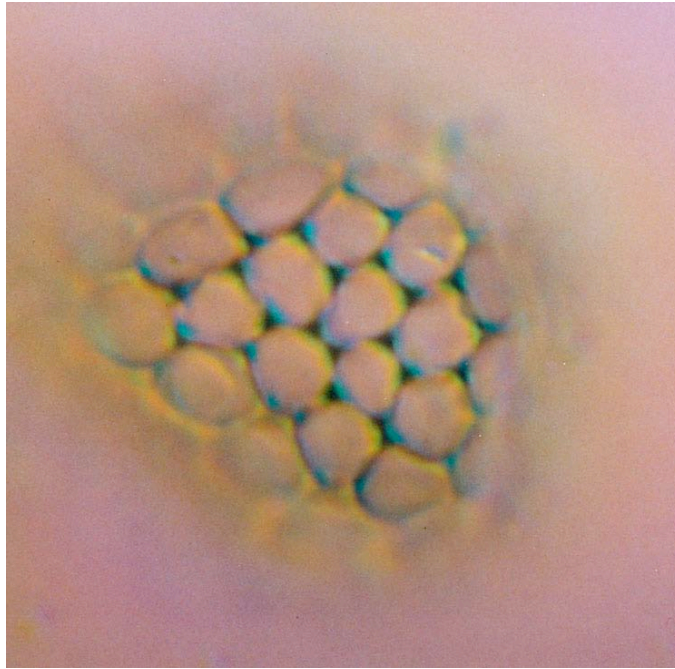


Fig. 28. LM of surface area of *G. reticulospora* prior to episporium deposition. X2400

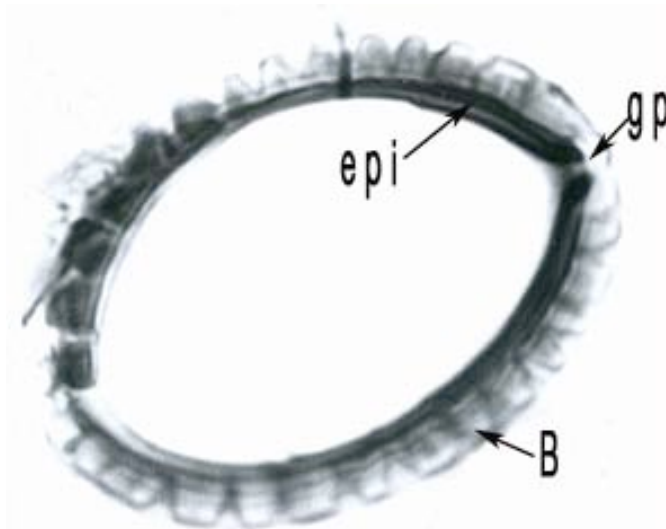


Fig. 29. TEM of ascospore of *G. reticulospora*. with fully developed "B" layer (B) and partially developed episporium (epi) with germ pore (gp). X3500

As has been shown in wall development of *Neurospora* ascospores these cisternal elements determine the characteristic wall surface topography that mature ascospores will have. Since circular pits characterize the wall surfaces of

ascospores of *Gelasinospora*, IMP are presumably not linear and continuous as they are in *Neurospora*. Instead they are apparently discrete, disc-like, discontinuous profiles that block the external deposition of the "B" layer matrix where they occur. In *G. reticulospora* pits are prominent and numerous, are initially covered by the "A" layer of the perisporium as they form, and become fully exposed following the completion of the deposition of the "B" layer (Figs. 25,28,29,30). In Fig. 25 remnants of the "A" layer are shown around the periphery of the rims of several pits. A faint outline of the net-like "B" layer can be seen through the "A" layer. Deposition of the episporium begins after the formation of the pitted wall layer (Fig. 29). At this stage, when viewed by LM, spores become progressively darker in color. Similar to its effect on the perisporium of *Neurospora* ascospores, Clorox treatment of *Gelasinospora* ascospores also causes an expansion of the "B" layer (Fig. 31). TEM micrographs of this stage reveal the episporium as an electron dense striated layer (Figs. 20, 23). The striations of this layer are similar to those seen in the episporium of *Neurospora* ascospores. The polar ends of the episporium of ascospores of *Gelasinospora* are also perforated by germ pores (Fig. 31).

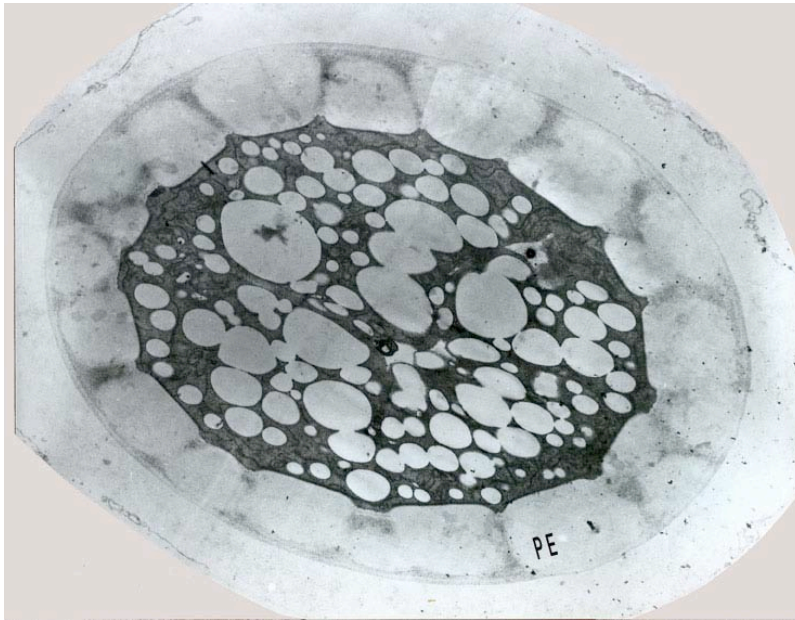


Fig. 30. TEM of ascospore of *G. reticulospora* with fully developed perisporium (PE). X9500

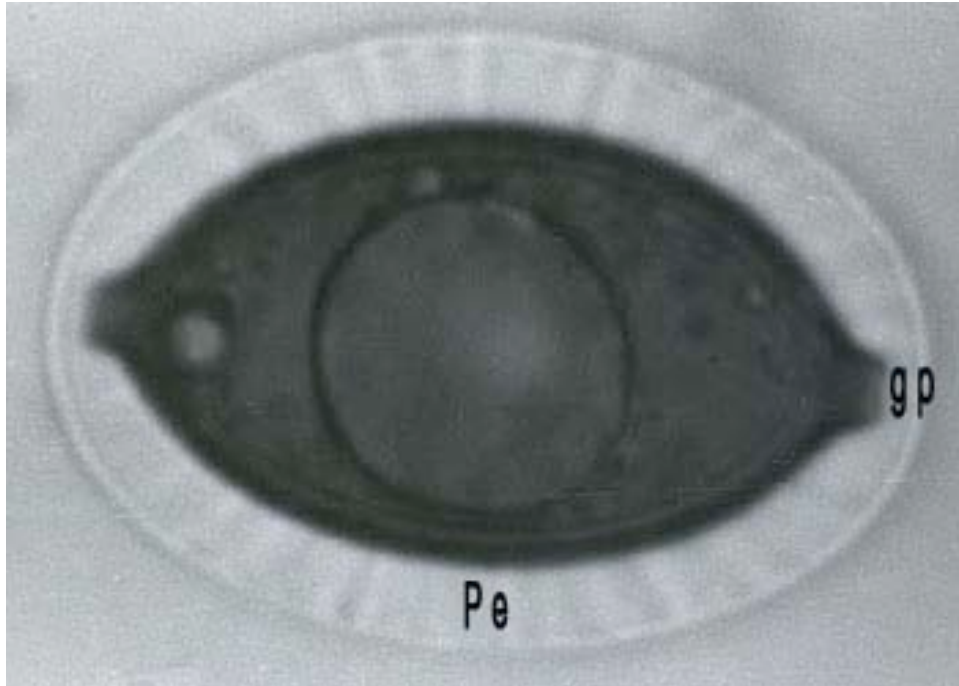


Fig. 31. Ascospore of *G. reticulospora* after Clorox treatment. Pe – perisporium; gp – germ pore. X70

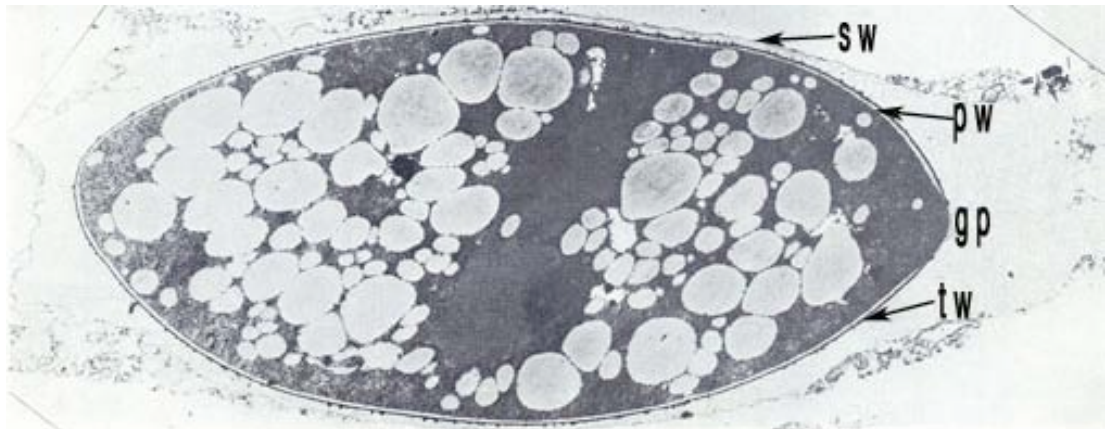


Fig. 32. TEM longitudinal section through developing ascospore of *S. fimicola* - (after Mainwaring). Gp – germ pore; pw – primary wall; sw – secondary wall; tw – tertiary wall. X5500

Wall Structure and Development in Ascospores of *Sordaria*

The ascospores of *Sordaria* are typically ellipsoidal in shape and black in color when mature. They closely resemble ascospores of *Neurospora* and the ellipsoidal species of *Gelasinospora*. Like *Neurospora* and *Gelasinospora* the

ascospores are discharged from their asci when mature. As previously mentioned, a key macroscopic feature that characterizes these three genera is the topography of the wall surface of their ascospores. Instead of pitted or ribbed walls, as found respectively in ascospores of *Gelasinospora* and *Neurospora*, the wall surface of ascospores of *Sordaria* are smooth (Fig.3). Except for some LEM and SEM observations, we have not conducted ultrastructural studies on the development and structure of the wall of ascospores in this genus. Therefore, the comparison of wall structure and development in *Sordaria* with *Neurospora* and *Gelasinospora* is based on reports in the literature by other investigators who have studied ascospore ontogeny in the genus.

Studies on wall structure and development in ascospores of *Sordaria* have been well documented. Although the delimitation of *S. fimicola* ascospores was investigated by Furtado and Olive (1970), wall formation and structure was not a focus of their study. Mainwaring (1972) was the first to provide detailed information on the fine structure of ascospore wall ontogeny in a species of *Sordaria*, viz., *S. fimicola*. The heterothallic species *S. brevicollis* was chosen by Hackett and Chen (1976) for their comprehensive study of ascospore ontogeny in the genus. More recently Bellemere et al. (1992) included *S. fimicola* and *S. prolifica* in their broad study on diversity of ascospore wall structure in selected pyrenomycetes.

There is general agreement in the findings of the authors cited above that the ascospore wall in *Sordaria* ascospores is multilayered. The terminology used by the different authors in designating or identifying these wall layers differs however. Mainwaring (1972) designates the wall layers observed in *S. fimicola* as primary, secondary, and tertiary (Fig. 32). The primary wall layer is described as being electron transparent and deposited between the outer spore investing membrane and the spore plasmalemma. This wall layer corresponds in position, time of deposition, and general appearance to the "A" layer described above for the first layer of the perisporium in *Neurospora* and *Gelasinospora* ascospore ontogeny. According to Mainwaring a wall with a density similar to that of the primary wall is deposited outside of the primary wall and this layer was designated the secondary wall. Subsequently, as reported by Mainwaring, a layer that becomes extremely electron dense is deposited between the primary and secondary walls and this layer is designated the tertiary wall. Mainwaring suggested that this wall layer is presumably the site where the dark pigment of mature *Sordaria* ascospores is located. There is no evidence in any of the TEM micrographs of Mainwaring that sporoplasmic cisternal elements, the IMP of *Neurospora* and *Gelasinospora*, are present during ascospore wall ontogeny in *S. fimicola*.

Hackett and Chen (1976) proposed a different nomenclature for ascospore wall components in their report on ascospore ontogeny in *S. brevicollis*. They recognized four wall layers in their study and proposed the terms periascosporium, delineation ascosporium, subascosporium, and endoascosporium as designations for these wall layers. A micrograph from their report of a mature ascospore with its three inner layers is shown in Fig. 33. According to Hackett and Chen the delineation ascosporium is the first wall layer to form. It is described as being a narrow electron dense layer that is deposited

between the investing membrane and the spore plasmalemma. Short spikes are dispersed over its outer surface. Associated with the development of the delineation ascosporium, and external to it, is the appearance of the periascosporium. It is reported to be an irregular electron translucent layer with poorly defined structural features that persists as a slime layer over the surface of mature ascospores. The next layer to form as Hackett and Chen report is the subascosporium. It is deposited internal to the delineation ascosporium and, when fully developed, is described as being highly electron dense with a ribbed substructure. Its appearance is associated with the darkening of the developing ascospore. The fourth layer, the endoascosporium, is electron transparent and interfaces with the plasmalemma of the mature ascospore. As shown in Fig. 34, a germ pore is present at one end of the ascospore. The germ pore perforates the subascosporium at one end of mature ascospores. It is covered however by the other wall layers of the ascospore. *Sordaria* ascospores have a single germ pore instead of two as normally found in ascospores of *Neurospora*, except *N. terricola*, and *Gelasinospora*.

The observations of Bellemere et al. (1992) on *S. fimicola* and *S. prolifica* ascospore wall structure and development generally agree with the findings of Mainwaring (1972) and Hackett and Chen (1976) relative to the number and positions of wall layers in *Sordaria* ascospores. The wall of the young ascospore is described as being electron transparent and covered externally by the perispore. Further development of the ascospore wall, according to these authors, involves a subdivision of the perispore and an increase in its complexity. This is followed by the appearance of a two-layered endospore and in mature spores the loss of the perispore.



Fig. 33. TEM of section of ascospore of *S. brevicollis* showing details of trilaminar nature of wall of mature ascospore. Da – delineation ascosporium (after Hackett & Chen).

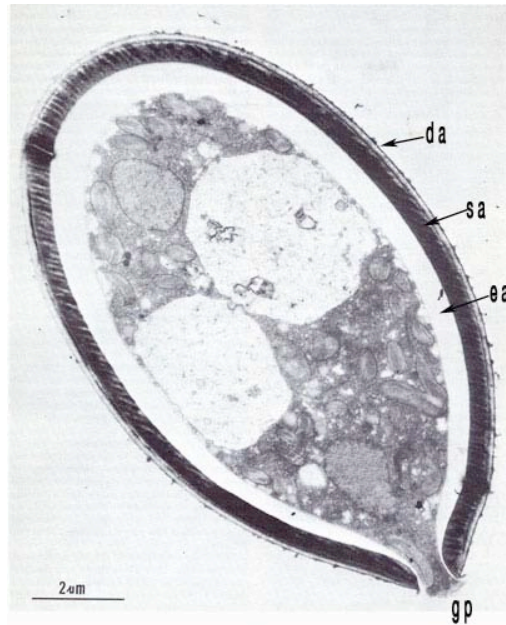


Fig. 34. Germinating ascospore of *S. brevicollis* showing typical wall structure of mature ascospore and germ pore (after Hackett and Chen). Da – delineation ascosporium; sa – subascosporium; ea - endoascosporium

Discussion and Summary

Common to each genus during ascospore wall ontogeny is the appearance of a narrow electron translucent layer as the first wall of the young ascospore. This layer is deposited between the spore plasmalemma and the inner investing membrane of the ascus vesicle. For *Neurospora* and *Gelasinospora* ascospores this layer is considered to be the initial component of the perisporium, one of the three main structural units comprising the ascospore wall of these genera (Frederick and Austin, 1993; Walker, 1983; Bryne, 1975). Hohl and Streit (1975), in their report on ascospore wall formation in *N. lineolata*, refer to this layer as the primary wall of the ascospore. The rib-vein component of *Neurospora* ascospores and the pitted wall component of *Gelasinospora* ascospores form next as underlying layers. Together these two wall components make up the perisporium.

Early ascospore wall formation in *Sordaria* differs in some respect from the deposition pattern found in *Neurospora* and *Gelasinospora*. In *Sordaria* the first wall layer to form around the young ascospore is similar, initially, to the first wall component of *Neurospora* and *Gelasinospora* ascospores. As mentioned previously, Hackett and Chen (1976) refer to this layer as the delineation ascosporium, Mainwaring (1972) refers to it as the primary wall, and in both reports an external layer, the periascosporium of Hackett and Chen, or the secondary wall of Mainwaring, is indicated as the next layer to form. These investigators have described this outermost layer, the periascosporium or

secondary wall, as a featureless electron translucent layer that persists as a slime sheath over mature ascospores. No comparable layer external to the first wall component of the perisporium has been observed in *Neurospora* and *Gelasinospora* ascospores. As wall ontogeny progresses in ascospores of *Sordaria* the first wall layer becomes more electron dense at its inner and outer borders and minute scattered spike-like processes appear on its outer surface (Hackett and Chen, 1976). Mainwaring reports the presence of similar processes on the wall surface of mature ascospores of *S. fimicola* but associates their presence with the formation of a tertiary wall. This wall layer is described in Mainwarings' study as developing between the primary and the secondary wall of *S. fimicola* ascospores.

In ascospore wall ontogeny of *Neurospora* and *Gelasinospora* all wall layers are centripetal in order of deposition. This pattern is reflected in the wall nomenclature of Frederick and Austin (1993) where the outer wall component of the perisporium is referred to as the "A" layer and the rib-vein or pitted component its "B" layer. A comparable wall structure pattern is absent in *Sordaria* ascospores. The events associated with the formation of the "B" wall layer in *Neurospora* and *Gelasinospora* appears to be unique in ascospore wall ontogeny. In these genera the rib-vein topography of *Neurospora* ascospore walls and the pitted topography of walls of *Gelasinospora* ascospores are determined by membrane elements in the sporoplasm of the developing ascospore. Subsequent to the deposition of the wall matrix of the "B" layer, membrane profiles (IMP) migrate from within the sporoplasm and become positioned at defined locations on the inner surface of the spore plasmalemma. At the sites where IMP are located there is no deposition of the matrix of the "B" layer over the external surface of the spore membrane. This results in the occurrence of a vein or pit in the outer spore wall that characterizes these genera. Studies on wall ontogeny of *Sordaria* ascospores do not reveal a wall layer comparable to the "B" layer nor any sporoplasmic membrane profiles that are associated with the deposition of any outer wall layer.

After the deposition of the "B" layer in *Neurospora* and *Gelasinospora* ascospores the episporium begins to form. However, prior to its deposition a narrow electron dense layer develops on its inner surface and binds the "B" layer to the developing underlying episporium. An episporium type wall layer is present in ascospores of all three genera. This layer is highly electron dense, brittle, and is perforated at one or both polar ends by a germ pore. The black color of ascospores in these genera is due to the pigmented episporium. Underlying the episporium and interfaced with the spore plasmalemma is the third principal wall layer, the endosporium. A narrow electron dense layer, comparable to the one between the "B" layer of the perisporium in *Neurospora* and *Gelasinospora* ascospores, forms between the endosporium and the episporium. These two binding layers merge at the germ pore opening of the episporium. In each genus the endosporium appears as an electron transparent featureless layer that is not perforated by the germ pore.

Similarity in ascospore wall structure, a common sporoplasmic determination of wall surface topography, and bipolar germ pores suggests that the genera *Neurospora* and *Gelasinospora* are closely related taxa within the family

Sordariaceae. These taxa represent two of several genera in the family that have sculptured spore walls (Jeng and Krug, 1976). It is unknown at this time as to whether similar sporoplasmic cisternae play a role in determining the wall surface patterns of other genera with sculptured spore walls as a developmental indication of their relatedness. Other genera in the family, such as *Sordaria*, lack sculptured walls. As indicated above, studies show that ascospore ontogeny in *Sordaria* differs in several respects from that in *Neurospora* and *Gelasinospora*. For instance, the perisporium of ascospores of *Sordaria* is reported to form after and external to the initial wall layer of young ascospores. A wall layer comparable to the development and structure of the "B" layer of the perisporium of the aforementioned genera is lacking in *Sordaria* ascospores and this accounts for their unsculptured or smooth wall surface. Common to these genera, however, is the presence of a similarly structured episporium that is perforated by a germ pore and the electron transparent endosporium that interfaces with the plasmalemma of the spore.

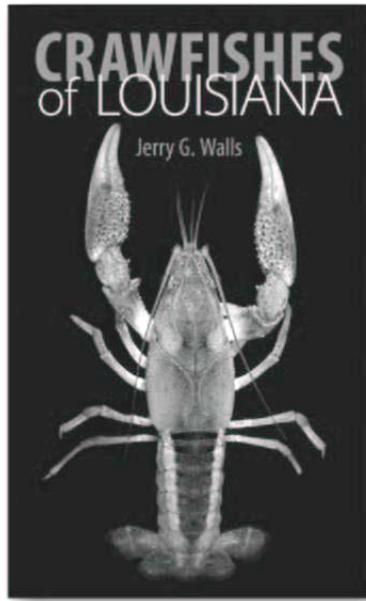
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**MARINE BIODIVERSITY CONSERVATION: WORKSHOP TO ESTABLISH
MARINE NATIONAL MONUMENT FOR BLAKE PLATEAU**

BY

Robert Y. George, George Institute for Biodiversity and Sustainability**Orrin H. Pilkey**, Nicholas School of Environment, Duke University**Kevin C. Foy**, Law School, North Carolina Central University**INTRODUCTION**

The 2010 Gulf of Mexico oil spill episode has awakened a new interest to initiate the protection of marine biodiversity by using the Antiquity Act of President Theodore Roosevelt in 1906 which created the first 'National Parks'. Using the Antiquity Act, recently a vast marine space of more than 140,000 square miles was protected as the 'Papahānaumokuākea Marine National Monument' off the Northwest Hawaiian Islands on the basis of recommendations from the scientists who made detailed efforts to assess the unique ecosystems in this vast space and considered socio-economic and cultural issues, including commercial and sports fisheries. With this background the authors of this article (George, Pilkey and Foy) organized a workshop in the Law School of the North Carolina Central University (NCCU) in Durham, North Carolina on Oct 15, 2010 with the goal of discussing the merits of, and deterrents to, instituting a new Marine National Monument within the EEZ (Exclusive Economic Zone) off the southeastern coast of the United States. This workshop brought under one roof scientists, attorneys and federal government policy makers.

The speakers at this workshop considered the scientific, social, political and legal issues surrounding 'Marine National Monument' designation for the Blake Plateau off the coast of Florida, Georgia, South Carolina and North Carolina (all within the jurisdiction of the Association of the Southeastern Biologists (ASB)). The discussions following these presentations focused on potential bottle-necks, with an eye toward recommendations for moving forward. In this article, the abstracts of the contributions from the participants of this 'Marine National Monument' workshop at NCCU are presented.

**1. BLAKE PLATEAU: HEEZEN NATIONAL MONUMENT TO PROTECT
VULNERABLE MARINE ECOSYSTEMS (DEEP-SEA CORALS)****Robert Y. George, George Institute for Biodiversity and Sustainability,
Wake Forest, N.C.**

The Coastal and Marine Spatial Planning (CMSP), embodied in the 2010 National Ocean Council (NOC) recommendations, provides us an opportunity to expand marine protected areas (MPAs) within EEZ off the US Atlantic coast. The recent discoveries of *Lophelia* reef ecosystems in many geographic areas of the world ocean (George and Cairns, 2007 a & b), in the Gulf of Mexico and off southeastern USA as Agassiz coral hills over Blake Plateau (George, 2002) as well as unique chemosynthetic seep communities (Van Dover et al, 2003) within EEZ of the Blake Plateau and Ridge present a unique system of Vulnerable Marine Ecosystems (VMEs) that call for spatial protection against potential natural gas drilling and production. The biodiversity over the Blake Plateau is

exceptionally high with a rich meiofauna and macrofauna community in the pteropod ooze sediments. The megafauna constitute large crustaceans with a rich diversity of shrimps and crabs. Peculiar sea-anemones are abundant, each with a mud-ball ballast, adapted for spatial movements northward in the Gulf-Stream. The benthic fish fauna is dominated by hag fish in the northern Plateau. Rat-tail fish and synphobranchid eels occur throughout the Blake Plateau.

Benthic commercial fisheries at the site are minimal with some wreck-fish fisheries that are now declining. Ecosystem-based Management (EbM) should take into account protection of the water column and parts of the western Sargasso Sea also. The designation of a new Marine National Monument, in honor of the great American oceanographer Bruce Heezen who originally described the topography of Blake Plateau and the sea floor physiography, need to be proposed to the Council for Environmental Quality (CEQ) in the White House. The present extent of MPA protection within US EEZ is not as high as in the EEZs of New Zealand (33%) or Australia (11%). US EEZ protection is often defined as less than 1%, although the restriction of bottom trawling in a much larger area of EEZ makes the total protected area more comparable to that of Australia. It is also important to point out that the unique high-profile deep-sea coral reefs and low-profile coral hills over the Blake Plateau are not damaged yet by bottom-trawling. These hard-bottom habitats are still in good shape, ecologically speaking, unlike similar reef habitats off the several areas of the European coast and seamounts. Therefore, a timely and swift action, applying the Antiquity Act, is now called for to designate vast sea-floor stretches and the water-column above as 'Marine National Monument' (MNM). This MNM would embrace a total of 50,000 square miles (including seeps, Agassiz coral Hills) and more than 23,000 square miles of the CHAPCs (Coral Habitat Areas of Particular Concern) already designated by the South Atlantic Fisheries Management Council (SAFMC).

2. TRIBUTE TO BRUCE HEEZEN: PIONEER EXPLORER OF THE DEEP-SEA FLOOR

Orrin H. Pilkey, Nicholas School of Environment, Duke University

Bruce C. Heezen was the most influential marine geologist of his era. Born in 1924 on a Vinton Iowa farm he died on June 21, 1977 while diving in the NR1 submersible on the Mid Atlantic Ridge, a feature he had discovered a decade earlier. Two achievements stand out in particular. Most important perhaps, starting in the mid 50s and continuing into the mid 60s, he and his artist/geologist collaborator Marie Tharp, produced the first ocean basin physiographic diagrams of all the basins. Tharp completed the physiographic diagram of the combined world's oceans in 1977 after Heezen's death. The diagrams were major steps forward in the understanding of the ocean basins and provided the basis for the plate tectonic revolution in geology. Reflecting the marvelous intuition that Heezen had for sea floor topography, the diagrams proved remarkably accurate which is why they are still the mainstay of Ocean basin maps in use today. Heezen was also the first to recognize the importance of Turbidity currents in bringing coarse material (sand) to the deep sea floor and in the construction of submarine canyons. He documented the existence and nature of turbidity

currents in his landmark study of telephone cable breaks on the continental margin that resulted from the 1929 Grand Banks Earthquake. In 1999 the US Navy christened the Research Vessel USNS Bruce C. Heezen.

Among more than 300 technical papers by Heezen are some of the first studies on the topography of the Blake Plateau, a vast Atlantic Ocean plateau, unique in the Americas, ranging in depth from 300 to 1200 meters. The Antilles and Florida currents join at the southern tip of the plateau to form the Gulf Stream, which has swept across this slowly subsiding surface for perhaps 60 million years. The current swept surface has erosion-formed valleys oriented parallel to the Gulf Stream current and extensive phosphorite and manganese deposits. The combination of a hard bottom and strong bottom currents provides a platform for a unique assemblage of marine organisms that include the scleractinian deep-water coral reefs and coral hills.

3. EDUCATIONAL PERSPECTIVES: SHOULD WE MAKE THE DEEP-SEA ECOSYSTEMS ON BLAKE PLATEAU TOOLS FOR PUBLIC KNOWLEDGE

Alexander Glass, Nicholas School of Environment, Duke University

The designation of the Blake Plateau as a 'National Marine Monument' faces not only legal and logistical challenges but educational as well. The National Parks Service Act of 1916 states that the purpose of national parks or monuments is "*to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations*". How would a deep-water 'Marine National Monument' off the coast of the southern United States be enjoyed by its visitors or students of different age groups when access is clearly logistically limited?

Parks, monuments, and sanctuaries portray themselves to the US public as being of enormous educational value. This is easiest for historical sites and parks or monuments with readily accessible, beautiful scenery and wildlife. Sanctuaries, by their very nature, on the other hand, provide little to very limited access. The latter must portray themselves as being of the utmost value to the conservation of local biodiversity and associated local fisheries or related economies. The Blake Plateau clearly preserves a diverse (perhaps locally unique?) fauna of organisms that deserve our protection. However, with deep water fisheries being so limited in the area, it is difficult to argue that the region must be preserved to provide hatcheries or refuge for regional fish populations. In other words, making the area off-limits to pelagic fisheries development or oil & gas exploration cannot be argued to benefit economies.

Many unanswered questions about the value of a marine sanctuary, park, or monument on the Blake plateau remain. Are the deep water reefs unique ecosystems worthy of protection, even against national security or military considerations? How much do we really know about the endemicity of the species found here? Are they truly unique or typical of global deep-water environments at this depth? Are they potentially threatened by human interference such as offshore mariculture or sonar defense arrays to detect

potential foreign security threats in the near future? How will the marine national monument be made accessible to the public? Above all, what sorts of educational benefits will the Blake Plateau monument provide?

4. REFLECTING ON MARINE PROTECTED AREAS AND NATIONAL MONUMENTS

**John D. Rummel¹ and Heather Ward²
East Carolina University^{1,2} and Barton College²**

Earth is a dynamic, living planet and changes off the coast affect large concentrations of people. The locations of coastlines from century to century and over millennia alter depending on glacial and interglacial climate variations. For example, 18,000 years ago sea-level was about 130 meters lower than it is today. During a warmer glacial minimum, we can expect the future coast of North Carolina to be some 80 kilometers west of the current sounds.

As the coast's climate and geology changes, we attempt to maintain a maritime economy acutely dependent on the health of rivers, marshlands, and adjacent waters. Quality of life along the Eastern Seaboard and fisheries in the Atlantic are under a great deal of stress, their sustainability threatened by a combination of environmental degradation and economic pressures. Overexploitation compromises the future of commercial and sport fisheries, both important contributors to struggling coastal economies. Over development degrades water quality. At the same time, interest in coastal cultural heritage—shipwrecks, lighthouses, maritime museums, and other historical sites—contributes to coastal tourist economies and may increase the scope and nature of businesses along the coast. Our ongoing struggle to balance resource use and resource preservation impacts all of these economic activities and the people that depend on them directly.

Those hoping to establish a new national monument or expand an existing marine protected area will need to consider this balance and articulate potential benefits to coastal residents in particular. Lessons from the founding of the Papahānaumokuākea Marine National Monument in the Northwestern Hawaiian Islands may inform efforts to create a national monument over the Blake Plateau. The Hawaiian effort involved carefully orchestrated communication efforts building upon years of incremental work by state and federal government officials. Scientists first defined a geographic space with unique ecosystems and problems. Proactive policy entrepreneurs then crafted solutions and promulgated regulations for a proposed protected area. The media embraced their vision of place and its means of protection, giving both distinctive visual appeal, narrative, and voice. Patience and a well-executed, multi-year educational and persuasive campaign that tactically deployed charismatic media proved essential to their eventual success.

5. WRECKFISH AND CRUSTACEAN FISHERIES ON THE BLAKE PLATEAU

**Brian Chevront, Division of Marine Fisheries, Department of Environment
and Natural Resources, Morehead City, North Carolina**

The primary fishery that occurs on the Blake Plateau is wreckfish. Atlantic wreckfish are deep-water fish and can be found on the ocean bottom at depths between 40 and 600 m (130 to 2,000 ft), where they inhabit caves and shipwrecks (thus their name). They are largely a solitary fish, however juveniles will school below floating objects. Wreckfish are oviparous fish that spawn in the summer. In the South Atlantic Bight the fish are most important as a commercial fish, reaching a maximum reported length of 210 cm (7 ft) and weight of 100 kg (220 lb). The average adult size is about 80 cm (~32 inches).

South Atlantic Fishery Management Council Snapper Grouper FMP Amendment 5 established the wreckfish individual transferable quota (ITQ) in 1992. Stock status of this fishery is unknown. Consequently, very little is known concerning the potential long term yield that can be taken from the wreckfish resource. However, it is known that wreckfish are long-lived and the fishery is concentrated in a small area. The Council is currently reviewing their Wreckfish management strategy.

The current total allowable catch (TAC) for wreckfish is 2,000,000 lbs. In recent years, landings have not reached the TAC. Only about 220,000 pounds per year are landed, but that is largely due to persons with ITQ shares choosing not to participate in the fishery. Likewise, participants are not transferring or selling their shares to others.

Research was conducted on the presence of golden crab, a relatively small commercial fishery. This fishery uses large traps that lie on the deep ocean floor. However given the low presence of golden crab and currents in the area, no fishery occurs there due to economic and safety reasons. Deepwater shrimp are not allowed to be harvested in the Blake Plateau. Fisheries over the Blake Plateau are mainly recreational and commercial fishing for billfish, dolphin, wahoo higher up in the water column.

6. CHEMOSYNTHETIC ECOSYSTEMS ON THE BLAKE RIDGE

**Mary Turnipseed and Cindy Van Dover,
Duke University Marine laboratory, Beaufort, North Carolina**

The Blake Plateau is home to at least one cold seep community. Located at 32 29.623N, 76 11.467W at 2155 m on the Blake Plateau, the community was first discovered during an Ocean Drilling Program cruise in 1995. It was subsequently explored in 2001 during the Deep East 3 Expedition, which was funded by NOAA's National Undersea Research (UNC-Wilmington) and Ocean Exploration Programs (Van Dover et al. 2003).

The Blake Ridge seep community sits on top of a salt diapir, where methane emanates from a subsurface hydrate reservoir. Microbial activity at the base of the food web converts inorganic to organic carbon, using energy derived from the oxidation of methane or sulfide. The community supported by this microbial chemosynthesis includes mussels, clams, cake urchins, sea cucumbers, many species of polychaete worms, squat lobsters, shrimp, anemones, flat worms, and nematodes.

The Blake Ridge seep is the subject of ongoing scientific research. The seep is located in an area called the Atlantic Equatorial belt, which stretches from the Gulf of Mexico across the ocean to North Africa. Though there is some evidence for connectivity among the chemosynthetic sites along the belt, the degree of overlap is presently unknown. The connectivity between the seeps in the Gulf of Mexico, Caribbean, and Blake Ridge seep communities will be the subject of an upcoming four-year study funded by the NSF to explore the genetics, physical oceanography and larval ecology linking the sites.

Additionally, the subsurface morphology of the Blake Ridge diapir indicates the presence of other potential conduits for methane seepage. Using *Deep Submergence Vehicle* Alvin, this project plans to explore the Blake Ridge diapir further for more seep communities.

7. LESSONS FROM THE GULF OF MEXICO: STATUS OF SHELF-EDGE MESOPHOTIC REEFS IN THE NORTEASTERN GULF

Kenneth Sulak, Lead Scientist, United States Geological Survey

Recent research in the Northeastern Gulf of Mexico has revealed the presence of the Pinnacle Reefs at the shelf-edge at 80 m, about 80 miles from the coast of Mississippi and Alabama. These mountain-top reefs serve as oases and are rich in biodiversity with an abundance of sessile invertebrates and many deepwater grouper species. Multibeam survey of the reefs show the vertical and horizontal reliefs and these reefs call for protection from oil and gas explorations in the future. These temperate reefs are located north of the Deepwater Horizon which from April 2010 spewed 172 million gallons of crude oil becoming the worst environmental disaster in the history of our nation. The fish fauna in the mesophotic reefs at shelf edge are primarily planktivores such as rough-tongue bass, yellow-tail reef fish, blue angel fish and red barbiers. The amberjacks are the common predatory fish species at the top of the food-chain.

In the VIOSCA KNOL (Lat. 29.106 –29.170 N; Long. 88.383 – 88012 W), northeast of Deepwater Horizon a deepwater coral reef occurs, predominantly inhabited by dense aggregations of the scleractinian coral *Lophelia pertusa*. This unique ecosystem also calls for protection. It is still not known how the oil, both in the surface and deeper depths, impacted these reefs at shelf edge and deep-sea of the eastern Gulf of Mexico. The lesson from the Gulf of Mexico oil spill is undoubtedly the compelling need to take conservation actions to create Marine Protected Areas in the eastern Gulf of Mexico and elsewhere off the southeastern United States where such Vulnerable Marine Ecosystems occur both at the shelf-edge and over the Blake Plateau.

Being a fish biologist with limited conservation experience, I would contend that the shelf edge reefs are worthy of consideration under some type of ecosystem/biodiversity conservation mantle. The monument route for protection of the deepwater *Lophelia* reefs may be a good approach for biodiversity protection of this Vulnerable Marine Ecosystem (VME).

8. US OPPORTUNITIES FOR CREATION OF THE HEEZEN NATIONAL MONUMENT USING THE ANTIQUITY ACT

Phil Kline, Greenpeace, Washington DC.

Greenpeace has promoted the development of the "Road Map to Recovery: A Global Network of Marine Reserves". Although the emphasis of Greenpeace has been high seas beyond the 200 nautical mile limits that define the national sovereignty of the countries of the world, Greenpeace recognizes the importance of establishing marine sanctuaries and national monuments within the EEZs (Exclusive Economic Zones) of the world Ocean. Greenpeace also advocates the compelling need to expand Marine Protected Areas (MPAs) to cover 40% of the area of the oceans. The recent 2010 Gulf of Mexico oil spill episode has awakened a new interest to create 'Marine National Monuments' (MNM) within the Gulf of Mexico (where hydrocarbon production and exploration dominated over the years) and also off the Southeastern United States over the Blake Plateau where the vulnerable marine habitats (VMEs), such as deep-sea coral reefs and Agassiz coral hills (George, 2002) still remain intact, neither adversely impacted by big oil industry activities nor by big commercial fisheries on the sea floor such as the orange roughy fisheries on seamounts.

The creation of the Blake Plateau National Monument marine protected area is entirely possible using the Antiquities Act. However, the opportunity to do this is in the hands of its supporters to create the atmosphere to make this happen. With the Obama Administration we now have sympathetic staffs at both CEQ under Nancy Sutley and NOAA with Jane Lubchenko. As a first step, the proposed Heezen National Monument (HMNM) needs to have some background work completed. A time line of activities and who will do them along with how they will be funded is the first step. Then a detailed proposal has to be drafted including, the legal framework, details of the proposed area, the scientific rationale, discussion of the biodiversity of the area and the reasons this particular area is a good choice for the creation of the HMNM. Once the background documents are finished, identifying supporters (for their active support) and having meetings with opponents informing them of this proposal is a next logical step. All of this should be completed before taking the final proposal to CEQ, NOAA and others. The new National Ocean Council created by President Barack Obama with the charge of protecting marine ecosystems might be very influential in this process - this is still unknown at this time. As a young environmental activist told me recently in Dominica about moving an environmental agenda forward "it is up to us".

9. LEGAL PERSPECTIVES ON ESTABLISHING A MARINE NATIONAL MONUMENT

Janet Steddum, Law Student (2LE), NCCU School of Law
Kevin C. Foy, Assistant Professor, Law School, NCCU

The authority to establish a national monument, whether terrestrial or marine, is found in the Antiquities Act of 1906. Congress enacted the legislation to prevent the plunder and pillage of Native American artifacts and structures which

were vulnerable to destruction during the settlement of the American West by homesteaders.¹ The second section of the Act gives “[the] President...[authorization], in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated on lands owned or controlled by the Government of the United States to be national monuments...”² In addition to the object itself, land surrounding the object may be taken to the extent necessary for the object’s proper care and management.³ The source of controversy surrounding the use of the Act relates to the restricted use of this once productive Federal land. The Act embraces a preservationist philosophy. Furthermore, no approval by Congress is required; this is an example of pure Presidential power used to protect arguably vulnerable objects of interest. While pre-existing rights and leases for the most part are still in force, they may be tempered by the management goals of the monument. Additionally, as the land is likely to be withdrawn from further entry, new leases and rights are effectively prohibited.⁴ There have been no successful legal challenges to either the President’s authority to establish national monuments or their size; the Act is still good law.⁵ However, it has been amended to preclude further use in Wyoming without Congressional approval.⁶ Legislation has also restricted the President’s use of the Act in Alaska.⁷

Another option for protecting the Blake Plateau area would be to seek designation as a sanctuary under the authority of the National Marine Sanctuaries Act.⁸ This Act encourages multiple uses of the area in keeping with a stewardship philosophy, requires public hearings, an Environmental Impact Statement pursuant to NEPA, and consideration of the impact to commercial fishing pursuant to the Magnuson-Stevens Act (16 U.S.C. 1851).

The establishment of the Northwestern Hawaiian Islands Marine National Monument in 2006 by President George Bush is a fine example of the use of the Antiquities Act of 1906 to protect a threatened marine ecosystem in the light of unsatisfactory attempts to do so under a garden variety Executive Order issued by President Clinton and through the National Marine Sanctuaries Act during the Bush administration.⁹ Federal jurisdiction in a marine environment is dictated by

¹ Dayton Duncan, Ken Burns, *The National Parks: America’s Best Idea* 104 (Alfred A. Knopf 2009)

² 16 U.S.C. 431

³ *Id.*

⁴ Carol Vincent, Kristina Hardy, *National Monuments and the Antiquities Act* 7 (Congressional Research Service 7-5700; R41330) (July 10, 2010)

⁵ *Id.* at 5-6.

⁶ 16 U.S.C 431a

⁷ 16 U.S.C. 3213; Alaska National Interests Land Conservation Act of 1980

⁸ 16 U.S.C. 1431 et seq.

⁹ Robin Kundis Craig, *Are Marine National Monuments Better Than National Marine Sanctuaries? U.S. Ocean Policy, Marine Protected Areas, And The Northwest Hawaiian Islands*, Sustainable Development Law & Policy Vol. VII, Issue 1 (Fall 2006).

international law and extends throughout the Exclusive Economic Zone and in some instances beyond to include the Outer Continental Shelf.¹⁰

ACKNOWLEDGMENTS

We wish to thank Dean Raymond Pierce of the North Carolina Central University School of Law for welcoming the participants. We are grateful to the George Institute for Biodiversity and Sustainability (GIBS) and NCCU Student Environmental Law Society for sponsoring this workshop. We are glad that Ms. Ilesanmi Adaramola, President of the Environmental Law Society made enthusiastic remarks at the outset. The workshop organizers are thankful to Dr. Billy Causey, Southeast Region Director of the National Sanctuary Program (National Oceanic Atmospheric Administration) for his participation and opening remarks as 'keynote address' at the beginning of this workshop.

NEXT STEP

The workshop organizing committee (George, Pilkey and Foy) will prepare a comprehensive "WHITE PAPER" that will include:

- (1) A detailed document identifying the locations and extent of the Vulnerable Marine Ecosystems (eg, Chemosynthetic seep communities, Deep-sea *Lophelia* coral ECOSYSTEMS, Agassiz coral hills and pteropod ooze ecosystems) over the Blake Plateau off Cape Hatteras, North Carolina to Cape Canaveral, Northern Florida.
- (2) This document will identify the support as well as resistance or obstacles to the proposal to create the 'Heezen Marine National Monument' (MNM).
- (3) Submission of the proposal to CEQ (Council for Environmental Quality), after discussions with National Oceanic and Atmospheric Organization (NOAA) and the Department of Ocean Energy Management Enforcement and Regulation. (DOEMER).

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¹⁰ <http://untreaty.un.org/cod/avl/ha/uncls/uncls.html>, United Nations Convention on the Law of the Sea (last visited October 14, 2010).

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BOOK REVIEWS

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Shores, E. F. 2008. **On Harper's Trail: Roland McMillan Harper, Pioneering Botanist of the Southern Coastal Plain.** University of Georgia Press, Athens, GA. 267 pp. \$42.95 (cloth). \$24.95 (paper).

As a second year graduate student back in 1978 searching for a dissertation topic, I found myself leafing through plant specimens in the University of Georgia's herbarium and came upon baldcypress (*Taxodium distichum*). When I turned over the next sheet, it read pondcypress, yet it had the same scientific name as baldcypress. That struck me as curious. How could two so distinctly appearing trees be the same species? Other questions immediately came to mind: Did they co-occur? What might be responsible for these differences? Was it ecotypic differentiation? Did they interbreed? When researching literature on cypress trees, I came across two papers by a Roland M. Harper that mentioned the morphological differences I had noticed (Harper 1902, Harper 1905). Even more interesting were speculations he made about the two taxa, including where they lived and why they appeared so different.

Further investigation revealed that no one had followed Harper up on these ideas, and in an instant, I knew I had my project. But always, in the back of mind, I wondered: "Who was Roland M. Harper?" Joseph Ewan (1968) published a short tribute after Harper's death, but no full length exposition existed until this excellent new biography by Elizabeth Findley Shores, first published in 2008 and now available in paperback. After reading this lively biography, I better understand both Roland Harper the person and his contributions to the botany and biogeography of the southeastern coastal plain.

Shores' biography takes a conventional and mostly chronological approach to Harper's life. Harper rarely threw anything away and his papers constitute the single largest collection by anyone at the University of Alabama (where he spent his last several decades). Shores' takes advantage of this great resource. She utilizes detailed notes of his numerous field trips, his numerous plant identifications (he discovered 20 new species), photos (over 4,000 of them) and other documents to effectively reconstruct the life and times of this somewhat eccentric botanist.

Roland McMillan Harper was born in 1878 in Farmington, Maine. When Roli (as he was called) was nine, the family moved to Dalton, Georgia. Thus began Harper's fascination with the natural history of the south. A second move to Americus, Georgia when he was 14 introduced him to the southeastern coastal plain, an area he would come back to for the rest of his life. When he was 16, he enrolled at the University of Georgia, where his passion for plant hunting took root along the nearby Oconee River. Harper obtained a Ph.D. in botany in 1905 from Columbia University (incorrectly listed as 1906 in Shores' book). Wanting to carve out a career that would distinguish him among the late 19th and early 20th century botanists, he studied the relationship between geography and plants of

the southern coastal plain, which was relatively unexplored at that time. Wrote Harper: "*One who does not know the plants he sees misses half the pleasure of life. Besides that, a botanist in such a little-explored place as Georgia has a good chance to make himself forever famous by discovering new plants.*"

As elaborated by Shores, Harper had the unusual habit of recording plant distributions from trains and later cars, even though he never learned to drive himself! Although not mentioned in the book, Harper came upon an idea for dating oxbow lakes while riding on a train toward Mississippi, which he published in the journal *Science* in 1912. Cypress trees, he reasoned, only colonized the lakes after they separated from the river, so all you had to do was count their rings and you could age the lakes. I do not know if anyone ever took him up on this though.

Shores has perfectly balanced information regarding Harper's personal life with that of his scientific career. She shows how he exasperated his family by failing to marry until late in life, by turning down permanent job offers (ostensibly to keep himself unfettered so that he could continue to explore the plants and geology of the southern coastal plain) and by not publishing a great book of his works. In fact, Harper never really held down a full-time job. Instead, he supported himself by working for both the Alabama and Florida Geological Surveys, by selling plants to herbaria, and by the odd job here and there, including a one year stint at the University of Georgia. Eventually, Harper was given a permanent appointment at the Alabama Geological Survey and an office in Smith Hall on the University of Alabama campus, where he remained for the rest of his life.

An entire chapter is devoted to speculating on why Harper never produced any great syntheses. Shores' thesis is that Harper had obsessive compulsive disorder. Among other things, he meticulously kept train schedules all his life and was obsessive about clipping and saving newspaper articles, all mannerisms consistent with such a diagnosis. There is also an extended discussion of his racial views: Harper was very involved in the eugenics movement, even attending a lecture on it by Leonard Darwin, Charles Darwin's son. Sometimes Shores' listings of Harper's travels and plants found gets a little tedious, but she keeps the story moving along with her lively prose and keen insights. One minor criticism is that it would have been helpful to have a separate bibliography of his scientific publications, rather than folding them into the main literature cited.

This welcome biography of Roland M. Harper by Elizabeth Findley Shores brings his life and accomplishments to a new audience for the first time. Well written, well researched and full of interesting anecdotes, you will feel, after reading this biography, that you finally know Roland M. Harper, perhaps the last of the south's old-school naturalists.

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Williams, J. D., A. E. Bogan and J. T. Garner. 2008. **Freshwater Mussels of Alabama and the Mobile Basin in Georgia, Mississippi, and Tennessee.** University of Alabama Press. Tuscaloosa, AL. 960 pp. \$70.00.

Freshwater Mussels of Alabama & the Mobile Basin in Georgia, Mississippi, & Tennessee by Williams, Bogan, and Garner is clearly a comprehensive examination of the mollusk fauna in one of the most diverse regions in the world. The book's focus is intentionally on identification and distribution of each represented species, spending only a mere 90 pages on general background information. Therefore, the book does not serve as an introductory malacology text, but is an invaluable resource to wildlife managers interested in mussel conservation or graduate level students completing research in the region.

The book stands out as a reference for unionid identification. Specimen pictures are high quality and text descriptions of external and internal unionid anatomy make identification a simple process, even for those with limited experience identifying mussel species. In addition, color distribution maps lend to the accessibility of the text. The fact that there is no dichotomous key means that a novice exploring the book to find a particular unknown species may have difficulty, but adding such a key would make the book even larger (at over 900 pages, this is a thorough study). Descriptions of the ecology and biology of each species are helpful for a general understanding of the species. In addition, if proper notes are taken during sampling for unknown unionids, the descriptions can be used during the identification process.

Overall, I find the flow of the book to be less "choppy" than one would expect from a taxonomy text. The verbiage used throughout the text is accessible and citations throughout ensure that any interest piqued by the topic can be further explored by the reader. Compiling a species list with descriptions of the ecology and biology of every mussel species in the Mobile Basin is a tremendous and daunting task and the text is clearly a collaborative effort by many people. Their hard work is evident in the final product and the text is a solid "must-have" for individuals interested in unionid research.

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Dorcas, M. and W. Gibbons. 2008. Frogs and Toads of the Southeast. University of Georgia Press. Athens, GA. 264 pp. \$24.95.

Frogs and Toads of the Southeast is one of five recently published volumes by Whit Gibbons and his collaborators. The volumes focus on herpetofauna of the Southeastern United States. Each book largely focuses on a major taxon (although taxonomists might object to the volume that lumps lizards and crocodylians) and the anurans have now been included in the series. Frogs and Toads of the Southeast is the second book in the series coauthored by Dorcas and Gibbons, as they previously wrote Snakes of the Southeast. The geographic focus of these books is defined by state boundaries with Louisiana being the westernmost state included, while Tennessee and Virginia are the northernmost states covered. Since this region is the most diverse portion of North America for anurans, salamanders, and turtles it is fitting that University of Georgia Press published the series.

The book starts with a 35-page introductory section that covers the basics of anuran biology. This opening includes broad overviews of many topics including southeastern anuran diversity, frog development, ecological roles played by anurans, defensive and reproductive behaviors, vocalizations, and ways to identify species. The format of the book, both in the introduction and later sections, uses clearly labeled blocks of text interspersed with photographs, maps, and fun anuran facts. The introduction is an effective overture for the intended audience—the millions of people who live or vacation in the Southeastern United States and find the natural world interesting. It is not a book designed for professional biologists, but they will also find it of much value. In keeping with the objective of being a book that is accessible to a wide audience, the authors do not cite the scientific literature and keep the use of Latin names to a minimum. Some biologists will find the use of older nomenclature (e.g., *Rana* rather than *Lithobates*) problematic but it will help reduce confusion and specific recent taxonomic revisions are mentioned briefly in the text of the species accounts.

Most of the book, like a field guide, is devoted to species accounts. The book covers the 42 species of native and introduced frogs and toads found in the Southeast. The volume, however, is not a field guide in any traditional sense. While it is a great resource for identifying a frog you grabbed, it also provides far more natural history information relative to what is found in the thin text provided by any standard field guide. Dorcas and Gibbons typically present five or six large photographs in each species account that provide a wealth of visual information on color patterns, breeding behaviors, and in many cases the appearance of tadpoles. The extensive use of large, high resolution photographs throughout the book to illustrate key points gives the book a different feel than a Peterson or Audubon field guide.

The book ends with a short section on people and frogs that covers conservation, herpetological research methods, and keeping frogs as pets. Fortunately, the issue of conservation extends throughout the book and includes focused discussions of conservation concerns in each species account. While verbal descriptions of frog calls are provided, no audio of vocalizations is

included in the book. The authors provided access to audio files at an internet site. Unfortunately, the website reported to contain these audio clips does not appear to be maintained by University of Georgia Press.

Intelligent youngsters that enjoy the outdoors or love animals will find the book captivating. The use of many images with short sections of text encourages browsing (i.e., rapidly flipping pages, occasional stopping to look closely at a photograph or reading a section of text). This is a path I know young readers will enjoy. While a few short technical sections of the book will challenge both the conceptual understanding of adult readers and the reading skills of children, the technical sections will not interfere with enjoying the book—it is always clear the next page will bring new images and ideas. Good books provide fresh insight each time you pick them up. This is clearly true for the volume. As I reviewed the book, I started to think about the diversity in anuran egg masses and then later considered the diversity in male vocal patch morphology you can find in southeastern frogs. Dorcas and Gibbons begin by suggesting that children are typically fascinated by the frogs, toads, and tadpoles they encounter. Their stated goal is to “help readers recapture some of that fascination by reacquainting them with the world of frogs and toads”. This book is hugely successful in that endeavor.

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*Bryson, C. T. and M. S. DeFelice. 2009. **Weeds of the South.** University of Georgia Press. Athens, GA. 468 pp. \$39.95.*

This book is an updated version of the *Southern Weed Science Society's Weed Identification Guide*, by C Dennis Elmore. The guide was originally published as a three-ring binder, and has been long out of print. If the original guide was anything like this updated version, it would have been very innovative at the time of its publication (circa 1985). The use of multiple color photographs for each species would alone have made the guide almost unique among its contemporaries. Advances in digital printing technology have made the use of color photographs much more common, and an increasing number of guides are using multiple photographs to illustrate each species. For these reasons, the book is no longer as innovative, but it remains a useful reference book for the identification of weeds in North America.

The book is divided into five major sections: an introduction, a key to plant families, illustrated species pages, a glossary, and an index. The introduction is extremely short and gives only the barest description on how to use the book. The map showing the geographical coverage of the guide indicates a region running from Virginia in the north through mid-eastern Kansas in the Midwest, down through and including the panhandle of Texas to the Gulf of Mexico. However the distribution maps on the species pages clearly show that the coverage is much broader than this, extending over much of North America for at least some species. The introduction also includes some simple drawings illustrating common botanical terms. Unfortunately, the drawings are so simple

that they do not easily convey the meaning of the terms to those not already familiar with them.

The Key to Families is a typical dichotomous key divided into sections by plant class (e.g., Pteridophyta [*sic*], Liliopsida, Magnoliopsida) and major characteristics (e.g., vines, opposite or whorled leaves, alternate leaves). Although the characters used in the key are correct, they are so general and so broadly described that they are unlikely to be of much use in actually identifying families. For instance, the first choice of the first couplet in the Liliopsida key is “flowers and fruits subtended by overlapping or 2-ranked scales.” I had to look at the families at the end of this section (i.e., Cyperaceae and Poaceae) in order to be certain what characteristics were being described.

The species description pages are the heart of the book. Each page contains the name of the weed (common and scientific), common name synonyms, a distribution map, multiple color photographs, and a description. The descriptions include information on its habit, habitat, origin, characteristics, special identifying features, and toxic properties. The photographs include pictures of the seeds, seedling, whole plant, and usually a photograph of the flower. The photographs are uniformly of high quality and are mostly standardized. The use of standardized images allows easy comparison among similar features across species (Baskauf and Kirchoff 2008). In the grass section (Poaceae), each page contains a drawing of the collar region (the sheath-blade junction) as well as a photograph of the same region on a living plant. The inclusion of these drawings should aid species identification of grasses.

The species description pages are divided into three sections, by class. Within a class the pages are arranged by family, then alphabetically by scientific name. Unfortunately, neither the family nor the scientific name is highlighted on these pages, making this organization very difficult to use. Someone searching for the Musk Thistle, for instance, must first know that is a member of the Asteraceae, then that its scientific name begins with “C” (*Carduus*). Only then can he or she locate the description of the species, which is clearly labeled “Musk Thistle”.

The glossary is in a standard format, but is not illustrated. The authors attempted to phrase the definitions so that they can be easily understood by users who are not botanical experts, and they largely succeeded in this goal. The inclusion of professionally prepared, illustrative drawings would have made the definitions even easier to understand. The index is in a standard alphabetical format. Its inclusion allows the user to find species without knowing their family and generic names. For instance, the Musk Thistle can be easily found under the “thistle” heading.

Despite the shortcomings of its layout, *Weeds of the South* is a useful reference book for weed identification not only in the southeastern United States, but throughout North America.

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Baskauf, S. J. and B. K. Kirchoff. 2008. Digital plant images as specimens: Standards for photographing living plants. *Vulpia* 7:16-30.

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Gibbons, J. W. and J. Greene. 2009. **Turtles: The Animal Answer Guide.** The Johns Hopkins University Press. Baltimore, MD. 184 pp. \$45.00.

One of the vivid memories of my early childhood took place when my mother refused to stop our car so I could retrieve a box turtle from the road (it would certainly be run over without my “help”). How many of us have had similar experiences? Turtles have been on earth for more than 200 million years and have been crossing paths with man since earliest human history. Their bizarre anatomy and serene behavior renders them among the most recognized and loved vertebrates. In our culture, most turtles are generally not viewed as vermin, pests, or other undesirables, but inoffensive, non-threatening, and even “cute”. These enduring qualities warrant the writing of this book. For those seeking truths about turtles – here they are.

Despite our longstanding attraction to turtles, ignorance and misinformation abounds. What’s the difference between turtles, terrapins, and tortoises? How smart are turtles? Why do so many turtles have yellow stripes on their necks? Are turtles a threat to game fish? How long do turtles live? Who studies turtles? Do turtles talk? In *Turtles: The Animal Answer Guide*, these and 101 additional questions are concisely answered by the renowned turtle biologists Whit Gibbons and Judy Greene. In a question and answer format, the book is divided into 12 chapters entitled: Introducing Turtles, Form and Function, Turtle Colors, Turtle Behavior, Turtle Ecology, Reproduction and Development, Foods and Feeding, Turtles and Humans, Turtle Problems (from a human viewpoint), Human Problems (from a turtle’s viewpoint), Turtles in Stories and Literature, and “Turtleology.” Thirty-six color and 70 black and white photographs enhance the text. Following the chapters are a list of scientific and common names for the 318 living turtle species, a list of organizations and societies concerned with turtle conservation, a six-page bibliography, and a seven-page index.

The first seven chapters of *Turtles: The Animal Answer Guide* cover various aspects of basic turtle biology and, along the way, put to rest widespread myths. For example, turtles cannot emerge from their shells, and, in spite of perceptions quickly formed when snappers eat incapacitated fish on your stringer, no study of the dietary habits of turtles has ever confirmed that turtles are a threat to game fish populations.

The last five chapters address the numerous roles turtles have played in human affairs. Chapter 8 (Turtles and Humans) asks, “What should I do if?” Chapter 9 (Human Problems from a turtle’s viewpoint) is of particular global importance. “Catastrophic decline” is what Conservation International calls it. Turtles have inhabited the earth since the Triassic and are often viewed as the epitome of patience, resilience, and perseverance. Tragically, almost half of the world’s turtle species are currently threatened with extinction. Anthropogenic activities such as habitat destruction, a lucrative pet trade, and use for food and medicine are primary causes of the decline. In this chapter, Gibbons and Greene discuss eight pertinent “green” questions ending with, “What can an ordinary citizen do to help turtles?” Chapter 10 (Turtle Problems from a human viewpoint)

includes a discussion of the exaggerated risk of contracting *Salmonella* poisoning from handling turtles (these days, it's much more likely the culprit is peanut butter or eggs!). On a lighter note, Chapter 11 (Turtles in Stories and Literature) contains references to turtles in religion, mythology, philosophy, children's literature, math, poetry, and famous sayings (Aaron Spelling says it's ok to kiss a turtle - my daughter knows better). I'll let you ponder what the last chapter, "Turtleology," is about.

I found this small (163 pp.; 7" x 10") hardback to be very readable and informative. The writing style is clear, concise, and easy to understand. Cris Hagen's color photographs are outstanding. The quality binding should withstand abuse from youngsters. *Turtles: The Animal Answer Guide* will be of use primarily to undergraduates, amateur naturalists, interested laypersons (my grandkids enjoyed it), and perhaps non-turtle organismal biologists. It may be that even Yertle could learn something from this informative book.

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ACADEMIC EMPLOYMENT OPPORTUNITIES

Christopher Newport University: Environmental Scientist

Christopher Newport University seeks an exceptional Environmental Scientist (tenure-track Assistant Professor) to diversify and/or strengthen the current teaching and research portfolio of a strong interdisciplinary Environmental Science program within the Department of Biology, Chemistry, & Environmental Science. We are looking for a teacher-scholar who is committed to excellent teaching at the graduate and undergraduate levels, developing a creative program of original scholarship involving Environmental Science M.S. graduate and undergraduate students, and demonstrating potential for collaboration with faculty within the department. We are interested in candidates whose research focus involves the broad field of aquatic ecology and environmental assessment, especially with interest in estuarine systems. Desirable areas of expertise include, but are not limited to, environmental toxicology and systems remediation. Exceptional applicants from other areas of environmental conservation will also be considered.

Applicants must have a Ph.D. (in hand by August 1, 2011) in Environmental Science or a related field with preference given to those with post-doctoral experience. Candidates must demonstrate promise for teaching excellence and the ability to establish a vibrant, externally funded research program. The successful candidate will contribute courses in the Environmental Science M.S. program and one or more undergraduate courses for biology and environmental biology majors and will be active in service to the University and community.

Located between historic Colonial Williamsburg and the ocean resort of Virginia Beach, CNU is committed to outstanding teaching, undergraduate education, and the liberal studies core; the University will soon seek to shelter a Phi Beta Kappa chapter. The Fall 2010 freshman class of approximately 1,200 students was selected from over 8,500 applicants and has an average SAT of 1200. Capital improvements (exceeding \$500 million) on the beautiful, 260-acre campus integrate the University's liberal arts vision, nurturing mind, body, and spirit. These include the state-of-the-art Tribble Library, home to the most comprehensive maritime research collections in the world; the Freeman Center athletic complex; and the I.M. Pei-designed Ferguson Center for the Arts, which brings to Virginia the finest performing artists in the world. In 2009, a Humanities and Social Sciences edifice was opened while two other academic buildings are currently underway: a 21st Century Integrated Science Center; and an innovative facility designed to create synergies among the sciences, social sciences, and Joseph W. Luter III School of Business.

Our faculty enjoys an atmosphere of collegiality and mutual respect that rewards outstanding teaching and fosters active intellectual and creative engagement. CNU faculty members are productive scholars and researchers, supported by summer stipends and year-long internal grants programs. New faculty members recently praised CNU's academic departments for their collegiality and support of pre-tenure faculty in a survey conducted by the Harvard Graduate School of

Education. Faculty and administrators actively consult and collaborate as the University works to forge a culture of scholarly inquiry, informed debate, and civic action that enriches students, faculty, and the surrounding community. The result is a supportive and cohesive academic setting in which the University cultivates and carries forward its mission. Attractive salary, health and retirement benefits packages and a well-designed family leave policy further enhance the CNU workplace. For further information on CNU, please visit our web site at <http://www.cnu.edu> and our institutional profile at <http://chronicle.com/jobs/profiles/3730.htm?pg=i>.

To apply, send a letter of application, curriculum vita, copies of graduate transcripts (photocopies acceptable for initial screening), a statement of teaching philosophy, and three letters of reference to:

Director of Equal Opportunity and Faculty Recruitment
Environmental Science Faculty Search
Search #8009
Christopher Newport University
1 University Place
Newport News, VA 23606

Review of application begins on **January 5, 2010**.
Applications received after **January 5, 2010**, will be accepted but considered only if needed.

Christopher Newport University, an EO Employer, is fully committed to Access and Opportunity.

Guilford College: Biology Position

Guilford College invites applications for a one-year position as Visiting Assistant Professor of Biology with a focus on organismal biology, effective August 2011. This position has the possibility of renewal. Primary interest must be in teaching undergraduates, both majors and non-majors, traditional-age and adult students. Responsibilities include teaching the organismal half of our two-course introductory sequence. Ph.D. in Biology is required. Submit cover letter that includes a statement of teaching experience and specialty areas, statement of teaching philosophy, CV, academic transcripts and three letters of recommendations to Fred Devine, Director of Human Resources, c/o Office of Human Resources, Guilford College, 5800 West Friendly Avenue, Greensboro, NC 27410. Review of applications will begin January 15, 2011. Guilford College seeks applications from people representative of diversity based on age, race, gender, sexual orientation, disabilities, ethnicity, religion, national origin, career and life experiences, socioeconomic background, geographic roots, as well as members of the Religious Society of Friends. EOE/AA

Guilford College: Forensic Biology Position

Forensic Scientist. Fulltime, Visiting Assistant Professor position beginning August 2011. Primary teaching responsibilities include the introductory course for Forensic Biology and Biology majors, BIOL 111: Integrative Biology – Molecules and Cells, and the upper-level course for Forensic Biology majors, BIOL 313: Molecular Cell Biology. Must be committed to enhancing the forensics program and working towards its accreditation. Expertise in a forensics specialty and experience in the field are desirable. PhD in the natural sciences is required. Submit a cover letter that includes a statement of teaching experience and specialty areas, statement of teaching philosophy, CV, academic transcripts, and three letters of recommendation to Fred Devine, Director of Human Resources, c/o Office of Human Resources, Guilford College, 5800 West Friendly Avenue, Greensboro, NC 27410. Review of applications will begin January 15, 2011. Guilford College seeks applications from people representative of diversity based on age, race, gender, sexual orientation, disabilities, ethnicity, religion, national origin, career and life experiences, socioeconomic background, geographic roots, as well as members of the Religious Society of Friends. EOE/AA. ☞

Shorter University: Assistant Professor of Biology

Fall, 2011 - A tenure-track position in Biology with teaching responsibilities in Comparative Zoology, Anatomy (including both lecture and laboratory), General Biology, and other courses dependent on applicant's background.

Candidates must have a Ph.D. and a strong desire to teach, mentor and advise undergraduates.

In addition to the required online application, candidates should send a cover letter, vitae, transcripts, three current reference letters, and statements of teaching and religious philosophy to: Human Resources, Shorter University, 315 Shorter Avenue, Rome, Georgia 30165.

Shorter University: Assistant Professor of Chemistry

Fall, 2011 - A tenure-track position in Chemistry with teaching responsibilities in Inorganic Chemistry, General Chemistry, and other courses dependent on applicant's background.

Candidates must have a Ph.D. and a strong desire to teach, mentor and advise undergraduates.

In addition to the required online application, candidates should send a cover letter, vitae, transcripts, three current reference letters, and statements of teaching and religious philosophy to: Human Resources, Shorter University, 315 Shorter Avenue, Rome, Georgia 30165.

Please be sure your name and position for which you are applying are clearly marked on all submissions.

Shorter University is an Equal Opportunity Employer. ☞


Shorter University: Chemistry Lab Coordinator

Opening for a Chemistry Lab Coordinator starting Fall 2011. Duties include maintaining and operating all General Chemistry Labs (CHE 1030 and 1040) with possible Organic, Quantitative Analysis, Nursing Chemistry, and Biochemistry labs with additional adjunct salary. There is also the possibility for teaching General Chemistry lecture as the need arises. Masters degree is preferred.

Candidates interested in the position should send a letter of application, vita, transcripts, at least two professional references and statements of teaching and religious philosophy to Brenda Newman, Human Resources Manager, Shorter University, Box 29, 315 Shorter Avenue, Rome, Ga., 30165. (Fax #: 706-236-1515).

Shorter University: Biology Lab Instructor

Opening for a Biology Lab Instructor starting Fall 2011. Duties include all General Biology Labs (Bio 1010 and 1020) with possible Anatomy & Physiology, Microbiology, and Zoology labs with additional adjunct salary. Masters degree is preferred. A strong chemistry background is a plus!

Candidates interested in the position should send a letter of application, vitae, transcripts, at least two professional references and statements of teaching and religious philosophy to Brenda Newman, Human Resources Manager, Shorter University, Box 2119, 315 Shorter Avenue, Rome, Ga., 30165. 

Saint Peter's College: Assistant Professor of Biology


The following tenure-track position at the Assistant Professor rank is available for August 2011, pending budget approval.

Saint Peter's College is a Catholic, Jesuit institution located in Jersey City, New Jersey in the New York City metropolitan area. Undergraduate enrollment is approximately 2,100 full-time students and a graduate enrollment is over 700 students. The usual teaching load is 12 credit/contact hours per semester. A doctoral degree [Ph. D.] is required as is a demonstrated scholarship record. Teaching experience is preferred. For more information about Saint Peter's College, please visit www.spc.edu.

The Department of Biology at Saint Peter's is a dynamic and growing department with seven full-time members and nearly 150 majors. The department is housed in the newly renovated Gannon Science Center, which also houses the Departments of Chemistry and Applied Science [Biotechnology, Biochemistry and Physics]. The Department of Biology offers program tracks in biology, environmental science and forensic science.

Candidates for this position will be expected to teach a variety of core/general education and upper level Biology major courses and labs including: General

Biology and Microbiology. Experience/ expertise in Environmental Science is a plus.

Applications (including curriculum vitae, cover letter, the names of three references and transcripts) should be submitted to: Saint Peter's College The Office of Human Resources, 2641 Kennedy Boulevard, Jersey City, NJ 07306 or via email to hrdept@spc.edu. Review of applications begins immediately. Application deadline is 15 January 2011. Saint Peter's College is an Equal Opportunity/Affirmative Action Employer and complies with Title IX of the Education Amendments of 1972 and with Section 504 of the Rehabilitation Act of 1973. 

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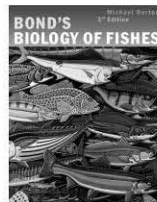


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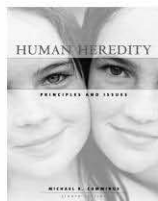


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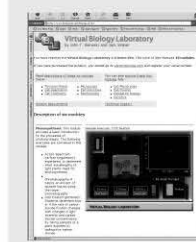


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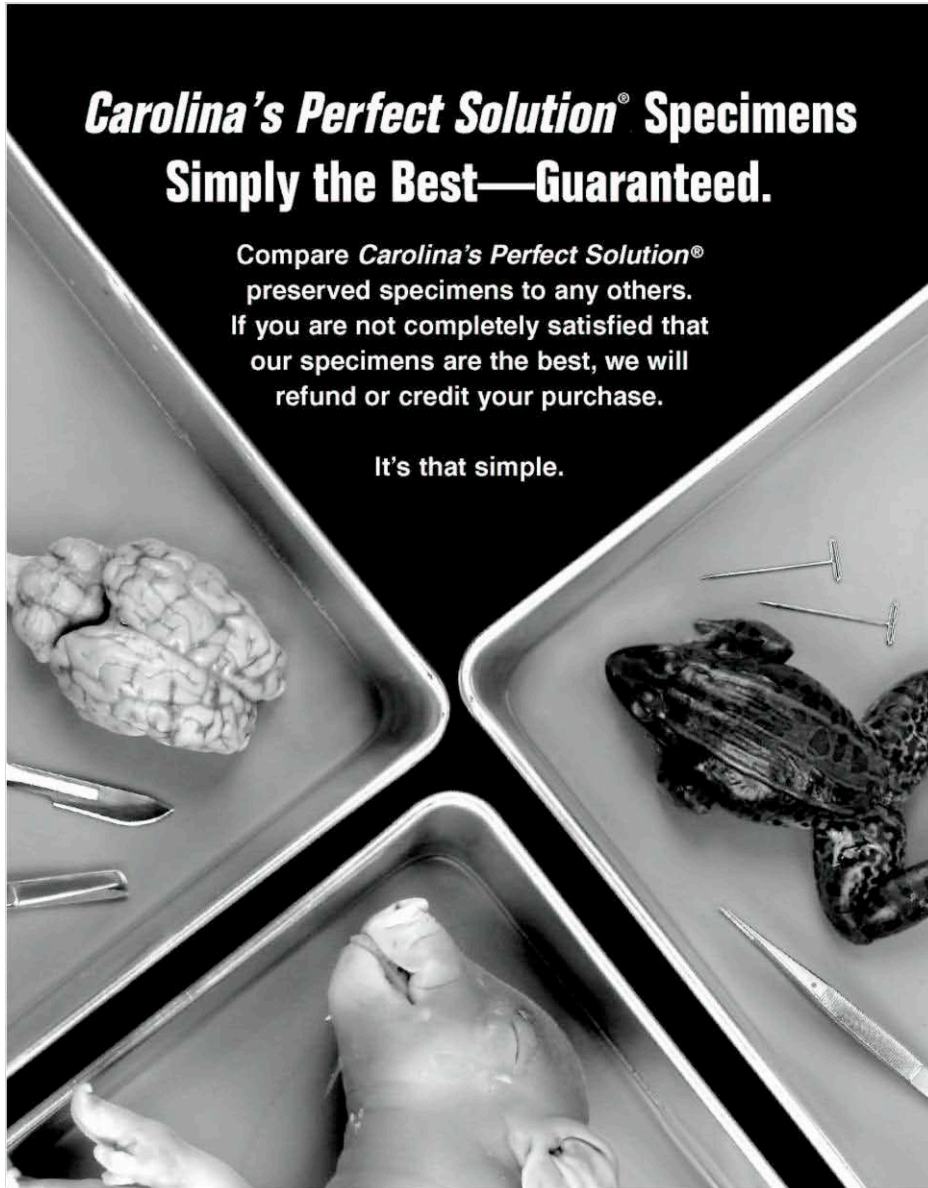
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