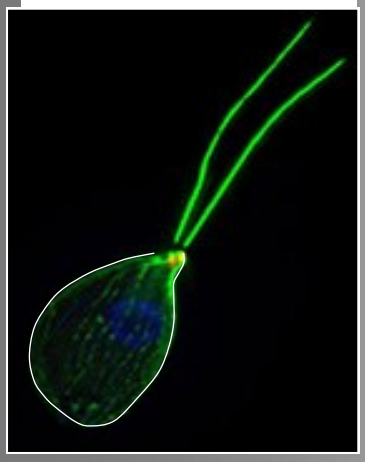
MicroNews

San Francisco Microscopical Society Volume 5, #4 November 2010

Amoeba That Swims When Stressed

This enhanced photo of *Naegleria gruberi* shows two long flagella that develop when the organism is stressed. By sequencing its genome, scientists hope to learn about the evolutionary transition from prokaryotes to the more compartmentalized eukaryotes.



The study was co-authored by **Simon Prochnik** of Berkeley Lab and the Joint Genome Institute and the sequence was published in the March 5 issue of the journal *Cell*.

Naegleria is a common soil amoeba - the sequenced organism was isolated from the mud in a grove of eucalyptus trees on the UC Berkeley campus

The image has been enhanced by a white line outlining the body of the organism. Due to the poor contrast with the black background the image had to be modified HS.

General Meeting

Wednesday, November 10

Creatures from the Deep & Microscopic Mon-

East Bay Meeting to be held at Merritt College in conjunction with Microscopy Students.

Parking charge of $2.00 (bring quarters) enforced—support your local community college!

Location is in the D building, second floor, room D247.

Come as early as 6 PM since microscopes will be available at that time. (6-9:30)

Bring your *Flash Memory Stick* and take home great pictures of your observations.

Bring your own specimens of living creatures or look through modern microscopes at bay and pond water collected by others.

Perfect your phase contrast technique. Learn about modern imaging techniques.

Get to know the students and find out their hopes and aspirations.

Adopt a student and buy them a membership in SFMS for 2011!

Does your membership expire in December 2010?

Look at your label. The date after your name indicates when your annual membership expires. Help the treasurer NOW by filling in the membership form on page 5 and sending it with your dues. (Consider buying an additional membership for a student. We will give it to someone worthy and provide them with your e-mail so that they can express their appreciation.)

Make the job of your volunteer treasurer a bit easier by responding to this request. Your membership is important to us, don't let it lapse.

INSIDE

MOON ROCK MICROSCOPY

Carbon is the backbone of all life. Its unique bonding properties make it ideal for building complex molecules. It is easy to jump to the conclusion that where there is carbon in the solar system, there is life. But that fails to consider the many other sources of carbon atoms, including the big bang. The Apollo program retrieved rocks from the moon and the analysis of these rocks has been ongoing since 1972. The most recent revelation is the presence of graphite, a form of carbon found in lubricants and pencil lead. Its most likely source is from the impact of carbon containing meteorites during a period of intense bombardment four billion years ago.

What is of interest to our members is the size of the dozens of globules of graphite found by Andrew Steele, at the Carnegie Institute, that he observed in a region just 0.1 mm square.

"The development of ever more sensitive microscopy and chemical-analysis techniques will continue to produce new insights from existing samples — good news, considering no nation appears to be close to returning humans to the lunar surface." (1) Watch China!

Scientific American, Sept 2010 pp 17

VIEWING & IDENTIFYING POND ORGANISMS

http://www.microscopy-uk.org.uk/

If you want to learn about Pond Life before you come to the November 10 meeting, visit the microscopy-uk web site. There is a rich and uncomplicated list of organisms that you may find in any pond. The illustrations and photographs are helpful and the descriptions of some species adequate. Links to further information are provided. It is a start.

Google Protozoa and you will find more than you have time to review. Once you learn to categorize the organisms you will be able to find information on most multicellular creatures including flatworms and insect larva that are common in ponds and streams.

You don't have to be a biologist to become familiar with algae, rotifers, annelids and nematodes. A simple key that shows the shape of the organism will get you into the right category 90% of the time. There often is so much to see that you will be wondering how so many creatures can occupy so small a volume of liquid, a single drop.

The biggest problem is their rapid motion. Methyl cellulose, a somewhat viscous substance, will slow down some of the less vigorous swimmers. Others can be trapped in the tangled mass of algae filaments. HS

WALKING WITH MICROSCOPY IN MIND

It does not take a lot of training to become observant. All you have to do is have an open and curious mind. All around us are objects that deserve our attention and many can be observed better if magnified. Birders know this so they carry binoculars. Microscopists have a harder time carrying their instruments into the field but often, a loop (or 10X hand lens) is sufficient to help identify interesting specimens. In addition, collecting containers such as small jars, pill boxes or baggies should also be in your pocket or fanny pack to help you bring home specimens.

Walking with my wife in our neighborhood, we came upon a swarm of flying termites. They rose up like a small cloud from the debris next to the road but I had left my fanny pack at home. Fortunately, the next day my neighbor collected a few from outside her front door so I got some specimens.

Termites make particularly interesting subjects for microscopy. Their gut is filled with other organisms that are easy to observe and quite varied in size but easily observed at 400x. With two pairs of tweezers, separate the thorax from the abdomen in a small drop of water on a slide. Protect

(Continued on page 3)

IS OPPORTUNITY FOR MICROSCOPY KNOCKING?

The famous Exploratorium, the cradle of hands-on science for young people (and many adults) in the Bay Area is moving to Pier 15 on the Embarcadero. It will take three years to build the $300 million dollar facility that will house exhibits, classrooms, and teacher-training facilities. This sounds like an opportunity for microscopy, especially since it is a museum of "art, science, and human perception," as described by the late Frank Oppenheimer, the founder of the museum. What better way to improve human perception of the microcosm than though a microscope. Water science will be a natural and important part of the activities. "It will be a ball explaining the wonderful microbial life that exists around us …" said physicist Dennis Bartels, the Exploratorium's Executive director. "There's a whole ecosystem made visible for us."

Microscopy can help to make that all real.

Doing science involves having the right tools in a safe space. Learning to use those tools, understanding that they are not magical black boxes, can be difficult and time consuming.

The modern microscope is such a tool. While in the simplest form a microscope can give students and amateur scientists a small taste of the beauty of the microcosm, only through a thorough grounding in both theory and practice will they be prepared in the safe, and effective use of the sophisticated research models. Safety here refers not only to the user but to the instrument that has become much more elaborate in its optics and in its interface with other instruments and computers. It is the computer driven microscope that could be used to engage the public. There are computer protocols that can focus a microscope and show on a television screen what is located on the slide. The opportunity to interest the young and the young at

(Continued on page 6)

Hermann Ludwig Ferdinand von Helmholtz

In 1821, the German states were arranged in a variety of kingdoms, principalities and city-states, often governed independently. The Kingdom of Prussia was one of the larger and therefore more powerful regions. It included the city of Potsdam where Helmholtz was born on August 31, 1821. By the time he died in 1894, the German states had united and formed the German Empire with African colonies, a transition that not only revolutionized the map of Europe, but that also laid the foundation for the chaos that Germany created in the 20th century. Our interest in Hermann Helmholtz is in his scientific contributions, particularly as they relate to vision, and therefore to understanding optics and how our eyes relate to microscopy.

He was a man of wide ranging interests and was particularly interested in natural science. His father, who was the director of a school in Potsdam, directed him to study medicine at the Charite because there was financial support for medical students. (This must sound familiar to modern parents.) His medical studies led him to experiments in physiology while his broad view of science gave impetus to studies in varied fields but particularly in physics.

At the age of 26, he wrote his first important scientific paper in which he considered the conservation of energy. This was based on the physiological studies of muscle metabolism. He tried to demonstrate that no energy was lost in muscle movement. From this groundbreaking achievement, the discovery of the principal of conservation of energy, and building on the work of other scientists, he postulated the relationship between mechanics, heat, light, electricity, and magnetism by treating them all as energy. He published his theories in 1847

If you attempt to look into a human or animal eye, what you will see is a dark chamber without detail. The examination of the inside of the human eye became possible with the invention of the ophthalmoscope by Helmholtz in 1851. This revolutionized the field and made him world famous. His interest in all the senses continued throughout his life but he had a special interest in vision and published a Handbook of Physiological Optics that gave his theories on special vision, color vision and motion perception. It became the fundamental reference work in this field in the second half of the 19th century.

(Continued from page 2)

with a cover glass and inspect. You will see protozoa that are able to digest cellulose, the main component of wood and a number of bacteria. In one such preparation, I saw spiral shaped bacteria that were large and easily visible without staining.

Termites form the order Isoptera of the class Insecta. The sexual males and females carry two pairs of membranous wings flat on their back at rest and these detach after their nuptial flight. What we observed was the swarming flight for dispersal. These swarms consist of kings and queens that settle in pairs, lose their wings, excavate a new nest, mate, and produce colonies of colorless and sterile young.

The more interesting aspect from a microscopist point of view is that termites are unable to digest wood. Thus each young nymph must meet an older termite, stimulate it to regurgitate a drop of gut fluid that contains the microorganisms that can digest cellulose and ingest this fluid. Trichonnympha is the flagellate that you will be trying to locate in the gut fluid. This protozoan has an apical region from which stream many flagella that extend over its entire surface like a long shaggy coat. Occasionally, a long splinter of wood will be seen inside the more globular posterior end.

NEW MEMBERS CORNER

Welcome Leslie Will

Our newest member, Les, is an amateur who is learning about microscopy from scratch!. We all did that at some point. He was influenced by a gift from his daughter who works with DNA in a LA criminalistics lab.

She gave him an AO microscope to help with his current hobby that is bee-keeping. Les retired from being an airline mechanic. He and his wife live in San Francisco.

Welcome and enjoy the fellowship. We look forward to learning more about bees while we become a resource to you about microscopy.

PARASITES

There are no shortages of parasites since if they don't kill their host they get a free banquet. Finding them, and understanding their life cycle can be complicated. Sometimes they get into the headlines as revealed in by the September 30, 2010, SF Chronicle's front page:"Tiny snail carries a worm that makes swimmers itch".

The snail was recently identified for the Chronicle by Andrew Cohen, Director of the Center for Research on Acquatic Bioinvasions. Finding the snail should not be particularly difficult since it has been found along the shore of the bay in several places but because it is small, it may be easily overlooked. One place to find it is at the foot of Ashby in Emeryville. Look for organisms that are clinging to a solid substrate since many snails are grazers.

Within the parsitized snail are hundreds of microscopic flatworms that are responsible for the irritation experienced by some swimmers. Crushing or mincing the snail in a small amount of bay water should liberate hundreds of cercariae, the freeswimming stage of the schistosome parasite for microscopic inspection.

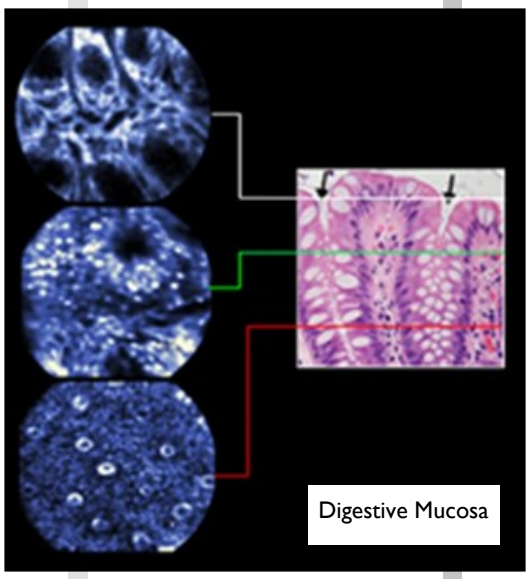
The cercaria have a split or forked tail and are easy to recognize.

It will be an adventure to produce a set of good microphotographs of this pest so I will try to bring some snails to the Merritt meeting. HS

Endoscopic Confocal Microscope

One of the more difficult concepts for anatomy students to learn is how to distinguish between the interior and exterior continuum of the body. Large spaces that are loosely identified as the inside of our body can be reached without breaking a surface. These spaces have surfaces that therefore are a continuum of the epithelium that separates us from the external world, our skin. Our lungs, kidneys, digestive and reproductive organs have passages that directly or indirectly lead to the outside forming some areas that can be reached without breaking the skin or the epithelial layer.

Endoscopes are used to explore the lungs, stomach, colon, and bladder. The magnification provided by endoscopes is limited. In order to provide a microscopic view of living tissue, a company called Mauna Kea Technologies has developed an instrument, called Cellvisio®, that is fiber-optic microscope. It comes in various forms that have a reach of three to four meters. They placed a microscope objective at the end of ultra-thin fibers and reduced its size to a very small lens system. Scanning and image analysis as well as laser beam generation are kept outside the body providing a remarkably flexible confocal system that can provide microscopic views of living tissue.



While endoscopes have been used for a long time to visualize the surface tissue of internal organs at a macroscopic level, these fiber-optic instruments can use confocal scanning because the fibers are both light or laser guides and image retrieval pathways. Tissues can be viewed directly or as a result of fluorescence. Fluorophores, which have either been specifically applied to the tissue or that are genetically or naturally present, will fluoresce when excited by the correct light wave length. This new light is transferred back along the same fiber to the laser-scanning unit for analysis. Exploration at different depth of field becomes possible. Interesting images and videos are available at the web site. The normal pulsation that accompanies some of the videos is either caused by the breathing cycle (about 12-15 cycles per minute) or by the pulsing of blood (40 to 80 pulses per minute).

"*When doing fluorescence imaging, resolution depends both on what is fluorescing and on the intrinsic resolution of the instrument. Cellvizio®-GI has an equivalent magnification 10 to 50 times greater than high magnification endoscopes.*" Quote from Mauna Kea web site.

http://www.maunakeatech.com/

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 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.

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.

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:

Micro News

San Francisco Microscopical Society
Henry Schott, Editor
20 Drake Lane
Oakland, CA 94611-2613

November 2010, Volume 5, No. 4

SFMS

Stamp

To:

WWW.SFMICROSOC.ORG

Micro News is published four times each calendar year, January, March, September and November.

Our Next Meeting: Merritt College, 12500 Campus Dr. Oakland. D – 247 6PM onward

to 9:30. Parking $2 in 25 cent pieces.

You will have access to Leica stereoscopes, mostly older models, but a couple of newer ones with a built-in camera; Meiji upright compound microscopes, with ability to Köhler but no camera; Olympus inverted compound fluorescence scope, with camera/computer connection, but with limited resolution in transmitted light: Leica upright compound scopes, again, with fluorescence but no Köhler ability, has camera/computer connection; Zeiss Primostar, similar to the above with built-in camera. Bring your flash memory stick and take home some great pictures. Bring samples of algae and other pond inhabitants. Please label where they originate. Bring any keys to these organisms that you may have.

(Continued from page 2)

heart in this field are boundless. What is needed to capture their imagination is the opportunity to transfer the sophisticated resources of a good laboratory to their home environment. The internet provides such an opportunity. Images from microscopes can be streamed to any computer as can related information that describes the image in age-appropriate language.

A ***"I Want To See"*** program, hosted by an institution such as the Exploratorium, could provide the first step to the natural curiosity that young people have in exploring their micro environment. The second step would be to provide, at nominal cost, the home computer – connected microscopes that are on the market.

Microscopes are only a tool through which individuals can explore part of the unseen world. Just as a telescope can help visualize the unseen macroscopic universe so microscopes, far less expensive than good telescopes, open a world of the very small. Unfortunately, the idea of becoming a micronaut , rather than an astronaut, as a lifetime occupation has not yet caught on among the seven and eight year old scholars. We must find a way to open that reality to them and to others and the Exploratorium in its new location will surely be an ideal site for exploring the micro-world.

Even better would be the formation of a consortium of similar institutions that would become magnets for a program focused on the micro-world. The Lawrence Hall of Science, the Chabot Science Center, the Randall Museum and institutions on the peninsula and San Jose, when connected with some of the educational programs at colleges, universities and high schools could have a major influence on science education development. All it would take is imagination and the energy and will to succeed in forming such a consortium. Once coordinated, a consortium would attract funding and support from both industry and government. It would be a significant step in improving student's understanding of the importance of science. HS

(Partly based on the SF Chronicle cover story, 10/19/10)