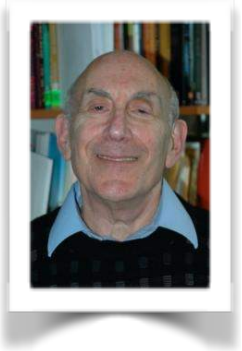
Department of Biomedical Sciences Newsletter
Fall Update 3
November 2015

The History of Biomedical Sciences at Grand Valley

Message from Professor **Shel Kopperl**:



I am happy to extend my greetings to all of you, students and those who have successfully become alumni of the GVSU **Biomedical Sciences Department** or before 2000 what was called the 'School of Health Sciences'. I have completed 45 years of teaching and associated activities at GVSU as of last April, and now starting three years of phased retirement (teaching only this fall, fall 2016, and fall 2017; no teaching during the winter or spring/summer semesters). During this time I am working on an informal **history of biomedical sciences** at GVSU since its inception as the School of Health Sciences in 1972.

The book will be part personal memoir and part items of interest to all those currently and previously connected with the **BMS Department**. Thus I would like to have a chance to interview or hold virtual or real-time conversations with as many of you (faculty, staff, students - former and current, etc.) as would be interested to contribute to the work.

I have known a number of you as either "**Health Science**" or more recently "**Biomedical Science**" majors whom I advised. Earlier I taught many sections of the "old" HS 100 course, now **BMS 100**, as well as HS 220, HS 301 and more recently sections of the capstone **BMS 495**. I have also taught the history of science courses for 46 years.

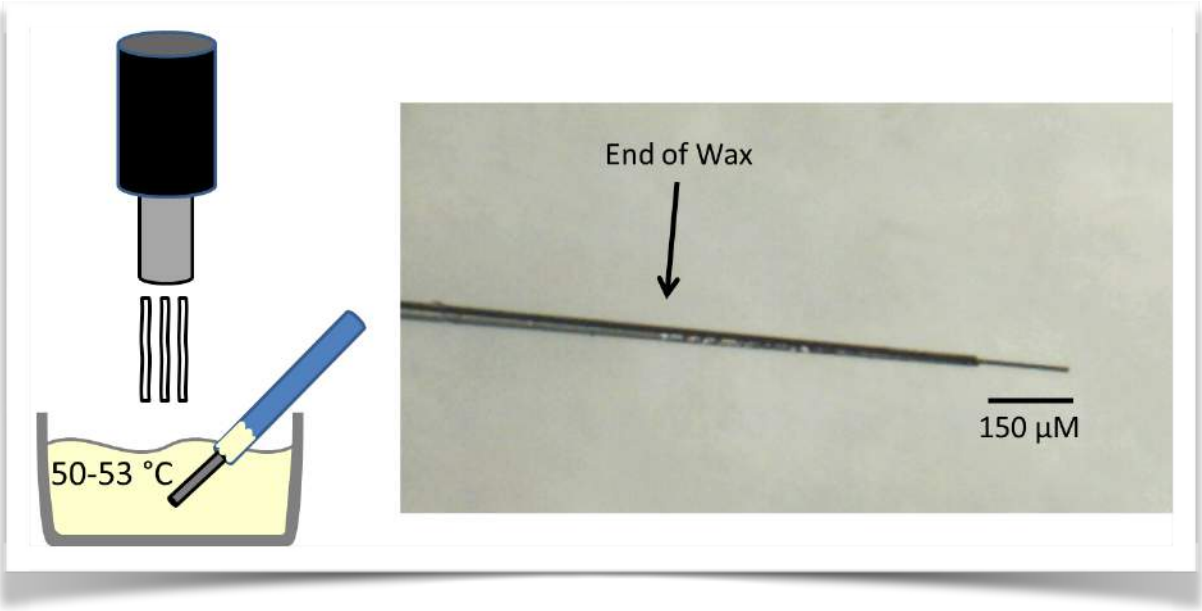
If anyone is interested in participating in this project and sharing memories (both good and not so good) with me and/or my editorial assistants (nine eager students from one of my Honors College classes), please let me know either by email at **kopperls@gvsu.edu** or writing to me care of the **BMS Department**. Thank you in advance for your assistance. It is my goal to make the work available to the wider public via Scholar Works, an open website administered by members of our library staff.

Paper Published in PLoS One

Dr. Eric Ramsson recently published a paper in the journal PLoS One. His research group, which includes 5 **GVSU** undergraduates on the paper, discuss the use of fast -scan cyclic voltammetry in his lab. Fast-scan cyclic voltammetry (FSCV) is a powerful technique for measuring sub-second changes in neurotransmitter levels. A great time-limiting factor

in the use of FSCV is the production of high-quality recording electrodes; common recording electrodes consist of cylindrical carbon fiber encased in borosilicate glass. When the borosilicate is heated and pulled, the molten glass ideally forms a tight seal around the carbon fiber cylinder. It is often difficult, however, to guarantee a perfect seal between the glass and carbon. Indeed, much of the time spent creating electrodes is in an effort to find a good seal. Even though epoxy resins can be useful in this regard, they are irreversible (seals are permanent), wasteful (epoxy cannot be reused once hardener is added), hazardous (hardeners are often caustic), and require curing.

Consequently the **Ramsson** lab has sought alternative methods of sealing elctrodes. In the paper, he characterizes paraffin as an electrode sealant for FSCV microelectrodes. Paraffin boasts the advantages of near-immediate curing times, simplicity in use, long shelf-life and stable waterproof seals capable of withstanding extended cycling. Borosilicate electrode tips were left intact or broken and dipped in paraffin embedding wax. Wax-sealing did not inhibit electrode sensitivity, as electrodes detected linear changes in dopamine before and after wax exposure. Paraffin seals were intact after 11 days of implantation in the mouse, and still capable of measuring transient changes in *in vivo* dopamine. From this it is clear that paraffin wax is an effective sealant for FSCV electrodes that provides a convenient substitute to epoxy sealants.



For more on the topic see:
Ramsson ES, Cholger D, Dionise A, Poirier N, Andrus A, Curtiss R (2015) Characterization of Fast-Scan Cyclic Voltammetric Electrodes Using Paraffin as an Effective Sealant with *In Vitro* and *In Vivo* Applications. PLoS ONE 10(10): e0141340. doi:10.1371/journal.pone.0141340; **http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0141340**

Catalyst Grant for Research and Creative Activity Awarded

Dr. Laura Stroik has earned a **Center for Scholarly and Creative Excellence Catalyst Grant** for her proposal "Paleontological Fieldwork at the Middle Eocene Site of the Uinta Basin, Utah." The Catalyst Grant for Research and Creativity encourages faculty in establishing and maintaining programs of research, scholarly, and/or creative activity. Projects display potential for having a significant impact on one's field or chart a new trajectory in one's scholarly, creative or artistic development.

Dr. Stroik performs intensive field research on micro-mammalian fossils that has had significant impacts within her field. The funds from this grant would assist her research program by creating numerous opportunities for undergraduate research students. Undergraduate **BMS** students could join her in many aspects of her work, which could include assisting her in the field in Utah, fossil identification and curation, quantification of dental anatomical variation across mammals using 3D microCT images, and conducting analyses of niche all at Grand Valley.

Plastination Lab News

For readers who have not been exposed to the term "plastination", it refers to the process of impregnating animal or plant tissues with a variety of plastic or silicone products to render the tissues odor-free and permanently preserved. The process was developed in Germany by Dr. Gunther von Hagens, and made popular through his many Body Worlds exhibits around the world.

History

During July of 2013 anatomist/professor **Tim Strickler** completed a workshop at the University of Toledo to learn a variety of plastination techniques, and in June of 2014 anatomist/professor **Dawn Richiert** and anatomy lab supervisor **Kim Wieber** completed the same workshop. Plastination of pig hearts and kidneys began in 217 Padnos Hall in September 2013, and to date we have produced over one hundred plastinates for use in **GVSU** courses. This fall we have embarked on a venture to supply equine limb plastinates to schools of veterinary medicine at MSU and St Georges University in Grenada. This exciting development was made possible with the cooperation of the veterinary anatomists at MSU, and will result in the addition of funds to the operating budget of the lab.

The Process

The plastination process begins with the dissection of the specimen, usually carried out by students (undergraduate and graduate) who have proven talents in dissection, and who find the preparation and processing of plastinates a fascinating activity. The specimen is then washed and bleached, and dehydrated in acetone. The dehydrated specimen is submerged in a vacuum chamber filled with liquid silicone and acetone is drawn out of the specimen under vacuum. As the acetone is removed, silicone is drawn into the tissues until all of the acetone has been replaced by silicone. The specimens are then posed in what will be their final positions, and treated with a catalyst which causes the silicone to set up and become dry to the touch. They are then ready to be used by students in our anatomy and biology labs. Carefully handled, these specimens will last for decades, and their use is completely without the mess and exposure to dangerous chemicals which is usually associated with wet specimens.

Plastinated Human Placenta

There are two silicone plastination techniques- one done at -20°C or colder, and the other at room temperature. We are using the room temperature technique, which produces specimens equal in quality to the cold technique and also uses much less energy. In addition, the silicone polymer remains fluid and can be used repeatedly. The cold mixture will set up at room temperature, and therefore has to be kept cold, whether or not it is being used to process tissue.

Plastinates produced

Plastinated specimens produced in the GVSU lab in the past two years range from a variety of vertebrates used in several biology courses (fish, salamanders, frogs, turtles, cats and fetal pigs) to human specimens acquired from the University of Michigan for this purpose. MSU does not permit us to retain human specimens beyond their normal two-year period of use, so the human material from the cadavers we receive from them cannot be plastinated. We have also

Justin Bria, BMS undergraduate dissector working on a horse head

managed to plastinate a few invertebrates and a few plant specimens. With the addition of two large (52" x 18") vacuum tanks in the winter of 2014 we are now able to plastinate rather large items. We have completed the plastination of a human upper limb, a head & torso, and a variety of organ and joint specimens. Students are currently preparing both human and animal specimens for plastination, includuing a 2-headed calf, a bisected horse head and a human pelvis and it's lower limbs. As mentioned previously, we will soon start work on the fore and hindlimbs of a pony.

Partial list of plastinates produced to date

35 fish
34 organs (human and other mammal- includes 6 hearts, 9 brains)
12 salamanders
6 human joints
1 turtle
1 human placenta
6 small mammals
Many human subcutaneous bursae
2 human hands
3 invertebrates (caterpillars, crayfish)
1 human torso
6 plants- voodoo lily flowers and osage orange fruits
1 human arm
1 chameleon egg-bound ovary

Narcine sp. **- an electric torpedo ray**

Recycling and energy efficiency

Because the plastination process uses large amounts of acetone and alcohol, one of the most important pieces of equipment in the lab is our recycler, which is able to reclaim acetone, ethanol and propanol. As the specimens are dehydrated in acetone, the water content of the solution increases. We start the dehydration process with 98% acetone (the concentration of the end product from the recycler), and when it declines to 80-85% we remove it for recycling and refill the dehydration container with fresh 98% acetone. Since the start of the lab in September 2013, we have reclaimed over 465 gallons of acetone and 32 gallons of ethanol. We have also made our recycler available to the chemistry department for their recycling needs, primarily acetone and isopropanol.

Future plans

With the completion of the new science building at GVSU in the summer of 2015 the plastination lab was slated to move to a larger space in 263A Padnos Hall, but the necessary

renovations to that space will not be completed until 2016, so we will remain in 217 PAD until the new space becomes available. There is, however, a central location where all of the plastinated specimens are now stored. They have all been labeled and catalogued to insure that can be easily found if they are needed, and that their location is quickly identifiable after they have been checked out for use in our courses. We look forward to moving into our new lab next year and producing veterinary plastinates for other universities.

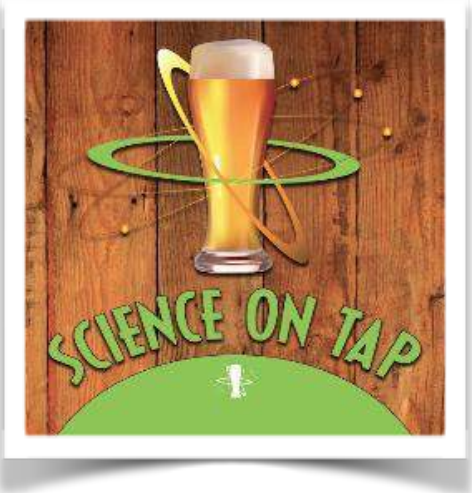
Lauren Begg, MHS Graduate Student dissector & fetal pig used

Betsy Witte, BMS undergraduate dissector studying calf anatomy

---

Science on Tap Program

Science on Tap, co-sponsored by **GVSU Biomedical Sciences** and SpeakEZ Lounge, is an opportunity for conversation, debate and interaction between scientists and the public while drinking beer. Each month at SpeakEZ, a knowledgeable expert hosts a scientific discussion about current topics in the news such as ebola, the paleo diet, and cutting edge cancer research. This is a great chance to exercise your academic interests in a casual setting while enjoying great food and adult beverages. People under 21 are ABSOLUTELY welcome to attend.



Upcoming Events:
December 10th: Dr. Craig Benjamin - Intro to BIG History

Facebook page : https://www.facebook.com/scienceontapgrandrapids/?fref=ts

---

Former and Current Student News

- Former Laker soccer standout **Katy Tafler**, B.S. 2009 and former advisee of **Dr. Frank Sylvester**, came down from Canada and became perhaps the greatest player in what may be the greatest athletic program in GVSU's prolific Division II history. Tafler, an Ontario native, posted almost-comical stats from 2005-08 under then-head coach Dave DiIanni. Her 269 career points (114 goals, 41 assists) rank first in GVSU history by a wide margin, vastly outpacing runner-up Mirela Tutundzic's total of 184. Tafler was a two-time Daktronics National Player of the Year, and won GLIAC Offensive Player of the Year three times from 2006 to 2008. She is the all-time GVSU leader in goals, game-winning goals and points per game, along with total points. "It's hard (to pick a best memory) because I think, like a lot of athletes or people who are perfectionists, you tend to focus on the bad things," Tafler said. "I have kind of a general overall feeling of just what a great experience it was. It's hard to pick out specific things, but the road trips and the feeling of what it felt like to connect with teammates for a goal was great." Her standing on the field was nearly eclipsed by her efforts off. The **Biomedical Sciences** major graduated with a 3.925 GPA , and earned the 2008 NCAA Top VII Award – one of the highest honors a student-athlete can achieve for on and off the field success. Tafler is now a resident in obstetrics and gynecology at McMaster University in Hamilton, Ontario. Original Article.

L-R: Brendan, Maureen, Tim & Jenn (representing Cullen Finnerty), Allyson Riley, Katy Tafler, Erika Ryskamp, Nate Peck, and Chuck Martin.

Upcoming Events

12/10 - Science on Tap - Dr. Craig Benjamin - BIG History
12/12 – GVSU Commencement for Fall
12/14 - 12/19 – Final Exams
12/23 – BMS office closed (will reopen of 1/4/16)
1/11 – Classes Begin

Interesting and Significant Items to Share

Don't be a stranger! The **BMS Department** would love to hear what you have been doing since leaving **Grand Valley** (i.e. internships, professional school matriculation, employment, etc...). Please send us your news, announcements, and photos to biomeddept@gvsu.edu or share on social media at our Facebook, Twitter or LinkedIn pages. You can also send **Dr. Dan Bergman,** Chair and Associate Professor, a message at **bergmand@gvsu.edu.**
