



Newsletter



A Biannual Newsletter

Editor: Stephen L. Gardiner

Fall 2008

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Message from the President

The task of producing an inspirational "Message from the President" was one of several reservations I had about accepting a nomination, but I did, after all, fully anticipate losing the contest to someone more inspirational! Fortunately for AMS, I get to write only one.

Without going back to check, I am certain that I will echo messages from AMS presidents-past and those of other professional societies when I ask: What is the role of AMS in today's science, are we fulfilling our potential, what should we be doing that we are not doing? It seems obvious that any organization should ask itself these questions regularly. Are we relevant in this fast-changing age of molecular tools? I would like to answer that we play a crucial role in promoting high standards and creativity in microscopy in biological science, and that we are doing so effectively. However, on the whole we are actually coasting with just minor adjustments of our sails - how is that for inspirational!? AMS does have two very important roles - it is a key partner and voice for its members in annually co-hosting one of the most important biological conferences in North America with the Society for Integrative and Comparative Biology, which is of special value to our younger members. AMS also is the co-publisher with Wiley-Blackwell of the hugely successful *Invertebrate Biology*. One could reasonably argue that these are sufficient answers to my questions. *Invertebrate Biology* bears the torch for traditional and modern microscopical methods, and addresses a compelling range of research with invertebrates. In fact, *Invertebrate Biology* is so successful that we are faced with the enviable task of having more good manuscripts than we do pages to publish them in a timely fashion. However, while we have published excellent papers that use confocal microscopy and we sponsored a superb symposium organized by Ruth Dewell and Kathy Coates that show-cased confocal microscopy, I am not convinced that we have adequately assimilated a natural constituency from among biologists who use this tool. I am not the person to effect this, but I urge our

members who are invested in confocal microscopy to step forward and help us explore ways to represent this field more appropriately within AMS. I would certainly like to hear from anyone with views on this.

The fact is that much of AMS energy goes into publication of *Invertebrate Biology*, steered by Pat Reynolds and a superb editorial team, while planning and executing activities for the annual meeting are a close second - for which we have to thank the two most important but much less visible people on the Executive, our Program Officer Kathy Coates, and our Secretary, Steve Gardiner. Steve has been Secretary of the AMS for so many years, I can't remember another Secretary, and he has been the institutional memory and lynch pin of the Executive all those years. He is stepping out of that role at the end of this year, so perhaps my most important task on behalf of the AMS has been to find a replacement. No sooner did I succeed at that, than my nominating committee left with us with the prospect of replacing Kathy Coates a year early by nominating her for President-elect! Ah, but that is a problem left for my successor, Vicki Martin. Actually, I am very grateful to the nominating committee of Mike Hart, Sara Lindsay, and Rick Hochberg for their diligence, and I'm sure they will be ready to help Vicki if necessary.

One of our important activities is the AMS Summer Research Fellowship. This year, we were able to offer one each specifically for an undergraduate and a graduate student, respectively Andrea Cross of the Florida Institute of Technology and Ivey Ellis of Auburn University (see their reports in this Newsletter). Many thanks to Vicki Martin for chairing the selection committee. Also, we continue to look for the beauty and fun in microscopy with our Photomicrography Contest run at the annual meeting. Please take note of Kathy's plea to participate - I'm impressed with how few of our members have the ego to want to show off the beautiful work that I know so many of you do; it's OK to show your talent!

The various regular activities mentioned above are more than enough to wile away the little free time most of us (don't) have, but it is important to keep examining what we do and how to maximize the products of our efforts. To that end, I asked the Membership Committee, chaired by Carole Hickman, and the Web Committee, chaired by Amy Johnson, to take a hard look at how we are doing in these two areas and how we can better integrate them. Jann Vendetti is key to the latter aim, carrying a triple-load as a member of both committees and as Student Representative to the Executive Committee. The Membership Committee has been engaged in dialogue with Wiley-Blackwell staff, who are providing insight on membership issues based on their experience with many similar professional societies. I encourage AMS members to contact these committees or me with suggestions or complaints about AMS performance in these particular functions - they are key to our relevance in coming years. And, I am, of course, happy to hear about any other matters of concern.

I look forward to seeing many of you in Boston!

Jon Norenburg
AMS President

Message from the Editor-in-Chief of *Invertebrate Biology*

Greetings from a snowy Thanksgiving in upstate New York! This year has been another successful one for *Invertebrate Biology*. We have had (to date) our second-highest submission count on record, which is keeping the editorial office busy. My thanks to our Editors for their conscientious work and wisdom throughout the year: Bruno Pernet (Cal State, Long Beach), Louise Page (U. Victoria), Nora Terwilliger (U. Oregon), Michael Hart (Simon Fraser U.), Greg Rouse (Scripps Institute of Oceanography), and Robert Thacker (U. Alabama, Birmingham). My thanks also to the Editorial Board for their advice and general support of the journal.

In addition to managing the high volume of submissions, we have also been adjusting to and streamlining the electronic workflow, including OnlineEarly electronic publication of all manuscripts. The transition of our co-

publishers Blackwell to Wiley-Blackwell has been smooth and essentially unnoticeable from the journal's viewpoint; my thanks to our Senior Production Manager, Rosemary Farmer, for her tremendous help and unfailing attention to all matters of production both print and electronic. As I write, the fourth (print) issue of the year is in press, with an appealing crinoid developmental series gracing the front cover.

As always, I welcome not only your submissions but also your comments on any aspect of the journal. We are pleased with its quality and representation of the Society but always strive to improve and enhance it in every way..

Sincerely, Pat Reynolds
Editor-in-Chief, *Invertebrate Biology*
Biology Department, Hamilton College

Message from the Program Officer

EVENTS FROM PAST MEETINGS

The proceedings of the 2007 symposium “Integrative Biology of Pelagic Invertebrates”, organized by Alison M. Sweeney and Sönke Johnsen, has been published in *Integrative and Comparative Biology* (Volume 47, Number 6, December 2007). This was another well-organized and well-received symposium sponsored by AMS.

Proceedings from the 2008 symposium sponsored by AMS, “Advances in Decapod Crustacean Phylogenetics”, organized by J. Martin and D. Felder are expected to be published in the 2008 volume of *Integrative and Comparative Biology*.

UPCOMING MEETINGS



January 3-7, 2009
The Westin Boston Waterfront Hotel, Boston, Massachusetts

The meeting venue is The Westin Boston Waterfront Hotel

<http://www.starwoodmeeting.com/StarGroupsWeb/booking/reservation?id=0807232002&key=EFDF1#contentlocation>

The hotel is quite new, has all the amenities, other than a spa, and is located close to the airport. It is moderate walk from historic areas of Boston and from the waterfront, and there is also good public transportation nearby. Room prices are in the range of previous meetings.

All presenters must be registered by November 14; the early-fee deadline for all registrants is November 30. The full scientific program for the meeting is now available online at the SICB meeting website.

Following are the numbers of submitted abstracts each year since I became Program Officer. Not any of my doing, but Boston is going to be the biggest for some years. It looks like this will be a very memorable meeting.

2002: 916 Anaheim
 2003: 780 Toronto
 2004: 1103 New Orleans
 2005: 1001 San Diego
 2006: 1034 Orlando
 2007: 1082 Phoenix
 2008: 967 San Antonio
 2009: 1372 Boston

Symposium: AMS is sponsoring one of the 2009 symposia, “The Biology of the Parasitic Crustacea”, organized by Jeffrey D. Shields and Christopher B. Boyko. This will be held on Sunday, January 4, 8:00 am to 3:00 pm, Session S2, room Harbor 2. Speakers and abstracts are listed at <http://www.sicb.org/meetings/2009/schedule/>.

Oral session: A complementary session (oral session 41) of oral presentations will take place on Monday, January 5, starting at 7:40 am; the details of this session can also be found at the SICB 2009 meeting website.

Poster: Another presentation to note is a poster by one of the 2008 Summer Fellowship awardees, Ivey Ellis: Ellis, I.R. and Kempf, S.C., Histological and SCP-like Neuropeptide Investigations in the Larval Oyster *Crassostrea virginica*, P1.128, on Sunday, Jan. 4.

Photomicrography contest: Remember to bring at least one of your best photomicrographic images to the Buchsbaum contest, at the AMS booth. I know many of you promised that this would be the year you would finally enter

AMS Event Schedule for Boston, 2009

Sunday, January 4, 2009

AMS Executive meeting – 8:00 pm to 11:00 pm

Invertebrate Biology editors meeting – 7:00 am to 8:00 am

AMS Booth (Booth #9), featuring *Invertebrate Biology*, Society activities, and membership renewals

AMS Photomicrography contest at AMS Booth – entries received until noon; voting begins in the afternoon

Symposium: The Biology of the Parasitic Crustacea, 8:00 am to 3:00 pm, room Harbor 2

Poster: AMS summer-fellow poster, 3:00 to 5:00 pm, P1.128; Ellis and Kempe

(DIZ business meeting – 5:15 pm to 6:15 pm)

Monday, January 5, 2009

AMS Keynote Lecture – “Life in the Colonies --- the alien ways of colonial organisms ” by Dr. Judith Winston, AMS Past President - 7:00 pm to 8:00 pm

AMS Booth, featuring *Invertebrate Biology*, Society activities, and membership renewals

AMS Photomicrography contest – voting continues at AMS Booth

AMS sponsored Poster Session – 3:00 to 5:00 pm, with special events and refreshments at AMS Booth (NEW FOR 2009)**

Oral presentations: Complementary session to Symposium: The Biology of the Parasitic Crustacea, 7:40 am to 10:00 am, room Otis

(DEE and DSEB business meetings – 5:15 to 6:15 pm)

**As a new sponsorship event this year, we are co-sponsoring the Monday poster session. During this session there will be refreshments at the AMS booth and more nearby. Voting for the photomicrography contest will be ongoing and there will be some special raffles at the booth, including one for a one-year membership in AMS. If you can think of more activities for the booth, please let me know, Kathy Coates, by e-mail at kcoates@transact.bm

Tuesday, January 6, 2007

AMS Annual General Business Meeting – 10:45 am to 11:45 am

AMS Annual Luncheon and prize-giving, **all welcome**, ticketed – noon to 1:30 pm, purchase tickets at registration (either online or at the meeting; limited to 40)**

AMS Booth, featuring IB, Society activities, and membership renewals

AMS Photomicrography contest – winners determined and prizes awarded at luncheon

(SICB business meeting - 5:15 pm to 6:15 pm)

**If you can afford it and your student can't, think about treating a student to lunch.

Please plan to attend the annual business meeting in order to make your views known on the activities and direction of AMS. Every year is an important year, and every year offers new opportunities for development and change.

2010 Seattle, January 2010 at the Sheraton Seattle Hotel and Washington State Convention and Trade Center



Just an early reminder for 2010 - as well as attending the meeting, please consider making a contribution. Posters and oral presentations can be submitted for inclusion in a complementary session to one of the symposia or in another keyword-related session. If you do submit an abstract, please include AMS as one of your affiliations.

Nine symposia have been selected for the 2010 Seattle meeting and a tenth is currently under consideration. Two symposia were very strongly favored by AMS and financial support has been offered to both from AMS. I am also going to try to make a case for supporting Ecosystem Engineers, which brings some new topics to SICB – marine ecosystems and plants.

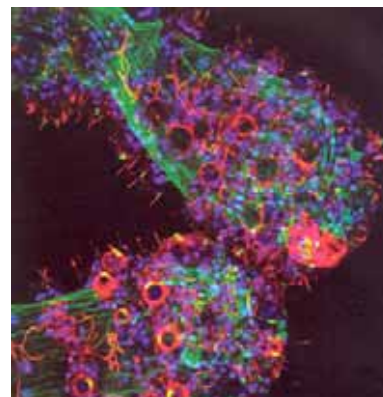
| Organizer | Brief title | | Sponsor |
|------------------|--|--------------|---------|
| Michael Hart | Evolutionary paths among developmental possibilities: ... marking ... Richard Strathmann | regular | AMS |
| Alexa Bely | Animal Regeneration: Integrating Development, Ecology and Evolution | Society wide | AMS |
| David Lambert | Spiralian Development: Conservation and innovation | regular | |
| James McClintock | Advances in Antarctic Marine Biology | Society wide | |
| Pauly Cartwright | Assembling the Cnidarian Tree of Life | regular | |
| Sarah Berke | Marine Ecosystem Engineers in a changing world: establishing links across systems | regular | KAC |
| James M. Harper | Metabolism, Life History and Aging | regular | |
| Melissa Bowlin | Integrative Migration Biology | regular | |
| Patrick Martone | Mechanics without muscle: evolutionary design of macrophytes | regular | |

If you are interested in stimulating a session of presentations on a particular topic, including one complementary to any of the symposia, please use the AMS to pass this information along to the members of the society and your peers. For example, I would be very interested in seeing a session of papers that highlights the costs associated with poor, persistent, taxonomic practices, and some ready means for ameliorating the situation.

2011 – location to be confirmed at SICB 2009

Please contact the Program Officer or another officer of AMS if you wish to submit an AMS sponsored symposium proposal for the 2011 meetings. The deadline for submitting symposium proposals for 2011 will be mid-August 2009. Information about submission requirements can be found at the SICB website.

Respectfully,
 Kathy Coates
 Bermuda



2008 Winners!!

THE RALPH AND MILDRED BUCHSBAUM PRIZE FOR EXCELLENCE IN PHOTOMICROGRAPHY

As professional microscopists I am sure that you have many exceptional photomicrographs in your collection. The Society invites and encourages you to enter it into the annual **Ralph and Mildred Buchsbaum Excellence in Photomicrography Contest**. The contest will take on place January 4-5, 2009 during the AMS and SICB meeting in Boston, Massachusetts.

Micrographs will be displayed at the AMS booth where SICB meeting attendees may evaluate them and vote for the best image in both black and white and color categories.

Winning micrographers in each category will receive a cash award, a photomicrography book, and a luncheon ticket to the AMS banquet at the next SICB meeting. The images will also be featured on the AMS website.

The contest is open to all SICB meeting participants, up to 3 entries each. Submissions must be prints, with maximum dimensions of 8 x 10 inches, unlabeled, unsigned, and mounted on poster board or foam-core mounting board. A single line of information identifying the subject (e.g., "Mouthparts of a mite") and stating the microscopical technique used (e.g., "SEM") should be below the photograph.

Entries will be accepted on the morning of the first full day of the meetings (Sunday, January 4, 2009) at the AMS booth in the exhibit hall. The deadline for submitting entries is before the exhibits close for lunch that day.

Voting begins on the afternoon of the first meeting day (January 4) and ends before exhibits close at the end of the second full day (Monday, January 5, 2009). All meeting participants who visit the AMS exhibit are allowed one ballot for each contest category.

We hope to see you and your micrographs in Boston!

American Microscopical Society Student Research Fellowship Reports

Ivey Ellis

Department of Biological Sciences



Comparative Neural Development of the Eastern Oyster *Crassostrea virginica* and the Opisthobranch Gastropod *Berghia verrucicornis*

The class Bivalvia is the second largest class within the phylum Mollusca; however, surprisingly little attention has been paid to the structure and function of the nervous system in larval bivalves. While a few immunohistochemical studies have been conducted (Croll et al., 1997; Kreiling et al., 2001; Voronezhskaya et al., 2007), it is difficult to formulate hypotheses and design experiments without a detailed histological analysis of development of the bivalve larval nervous system. Also, there has been no documentation to date of the location of small cardioactive peptides (SCPs), common neuropeptides in molluscan larvae. My goal is to 1) examine the anatomy and development of the larval nervous system in the eastern oyster, *Crassostrea virginica* through immunolabeling of SCP-like neuropeptides and histological analyses, 2) conduct a similar examination of larvae of the opisthobranch gastropod *Berghia verrucicornis*, and 3) perform a comparative analysis of the central nervous system of these two species. *B. verrucicornis* provides a helpful comparative foundation, due to the considerable amount of information available on the opisthobranch larval nervous systems (Kriegstein, 1997; Kempf et al., 1987; Page, 1992; Carroll & Kempf, 1994; Kempf et al., 1997).

Staged larvae of *C. virginica* were obtained from the Daulphin Island oyster hatchery and shipped to our laboratory at Auburn University. Adult *B. verrucicornis* were collected on our annual Florida Keys field trip in May 2008 and larval *B. verrucicornis* were cultured according to the methods of Carroll & Kempf (1990). Due to the ability to culture *B. verrucicornis* within the laboratory and the limited amount of *C. virginica* larvae purchased, most of my effort to date has been concentrated on examining *C. virginica*.

Histological analysis: Since funding was received from the American Microscopical Society, I have been able to identify the most effective methodology for examining the larval nervous system in *C. virginica*. The D-hinge, eyed, and pediveliger stages of development were fixed in either a gluteraldehyde and osmium fixative or a paraformaldehyde fixative, and embedded in Epon plastic. Thin sections were cut at 0.5-1.0 μm , stained with Thionin, coverslipped with Epon 812 plastic, and examined and photographed using a Nikon Optiphot microscope.

To date, my histological investigations of the eyed *C. virginica* reveals the presence of an apical ganglion positioned on top of the cerebral commissure, two cerebral ganglia with cerebral connectives extending posteriorly and two pedal ganglia with a pedal commissure between them. In addition, the pleural ganglia appear to be associated directly with the cerebral ganglia rather than being a separate pair of ganglia. Further investigations of all three larval stages of development are being conducted in alternate planes of view including frontal, transverse, and sagittal. Results will enable me to draw conclusions about the structure of the entire larval central nervous system of *C. virginica*.

Immunological analyses: Larvae of *C. virginica* were immunolabeled with an antibody that binds to the peptide neurotransmitter SCP (small cardioactive peptide) at each developmental stage described above. Labeling of SCPergic neurons was examined with a Bio-Rad MRC 1024 laser-scanning confocal microscope.

Presence of SCP-immunolabeling at the D-hinge stage reveals that SCP-like neuropeptides within the central nervous system loop are established early in development (Fig. 1). Furthermore, SCP-immunoreactivity increases as development of the larva progresses. This indicates that SCP-like substances are present early in development and presumably provide for larval nervous system functions through the stage at which metamorphic competence is acquired. In addition, there is an increase in the number of SCP-positive perikarya identified in the most posterior region of the larva (presumably the visceral ganglia) as development proceeds. These ganglia have yet to be identified in histological sections at this time.

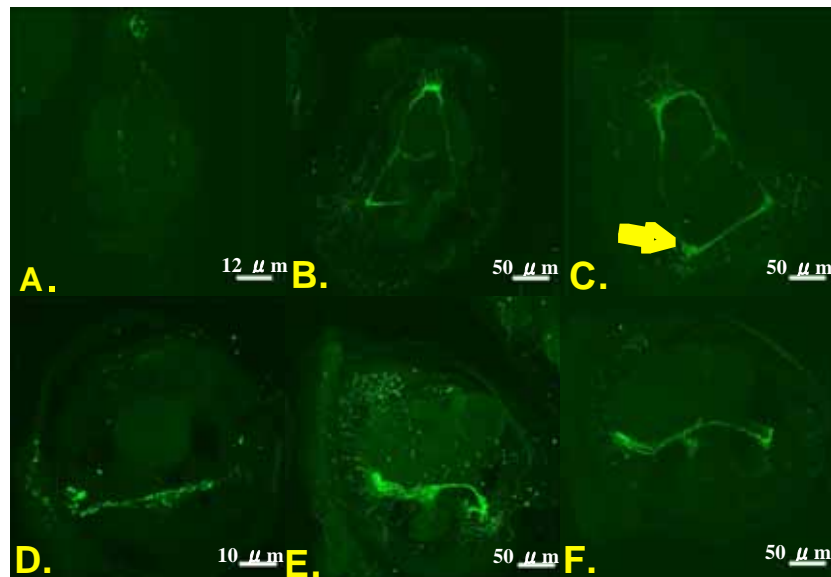


Fig. 1. SCP-like neuropeptide immunolabeling results for *Crassostrea virginica*. A) Frontal view D-hinge stage, B) Frontal view eyed stage, C) Frontal view pediveliger stage, Note: arrow indicating the high number of perikarya seen at this stage (presumably the visceral ganglion), D) Sagittal view D-hinge stage, E) Sagittal view eyed stage, F) Sagittal view pediveliger stage.

Future Work. Continued histological analysis of the three larval life stages of *C. virginica* is my current priority. Once these results are obtained, the immunolabeling experiment will be compared to the histological data in order to determine the specific location of labeled neurons and axonal processes. These locations will then be verified by sectioning larvae labeled with SCP antibody and visualized with a Zymed Histostain (DAB) kit. Additionally, investigations of *B. verrucicornis* will be conducted in order to make comparative hypotheses pertaining to larval neurology within the phylum Mollusca.

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Andrea Cross

Department of Biological Sciences



Functional Architecture of Retinal Photoreceptor Arrays in Endangered African Spurred Tortoise: *Geochelone sulcata*

Vision in animals is important for food acquisition, predator avoidance, and reproductive behavior. Most turtles rely heavily upon vision, but other than the model species *Pseudemys scripta elegans* (red-eared slider), little research has been done on turtle vision. This study investigates the abundance and distribution of different

opsin-based photoreceptors in the retina of the African spurred tortoise, *Geochelone sulcata*. This species is threatened with extinction (CITES Appendix II), but it readily reproduces in captivity, making it a good model for the genus *Geochelone*, which contains critically endangered turtle species. All previous studies (based upon light microscopic anatomy only) reported only single and double cone photoreceptors in tortoise retinas, but no rods (Detwiler 1916, Forbes et al. 1958). Given more recent advancements in the field of microscopy, and the development of highly specific immunolabeling techniques, it is now possible to determine whether diurnal tortoises have functionally-distinct classes of retinal photoreceptors.

Eyes of *G. sulcata* were prepared by dissecting away the anterior segment (cornea, iris, and lens), leaving an eyecup consisting of the sclera, choroid, and retina. Eyecups were fixed and embedded in Durcupan resin. Blocks were sectioned at 1 μm , stained with a 1:1 mixture of methylene blue and azure II, and viewed by light microscopy to examine the morphology of photoreceptors.

Some eyecups were fixed in 4% paraformaldehyde, and cryo-sectioned at 20 μm for fluorescence microscopy. In addition, retinas were isolated from some eyes for retinal whole mounts. Tissues were double-labeled with antisera against rod and cone opsins; sections were viewed with a Zeiss Axioskop 2 with a mercury arc lamp, and whole mounts were viewed with a Nikon C1-Si confocal laser scanning microscope.

Light Microscopy

The general architecture of the retina of *G. sulcata* was similar to that of other turtle species. Six layers in the retina were observed, with the photoreceptors located above the darkly stained nuclear layers (Fig. 1). At the light microscopic level, all photoreceptors appeared morphologically cone-like and appeared similar to the photoreceptors shown in historical light microscope studies (i.e., Detweiler, 1916; Fig. 2). Cone photoreceptors typically have a wide base, tapering to a point. In tortoises, oil droplets in cones are commonly observed and were seen as white circles within the photoreceptors.

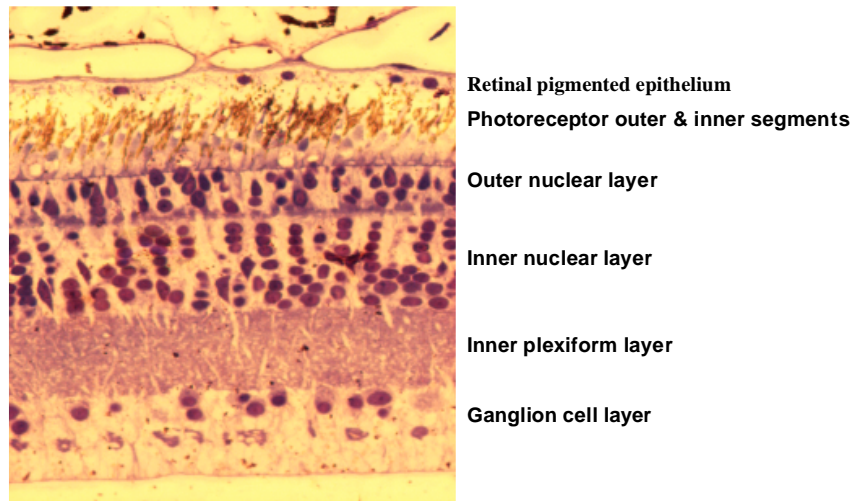


Fig. 1. Retinal organization in juvenile *G. sulcata*, viewed at 40x magnification.

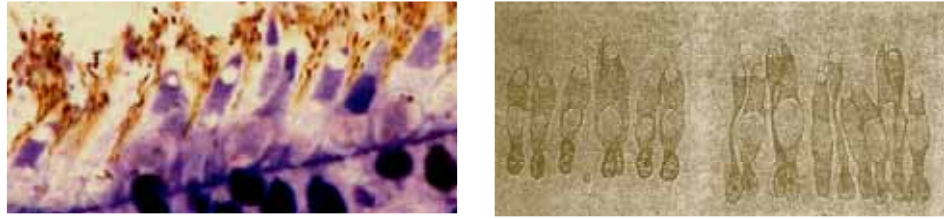


Fig. 2. Left: Photoreceptors observed under oil-immersion (63x) from the retina of a juvenile *G. sulcata*. Right: Photoreceptors from Detwiler (1916).

Immunohistochemistry

Both anti-rod opsin and anti-cone opsin antisera labeled the retina of *G. sulcata*, indicating the presence of rod opsin and a new spectral class of photoreceptors (Fig. 3). Each photoreceptor was only labeled by one antibody with no overlap. A negative control to test for auto-fluorescence, where no secondary antibodies were added no fluorescence occurred.

Two different types of rod anti-sera were tested, because some monoclonal antibodies have been found to label both rod and cone outer segments in the turtles *Geoclemys reevesii* and *Pseudemys scripta* (Ohtsuka & Kawamata 1989). To confirm labeling was occurring in rods, CERN-922, a polyclonal antibody that labels incomplete and complete forms of the rod-opsin protein throughout the photoreceptor, was used. Both antibodies labeled the same cells, causing yellow fluorescence in the photoreceptors (Fig. 4). CERN-922 labeled more proteins in the cells, whereas the monoclonal labeling was restricted to the very outer portion of the photoreceptors.

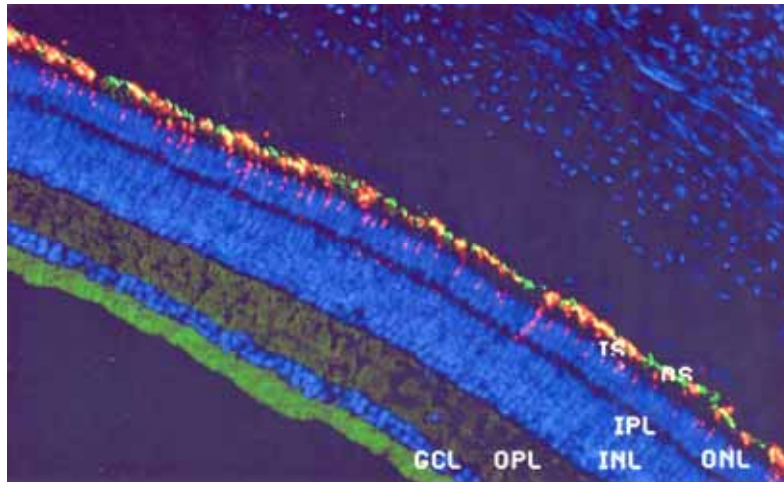


Fig. 3. Immunolabeled retina of *G. sulcata*, showing rod opsin-like immunoreactivity (IR; red), cone opsin-like IR (green), and DAPI-labeled nuclei (blue). Rod-like IR occurs in outer and inner segments; cone-like IR is restricted to outer segments. Yellow appears to represent distinct red- and green-labeled cells in the same vertical plane (not double labeling of single cells). Abbreviations: GCL: ganglion cell layer; INL: inner nuclear layer; IPL: inner plexiform layer; IS: photoreceptor inner segments; ONL: outer nuclear layer (photoreceptor nuclei); OPL: outer plexiform layer; OS: photoreceptor outer segments.

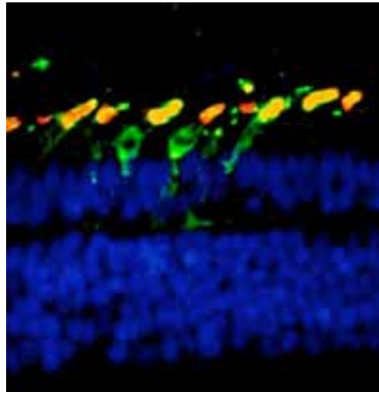


Fig. 4. Retina of *G. sulcata*, showing labeling using two different anti-rod opsin antisera. The monoclonal MAB-5136 was labeled red; and the polyclonal CERN-922 was labeled green. Yellow indicates co-localization of opsin by the two anti-rod opsin antisera. Blue: DAPI-labeled nuclei.

The whole-mounts also showed cone and rod labeling, both evenly distributed throughout the retina. Cones appear numerically dominant, but there were no patchy ‘cone-only’ areas (Fig. 5).

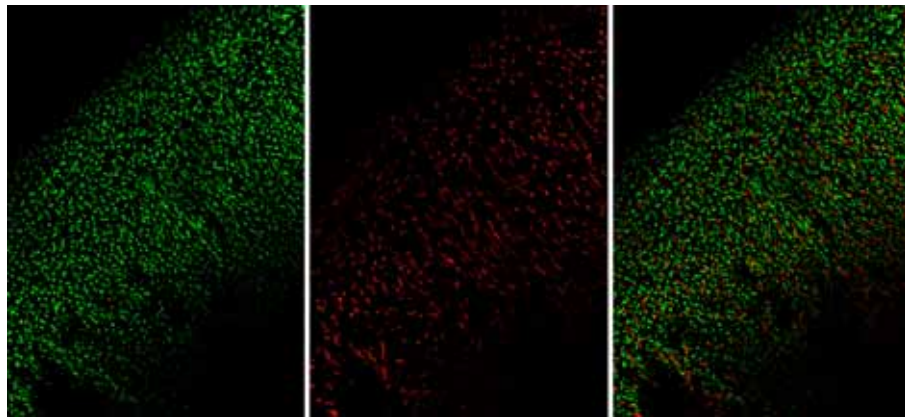


Fig. 5. Whole mount retinas of *G. sulcata*. The first image shows the cone labeling by CERN-922, the second shows the rod labeling by MAB-5136, and the third shows both cones and rods.

Discussion

This study comprises the first immunochemical survey of the retina in any tortoise species. Rod-opsin immunohistochemical labeling suggests the presence of rod photoreceptors and a greater range of spectral sensitivity than would exist in a cone-only retina. There were visual differences between the photoreceptor cells, but all had a cone-like morphology.

The contradiction between the results shown here and conclusions drawn from previous studies may be explained by developmental plasticity. All previous studies were performed on adult animals, whereas the shown results were obtained using juvenile tortoises. This suggests the possibility that photoreceptor types and numbers may change over the course of tortoise retinal development. Hatchling and juvenile tortoises are easy prey for a variety of predators, and spend most time under dense cover. Spending significant amounts of time in low-light environments may require a visual spectrum adapted to dim light conditions. As tortoises age and transition to bright environments, they may shift from having a retina with duplex organization to a cone-dominated retina. Adult *G. sulcata* retinas may exhibit greatly

reduced rod-opsin labeling relative to hatchlings and juveniles or they may maintain significant numbers of rods throughout their lifetime. These tortoises are avid burrowers, excavating deep tunnels that they use to escape the heat of the day in their native sub-Saharan habitat as well as in captivity. A duplex retina may be adaptive to alternating between a high-light environment during foraging episodes and a low-light environment when in the burrow. If this is the case, there may be significant differences in retinal organization between tortoises like *G. sulcata* (and the endangered North American gopher and desert tortoises, *Gopherus polyphemus* and *G. agassizii*, respectively) which excavate burrows, and other species that do not.

Current activities in this ongoing study include 1) the use of transmission electron microscopy to determine whether rod and cone photoreceptors exhibit ultrastructural differences, and 2) microspectrophotometry to confirm the presence of rods by spectral absorption profile, and to determine the number and characteristics of spectrally-distinct cone photoreceptors. This work is providing a comprehensive understanding of vision in endangered tortoises, and will help define how visual capabilities affect tortoise behavior. The results of this work may lead to improved conservation strategies both in captivity and in the wild.

Acknowledgments

I would like to thank, Mrs. Gayle Duncombe for her help in Florida Tech's High Resolution Microscopy & Advanced Imaging Center, Dr. Michael Grace for his help in tissue preparation and project direction, and the AMS Student Research Fellowship for the funds to purchase antisera. This project was also partially funded by Sigma Xi Grant-in-aid of Research #G200803150617.

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American Microscopical Society

Fall 2008 Elections

Candidates for Elected Offices

Following is biographical information on candidates for the offices of President-Elect for 2009, Secretary (2009-2011), and Member-at-Large (2009-2011).

For President-Elect for 2009

Kathryn A. Coates Education: BS – Univ. of Toronto, 1974, MSc, PhD – Univ. of Victoria, Canada – 1979, 1987. **Positions:** Curatorial Fellow, Royal Ontario Museum - 1985-87; Assistant Curator, Assistant Curator-in-Charge, Associate Curator-in-Charge, Dept. of Invertebrate Zoology, Royal Ontario Museum – 1987-96; Associate Scientist, Bermuda

Biological Station for Research, Inc – 1996-2005; Academic Education Advisor, Bermuda Biological Station for Research, Inc – 1997-2000; Associate Research Scientist, Department of Conservation Services, Bermuda Ministry of Environment, Telecommunication and E-commerce – 2005-present. **Current Academic/Professional Positions:** Professor, Faculty of Graduate Studies, Univ. of Toronto; Adjunct Professor, Dept. of Evolution and Ecology, Univ. of Toronto; *ad honorem* faculty, Marine Science Dept., Univ. of Puerto Rico; Research Associate, Dept. of Natural Sciences, Royal Ontario Museum; Research Associate, Bermuda Aquarium Museum and Zoo. **Academic/Professional Service:** Am. Micros. Soc. (Program Officer, 2002-present); NA Benth. Soc., Taxonomic Certification Program (Oligochaeta expert) – 2005-present; Canadian Associates of Bermuda Institute of Ocean Sciences, Board of Governors – 1996-present; Co-chair, Subcommittee on common names of clitellates of North America, for AFS (CNAI) – 1988-present; Editor for International Aquatic Oligochaete Biology Symposium Proceedings V-VII, 1991-2000; Co-organizer, SICB Symposium and symposium website, *The New Microscopy* – 2005; Co-organizer and trainer, training workshop on aquatic oligochaete taxonomy and identification, Tallahassee, Florida, Florida Department of the Environment; Reviewer for mss (*Proc. Biol. Soc. Wash.*, *J. Morph.*, *Invert. Biol.*, *NZ J. Mar. Freshw. Res.*, *Hydrobiologia*, *Hydrobiol. Sinica*, *Species Diversity*, *Mar Biol Res.*, *Comp. Integ. Biol.* etc.); 11 graduate students (2 current). **Memberships:** AMS; SICB; NA Benth. Soc.; Syst. Soc. (UK); Assoc. Mar. Labs Carib.; Amer. Assoc. Zool. Nomencl.; Est. Res. Found.; Biol. Soc. Wash. **Research Interests:** Morphological and molecular phylogeny, phylogeography, biogeography and systematics of clitellate worms, worldwide; conservation biology and ecology of tropical seagrasses; morphological and molecular phylogeny, phylogeography, biogeography and systematics of tropical and subtropical hard and soft corals; conservation biology of tropical, intertidal, gastropods.

For Secretary (2009-2011)

John D. Zardus. Education: Ph.D. (1998), Northeastern University, Boston, MA; B.S. (1991) and M.S. (1988), Brigham Young University, Provo, UT. **Positions:** Assistant Professor (2005-present), The Citadel, Charleston, SC; Postdoctoral Fellow (2001-05), University of Hawaii, Honolulu, HI; Postdoctoral Fellow (1999-01), University of Massachusetts, Boston, MA. **Service:** Subject Editor (2005-present), *Journal of Marine Biology Research*; Member-At-Large (2008), American Microscopical Society. **Memberships:** American Microscopical Society, International Sea Turtle Society, Society for Integrative and Comparative Biology, The Crustacean Society. **Research Interests:** General ecology and evolution of marine invertebrates with emphasis on larval biology and phylogenetics. Current projects include: relationships among barnacles commensal with turtles and marine mammals; assembling the bivalve tree of life.

For Member-at-Large (2009-2011)

Rick Hochberg. Education: B.S., 1993, Humboldt State University, CA; M.A., 1998, Humboldt State University, CA; Ph.D., 2002, University of New Hampshire, NH. **Positions:** Postdoctoral Researcher, Queensland Museum, QLD, Australia 2001-2003; Postdoctoral Fellow, Smithsonian Marine Station, FL 2003-2005; Assistant Professor, University of Massachusetts Lowell, MA 2005 – present. **Service:** Associate Editor, *Proceedings of the Biological Society of Washington*, 2007-present; Editorial Board, *Invertebrate Biology*, 2007-present; **Research Interests:** Biology and evolution of meiofauna; functional morphology of Rotifera.

Election Ballot

You may return your ballot by regular mail to: Stephen L. Gardiner, Department of Biology, Bryn Mawr College, 101 N. Merion Ave., Bryn Mawr, PA 19010-2899 USA; you may also return your ballot by e-mail to: sgardine@brynmawr.edu. Although sender address will be present on e-mail ballots, a signature is not required. Information on all ballots returned will be held strictly confidential. Deadline for receipt of all ballots is December 31, 2008.

President-Elect for 2009

Kathryn A. Coates _____ Write-in* _____ Abstain _____

Secretary (2009-2011)

John D. Zardus _____ Write-in* _____ Abstain _____

Member-at-Large (2009-2011)

Rick Hochberg _____ Write-in* _____ Abstain _____

*Please be certain that your write-in candidate would be willing to serve in this position.