MicroNews

San Francisco Microscopical Society Volume 6, #1 January 2011

MY WISH FOR SFMS

By Peter Werner, President

Amateur microscopy has a ways to go to match the popularity of amateur telescope enthusiasm. Perhaps it is an image problem – amateur astronomers peer grandly into the starry heavens, while microscopists turn their view to seemingly mundane or even unpleasant things, such as the detritus floating on a pond. In fact, when Isaac Newton penned what is perhaps his most famous quote, *"If I have seen further it is only by standing on the shoulders of giants,"* it was addressed to none other than his colleague and rival, pioneering microscopist Robert Hooke.

Yet, in terms of richness, beauty, and opportunity for discovery, the invisible world within has every bit as much to offer as the invisible world beyond. To this end, on November 10th, SFMS held its meeting at Merritt College with the theme of "Pond Scum Night". The society has held events like this before, where collections of samples from various aquatic environments were brought in for observation under the microscope. Our meeting spot this time was at Merritt College, where we were able to make use of the quality microscopes that the Merritt Microscopy Program has as teaching tools, which added greatly to our ability to observe and enjoy the collections that were brought in from the field.

The event was attended by some 20 people, a mix of SFMS members, Merritt Microscopy students, and a few interested others who dropped by based on announcements placed on the Bay Area mycology and permaculture mailing lists. Several people brought in identification books, and laptop computers were used to link to online keys.

The variety of collections and organisms did not disappoint. These included a pond water collection I had made several days earlier and "baited" with boiled sesame seeds and a dead fly. As predicted, this produced oomycete (water mold) colonies on the seeds, and especially on the fly. Another member (forgive me forgetting a name here) had brought in an absolutely beautiful sample of bryozoans from Lake Mendocino. Will Gurske brought some outstanding collections from favorite collecting spots in the reclaimed salt ponds near Newark and Fremont, full of diatoms, ciliates, and amoebae. (Will has a special permit to collect in this National Wildlife Refuge.) Inveterate taxonomist that I am, I spent some time, even after everyone else had left for the night, keying out and identifying what I was seeing in this collection. Between my keying and Will's earlier observations we identified *Paramecium*, *Frontina*, and *Euplotes* among the ciliates and *Pleurosigma* and *Bacillaria paxillifer* (carpenter's rule) among the diatoms.

Several of us collected samples from Montclair Pond earlier in the day. These yielded examples of what appeared to be *Spirogyra*, and some interesting water mites that Debbie Brusco imaged with a dissecting scope and that later were identified on the website *BugGuide* as belong-

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INSIDE

Future meetings of the SFMS

The board has moved our regular meetings to Wednesday in order to reduce the conflicts we have had with other organizations that meet on Tuesday. After our January 12 meeting that will start early, at 7:OO PM to accommodate out speaker, (see details on last page), we will meet on March 9 and May 11. You will also be notified by e-mail of out meetings.

What would you like to have happen at Society meetings? Have you suggestions or ideas that would increase participation and attract more members? The board is interested in hearing your suggestions and promoting the fellowship and educational opportunities that meetings provide.

The next ***Micro News*** is due in late April.

DUES DUE

When you pay your yearly dues, you are supporting the activities of the Society that include holding meetings at various venues, providing for the costs associated with the meetings, printing and sending out the Micro News and meeting the expenses associated with our recruiting efforts. Without new members the society would wither away.

Twelve dollars is so small an amount that most members wonder how the organization survives on this income. The answer is reserves! We prefer to slowly use our ample reserves that previous treasurers have accumulated. (Expenditures are authorized by the board so your money is not spent frivolously.)

Occasionally, students living on a 'shoe-string' would like to join. You can designate an extra $12 as a ***donated membership*** that the board can award to such a student. Send your check, properly designated (dues or donation) to:

Treasurer M. Chan
435 Melrose Ave.
San Francisco,
CA 94127-2217

KNOW FOR WHOM YOU ARE VOTING

January elections are mandated by our constitution and only attending members at the January 12 General Meeting can vote. Technically, that means you have paid your dues for 2011 or are a Life Member. We are not strict about that issue but do encourage you to participate. Unlike the 2010 election, we have a full slate but you can still nominate a member who has agreed to serve if elected for any specific office prior to the election. The nominees for office are: for President: Peter Werner; for Vice President: Bill Hill; for Treasurer: Myron Chan; for Recording Secretary: Debbi Brusco; for Corresponding Secretary and Editor of the Micro News: Henry Schott.

Myron was elected in 2010. The other candidates were appointed to their positions in anticipation of this upcoming election.

As one of the older members serving on the board, I recommend that our constitution be revised and that elections be held every two years. Such a revision should be conducted by a committee of members willing to sit down and propose a modern constitution. To see our current constitution go to our web site: www.sfmicrosoc. org

Henry Schott

Diatoms, a commercial slide provided by Myron Chan at the November meeting at Merritt College. The slide illustrates the great variety of shapes of these single celled organisms.

CAPTURING WATER MITES, November Meeting

The November 10, 2010 meeting of the Society at Merritt College was interesting in several aspects of microscopy. Members and guests were able to use a variety of microscopes and meet some of the students that are in the microscopy program at the college. In order to see something of interest, several members met at the Montclair Park pond and collected specimens by using nets and floating debris. A net made from a woman's sheer stocking with a plastic jar sewed at the collecting end, is a simple and effective way to concentrate some small organisms. Since many organisms are sessile, collecting some of the bottom debris and reeds that have been in the water for a long time can also be a good source for such organisms. The five members came away with several jars of water for later inspection.

Debbi Brusco, Recording Secretary, wrote in an e-mail: "The water from Montclair duck pond contained some water mites. If you were at the SFMS meeting on Wednesday night, you might have seen these. I took some photos using the dissecting scope and posted them here to try and get an ID." (identification). In short order she received a response from Dr. Proctor. *"Excellent photos of a male Piona. The notch in the fourth legs is for holding on to the legs of the female during sperm transfer, which the male does by inserting a cluster of spermatophores (held by modified third-leg tarsi) into the genital opening of the female*." Arthropods (Arthropoda) » Arachnids (Arachnida) » Mites and Ticks (Acari) » Acariformes » Actinedida » Parasitengona » Water Mites » Hygrobatoidea » Pionidae » Piona.

Since much of the Society's communication is by e-mail, President Peter Werner responded to Debbi:
"Thank you so much for posting those pictures. Getting some outside help in ID'ing the various organisms is definitely helpful. This area of organisms is new to me, and I could unfortunately put only the most general names on most of the organisms I saw.

I was able to ID a number of protists in one of the Don Edwards salt marsh slides Karen Rusniak showed me. I saw lots of ciliates – *Paramecium*, *Euplotes*, and lots of *Frontonia*, plus the diatom *Pleurosigma*. Unfortunately, I did not get pictures, but would really like to make more slides and some images from that collection again if I can find it."

(Continued from page 1)

ing to genus *Piona*. Sherry Fuzesy got some really amazing pictures of *Spirogyra* under a phase-contrast and fluorescence microscope, in which its characteristic double helix arrangement of chloroplast fluoresced and stood out with particular brightness.

For the most part, participants had a good time observing and photographing the beauty and variety of the microbial life on display. Several Merritt Microscopy students were able to get a class project out of the collections as well. Some bolder individuals made attempts to key out and identify what we were seeing, but most of us are rank beginners when it comes to identification of aquatic life. I hope that as our knowledge base grows and we make more keys available, we will be able to start compiling species lists from these events, and make at least a small contribution to knowledge of local biodiversity.

I think we are living at an opportune time for microscopy. On one hand, basic microscopes, either used lab models or newer basic scopes, are increasingly available at prices comparable to consumer cameras and photo equipment. In some cases, companies and schools are literally giving away broken down old microscopes, fixable by those with a modicum of repair skills. On the other hand, high-end fluorescence microscopes, and even confocal and electron microscopes, are becoming increasingly common in academic and biotechnology labs, enabling new discoveries on countless topics.

Several community colleges, Merritt, Delta, and Ohlone, now have a number of fluorescence, confocal, and electron microscopes available for use by anybody who is willing to do the class-work necessary to be trained on this equipment, in some cases after only a few weeks. Also promising are emerging techno-hacker spaces like Noisebridge, in the Mission, that are involved with restoring old microscope equipment and making it available to everyday users. All of this available technology need only be connected with the already existing popular interest in natural history and biodiversity of all kinds to really take off. If there is one thing I wish for SFMS, it is that the Society can play a key role in this process.

PW

Lacks' Immortality

THE HeLa STORY

There are thousands of tools that have revolutionized the way we live. The microscope is the one we find interesting because it has opened up our ability to view so many minute objects that remains unclear or invisible to the naked eye. Microscopes were essential for Matthias Schleiden (1838) and Theodor Schwann (1839) to propose that all plants and all animals are composed of cells. Rudolf Virchow in 1858 proposed that all cells arise only from preexisting cells. Darwin, in the following year, published his theory of evolution. This sequence illustrates how microscopy helped to shape human thought and focus attention on cells.

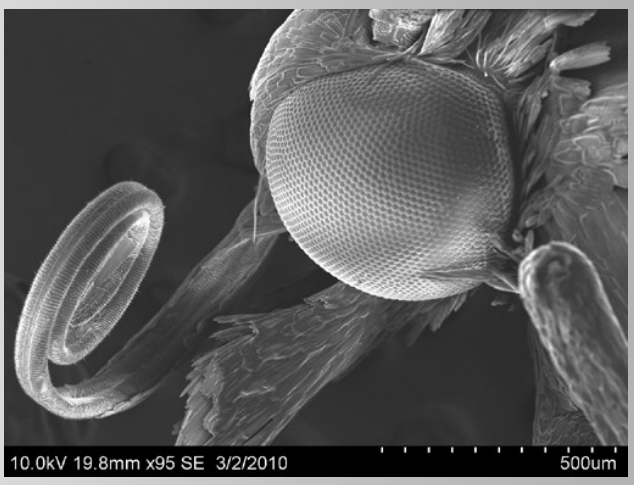
We leap here ahead a century to 1951 when a woman was diagnosed with cervical cancer at John Hopkins hospital in East Baltimore. A sample of the biopsied cervical cells was sent to Dr. George Gey, head of tissue culture research at Hopkins, a relatively new field of study. While some success had been achieved by this time with tissue culture, most cells died quickly and the few that survived did not grow much or reproduce frequently. What was needed for ongoing research was a cell culture that would behave as many bacterial cultures behaved: spread them on a Petri dish, incubate with the proper media and harvest an abundant crop. That was the aim of the tissue culture laboratories but success seemed out of reach until the cervical cancer cells of Henrietta Lacks arrived. It was the practice to label the culture dishes with the first two letters of the patient's first and last name thus the cell culture line that developed from this cancer patient became known as ***HeLa.*** Cell cultures of the HeLa strain became the preferred cells for a wide range of studies including the effect of radiation on cells, hormone experiments and virus studies. *"By the 1960's, scientists joked that HeLa cells were so robust that they could probably survive…on doorknobs. They were everywhere. The general public could grow HeLa at home using instructions from a* ***Scientific American*** *do-it-yourself article,…"*

The above quote is from ***The Immortal Life of Henrietta Lacks*** by Rebecca Skloot who chronicles the discovery and the lives of the Lacks as they learned that their mother's cells became the main substrate for a vast amount of research, providing scientists with an endless supply of living cells for their experiments. I found the book interesting and became engrossed in both the scientific and the sociological story because of the great contrast between the highly educated scientific community and the tragically unsophisticated and poorly educated Lacks family who did not benefit from the exploitation of Mrs. Lacks' cells.

We little realize how much has changed since the post WWII years. Despite what we learned of the cruel and inhumane medical treatments and experiments by German doctors under the Nazi regime, HeLa cells were injected into many patients without their consent or understanding. The Tuskegee Institute became the main source of these cells because it was there that a factory was built through a foundation. Soon, *"…technicians, served as a quality-control assembly line, staring through microscopes at hundreds of thousands of HeLa cultures each week, making sure the samples were alive and healthy."* Using HeLa cells, scientists helped prove that the Polio vaccine developed by Salk was safe and effective. Yet at the same time and on the same campus, state officials were conducting the infamous syphilis studies!

Of equal importance to the description of the science that was influenced by the successful culturing of the HeLa cells, is the story of the Lacks family and their experience in a small town called Clover, not far from John Hopkins. Deprived of meaningful educational opportunities, they grew up with only their culture and intelligence to guide them. These they applied and over time learned how to understand what had occurred to their mother and her cells although Rebecca Skloot, through her investigative journalism was a great motivator. The end notes and index makes this a book worth keeping on your science shelf. HS

MOTH PROBOSCIS by Clara Mamone



Clara is a student at Merritt College. She took advantage of a class in electron microscopy offered at Ohlone College in Fremont to produce this image of the head of a moth .

Adult mouthparts include a prominent proboscis formed from maxillary galeae, and are adapted for sucking nectar. Mandibles are absent in all except the Micropterigidae which have chewing mouthparts.[8] Adult Lepidoptera have two immobile , multi-facetted, compound eyes, and, only two simple eyes or ocelli, which may be reduced.[9]:31 Antennae are prominent and besides the faculty of smell, act as olfactory radar, and, aid navigation, orientation and balance during flight.[10][11] In moths, males frequently have more feathery antennae than females, for detecting the female pheromones at a distance. (Partly from Wikipedia)

THE ARCHITECTURE OF THE FRUIT FLY'S BRAIN MADE VISIBLE

Some many years ago, when I was young and in college, I studied genetics using fruit-flies. I did not think much about their brain but it turns out that with new techniques now available, using green fluorescent proteins, the complex structure of the brain and the pathways of the neurons in the brain of Drosophila can be mapped as a three dimensional array.

There are about 100,000 neurons in the fruit fly's brain. This complexity of interconnectivity will not be resolved when all neurons have been mapped but Dr. Chiang of Taiwan, has already mapped 16,000 of them and since each is identified in a database as to its location, a pattern has emerged that indicates an

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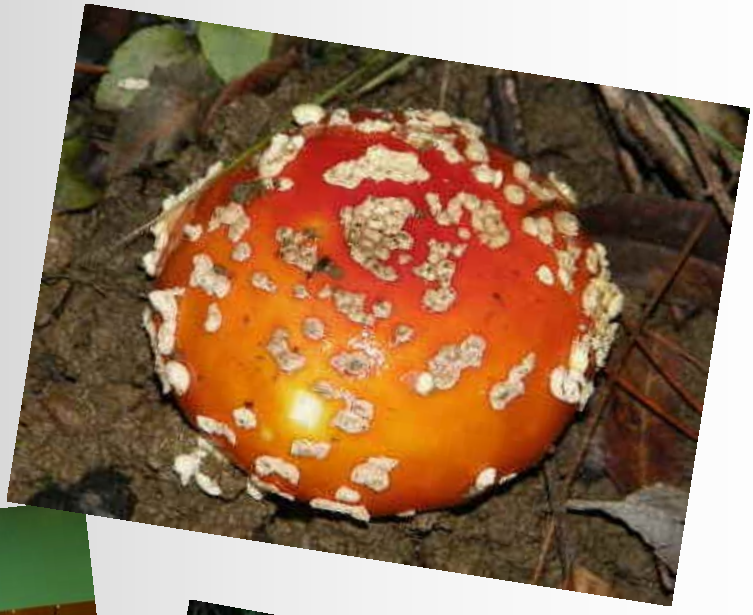
THE FUNGUS FAIR at Lawrence Hall of Science

Lactarius rufus



As part of SFMS's outreach efforts, members of the Society participated in the annual SF Mycological Society's Fungus Fair held this year for the first time at UC's Lawrence Hall of Science.

In the picture above, the two tables with microscopes, lent by the Merritt Biology Department, were set up and manned by Peter Werner who is sitting adjusting one of the microscopes, and Helmut Will who is standing at the corner of the tables..

Debbi Brusco and others came and helped at various times,

The pictures of mushrooms were taken by Henry Schott under the pines in Redwood Park's east ridge. The rains have made this year a very prolific year for mushrooms., many growing to large size. (Note the pen in the lower right image.) The two upper right images are Amanita muscaria also known as the death cap. HS

FRUIT FLY BRAIN cont.

(Continued from page 4)

architecture of the fruit fly's brain consisting of 41 processing units and 58 tracts connecting to other parts of the brain and to six hubs. Thus an atlas is being constructed of this very small brain that can be correlated through further investigations to the well known genetics of the fly.

How are the neurons made visible? A gene for the green fluorescing protein is inserted into the fruit fly's genome along with a repressor gene. Using a technique developed by Dr. Chiang, the repressor can be deactivated in just one neuron at a time, When the gene goes to work, *"the fluorescent protein reaches every part of the neuron, defining its structure in exquisite detail."*

"He also invented a remarkable solvent for making the Drosophila brain transparent. This is essential if the glowing green neuron is to be imaged precisely. The solvent is so effective that if a researcher fails to keep an eye on the dissected brain as it lies on a microscope slide, the brain will simply disappear when the solvent is added…" Dr. Ann-Shyn Chiang has been working on this project for the past ten years. He foresees several more years before the atlas is completed.

The nervous system of C. elegans, a laboratory round worm about one to two millimeters long, is the only other nervous system so far explored in great detail. It has 302 neurons.

Additional information is available in the article in the New York Times, December 14, 2010, page D4, Decoding the Human Brain, With Help From a Fly, by Nicholas Wade, available on line. (The quotation is taken directly from the article.) HS

CHOANOFLAGELLATES

We like little things so long as we can turn a lens onto animals, plants, or non-living structures. Revealing their internal structure or external appearance as seen through a microscope makes us appreciate the fine tools at our disposal. The world is full of small organisms and the oceans contain vast numbers or nanoplanktons called choanoflagellates. They are very small. They are also voracious eaters of even smaller creatures such as bacteria and organic debris found in coastal waters. Since they remove these elements from the water, they and other filter feeders effectively clean the water and in turn become food for larger creatures such as planktonic larvae. They are an important part of the ocean food web.

Choanoflagellates resemble in structure the feeding cells of sponges that are called choanocytes. At the apical end of the cell, a long flagellum helps to propel the cell through the water or to stir the water so that the 30 to 40 tentacle-like filaments that form a cone around the flagellum can catch particles.

A team led by Dr. Mark Dayel and Dr. Daniel Rokhsar at the University of California, Berkeley, and associates recently sequenced the genome of one choanoflagellate species. In an effort to elucidate the transition from single cell to multicell organisms, they identified many genetic features that were shared exclusively between choanoflagellates and animals. Multicellular animals must have adhesion proteins that help to hold cells together. The analysis of the DNA of these single celled choanoflagellates revealed that they had 78 pieces of proteins, many of which in higher animals are involved in adhesion between cells. Perhaps, these same molecules are used by single celled animals to capture prey. There is evidence that ancestral flagellates gave rise to multicellular animals and that such adhesion proteins may have helped in the initial clustering and future organization of multicellular animals.

Illustrations and a longer description can be found in the New York Times, December 14, 2010, article by Sean B. Carroll, section D3. Look up Remarkable Crea-

SEM EDUCATION

There are few places where you can practice on an expensive instrument and see the results of your efforts right away. It is more practical to do what the airlines have done, set up a simulation. At the University of Cambridge, UK, engineering students use a version of the virtual SEM (VSEM) to practice what they have seen in a hands-on demonstration to get measurements of features on a silicon chip.

www.virtualsem.com contains a suite of internet based teaching software that you can access. See more in Microscopy Today, May 1020, page 44m Virtual SEM by N.H.M. Caldwell et al.

The Early Butcher,

3.4 x10^6 years ago

If you are an anthropologist, you would like to find bones of our ancestors, particularly bones that they may have butchered. That would tell you a lot about their lives. An international team of paleoanthropologists, archeologists and geologists, including Shannon McPerron of the Max Planck Institute and Zeresenay Alemseged, an Ethiopian paleoanthropologist at the California Academy of Sciences, proposed that the species Australopithecus afarensis, which lived in Ethiopia, Kenya and Tanzania, used stone tools as evidenced by "butchering" marks found on bones. The cut marks found on bones was the evidence since no stone tools were uncovered.

Dr. Dominquez-Rodrigo of the Complutense University of Madrid became suspicious since Australopithecus was thought to be vegetarian because of its large teeth. A microscopic analysis of the bones showed that the marks looked very different from butchering marks and were more likely scratches made by animals trampling across the bones.

It seems that it took at least another 800 thousand years before stone tools were used in preparing meat. Butchering thus started only 2.5 million years ago. After that skill was developed, our ancestors never were the same again. Eventually they learned to butcher each other. Not a pretty picture to behold. HS

NY Times 11/16/10

COPY THIS PAGE AND SEND IT TO A FRIEND OR COLLEAGUE, HAND IT TO A MICROSCOPIST, GIVE IT TO A SCIENCE-ORIENTED TEEN OR A SCIENCE TEACHER. HELP US GROW! THE MORE INTERESTED MEMBERS WE HAVE THE MORE INTERESTING MEETINGS WE CAN SPONSOR.

Why should I join?

If you are a professional:

- Enjoy the company of professionals attending Society meetings.
- Use our research grade Zeiss Ultraphot III microscope available to members who have participated in a training session.
- Share in the tradition of scientific objectivity and serious endeavor with other professionals.
- Improve the public's understanding of microscopy and scientific endeavors.
- Add the Society to your resume.

If you are an amateur:

- Participate in exploration and discovery at our meetings and fieldtrips.
- Develop a new and fascinating hobby.
- Borrow a microscope to take home before buying your own.
- Learn how to buy a good microscope.
- Discover your micro-world at home.
- Help children understand science.
- Receive information, science articles, reports of meetings and activities of interest to members and microscopists.

Copy or fill in this half page:

Membership Application

San Francisco Microscopical Society

Instructions: Please provide all requested and marked with (*) information, if available, and enclose the $12.00 dues for the calendar year 2011 or pay $144 for Life Membership.

We welcome all interested individuals of any age.

Enclose a business card if available.

_____
*Print your name: First, Middle, Last

_____
*Print street address or mailing PO Box

_____
*City *State Zip 5 + 4

_____
*Print your e-mail

(_____)_____
*Home phone

(_____)_____
*Cell Phone

_____
URL

_____ _____
Occupation Age or Birth date

If you own one of more microscopes, briefly describe what you have and use the back for additional space. What is your special interest in microscopy?

_____

_____

_____

_____

Mail to: Myron Chan, SFMS Treasurer
435 Melrose Ave
San Francisco, CA 94127

FROM:

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SFMS

Stamp

To:

WWW.SFMICROSOC.ORG

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SF Microscopical Society MEETING

WEDNESDAY, January 12, at 7 PM at the Randall Museum, 199 Museum Way, San Francisco.

CONFOCAL MICROSCOPY AND ITS APPLICATION TO FORENSIC BULLET AND CARTRIDGE CASE EXAMINATION.

by STEPHEN A. SHAFFER

Stephen Shaffer, forensic specialist, and currently in graduate studies at UCD, will present his recent studies on confocal microscopy. He is a former member of SFMS and was the original web master of our web site. During the '90s he made a number of presentations to our members and is particularly remembered for a demonstration of a digital version he made of McCrone's atlas of microscopic particles useful in identifying specimens important in forensic investigations. Steve is the CEO of MicroDataware.