



MicroNews

San Francisco Microscopical Society

Volume 5, #2 March 2010

Please Note

Regarding Meetings:

The March meeting will take place at Merritt College, in Oakland, on **WEDNESDAY, March 10**, (when the microscopy class meets). See elsewhere in this issue for more information.

Your next Micro News will come in late August and will announce the September meeting.

Since there is no April-May issue of Micro News, the Tuesday, May 11 meeting at the Randall Museum will only be announced on Yahoo Group e-mail or you may call (415) 457 - 0355 for more information.

On The State of the Society

Results of the January Election, Finances, Governance

The January meeting, 1/12/10, of the Society was possibly the most important meeting of the year since much of the next year's planning falls on the elected officers of the society,

It is amazing what people will do for money! They will dress in funny clothes, wear dunce caps, run around in the jungle and race across continents in a televised competition. It is even more amazing what they will do for no other reward than having participated in a worthwhile community effort. Several examples come to mind. Habitat for Humanity builds houses for those people who are willing to contribute sweat-equity and who would otherwise never own their own home. Schools and teachers depend on volunteer tutors to help students master material when they fall behind. Societies form around specific diseases to help those afflicted to cope with their challenges.

Volunteers to keep the Microscopical Society functioning were, in greater measure, absent at the January meeting when a new slate of officers was to be elected to replace the current board. If we think of the Microscopical Society as a boat, it is currently adrift with only one elected crewmember, our new treasurer, Myron Chan. The boat has been on course without a functioning captain for the past two years because the other crew members have been willing to navigate and carry out the captain's duties of setting the course and insuring cooperation among the crew members. But now, having been burdened too long, that "trusty crew rebels" (as is sung in H.M.S. Pinafore). Now, instead of five, there is only one and he of necessity will devote all his attention to mastering the task of treasurer.

The boat is adrift! The sails are torn to shreds and the tiller is

broken. The anchor is unable to find the sandy bottom and in the distance, one can hear the crashing waves as the surf pounds against the cliffs and rocks that form the shore. What will be the fate of the boat? Who will rescue the passengers, the SFMS members, who seem unwilling to help themselves? Is the fate of the boat sealed? Must the laid-up treasure go down into the abyss as it did with the Spanish galleons? Where is the voice that will rally the passengers and find the Navigator and the other trusty crewmembers to take hold of the tasks that need to be done to rescue this floundering vessel, the San Francisco Microscopical Society?

From the perspective of the editor, we now have a ship with a

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SUPPORT BUG DAY AT THE RANDALL

Bug Day? If you have never set aside time to help a child learn about nature and the microscopic world below our feet, here is the perfect opportunity to do so. Over 1,000 children and adults come to Bug Day and each come away with a better appreciation and sense of wonder about our environment and the creatures that live among us.

This year we're more excit-

ed than ever to share our favorite Randall Family Event with San Francisco. I'm hoping to see all of you back again to help us celebrate all that is special and exciting about bugs!

The SFM Society has participated in this yearly event and those who have helped out at the table have enjoyed meeting kids from all walks of life to enrich their NK (Nature Knowledge)

Please contact Helmut Will (werdorf@att.net) or call 650 588- 0842, so that we can begin planning for our day at the Randall. The date is April 17th, 2010 . Time is 10:00 am - 2:00 p.m. Spend two hours 10-12 or 12 to 2 helping out at our table where we will have magnification setups with BUGS!

Prochlorococcus from *The World Is Blue*

The World is Blue
A book worth reading.

There are plenty of books that warn us of the consequences of global warming. Sylvia Earle goes beyond this dire warning and shows in her clear and unambiguous description of man's impact on the ocean and our ignorance of the ecology of this vast portion of our home, is rapidly approaching a tipping point from which we may not recover. It is an eye-opening read of the interdependence of ecological forces and the life-support cycles, such as the carbon dioxide, water and carbon cycles, that we depend upon. It is the "Silent Spring" of our time!

The Editor



Dr. Sylvia Earle

"The conversion of energy from sunlight to photosynthesizers to animals occurs first on the microscopic scale, and continues thereafter for the lifetime of the consumer, the diet changing with increased size. Most of the action starts with sunlight, converted in the cells of trillions of microscopic organisms supplied with chlorophyll, carbon dioxide, and water, into simple sugars and oxygen. This is how a

large measure of atmospheric carbon dioxide is taken into the sea, and how a large measure of oxygen is discharged back to the atmosphere. One kind of blue-green bacteria, *Prochlorococcus*, is so abundant – about 100 octillion (1 octillion = 10^{27}) are alive at any given moment – that it alone is responsible for about 20 percent of the oxygen in the atmosphere. Put another way, this nearly invisible form of life gener-

ates the oxygen in one of every five breaths you take, no matter where on the planet you live."

The World is Blue, (pp54) by Sylvia A. Earle, National Geographic, 2009. She is Explorer in Residence at the National Geographic Society, and is known as "Her Deepness" for her many deep sea dives. She is recipient of numerous awards and prizes for her scientific work in oceanography.

(Continued from page 1)

number of leaks and no one to man the bilge pump or to guide the crew to shore. There is plenty of fuel for the engine but no one to turn on the engine or set the sails and select the course. The members of the Society need to decide if what they have, a society devoted to exploring microscopy, is worth their serious participation or whether it would be better to scuttle the ship and drift into oblivion. Its time to express your opinion and to be counted.

During the meeting, the retiring treasurer, Henry Schott, gave a report for the fiscal year 2009. The income of the society consisted of dues, interest and donations.

	Income
Life membership	144.00
Dues 2009	72.00
Dues 2010	60.00
Interest	289.92
TOTAL	\$565.92

	Expenses
Postage	126.67
Printing	207.50
Miscellaneous & Web site	418.20
TOTAL	752.37

DEFICIT (\$186.45)

Because of our large reserves, we can afford a deficit of this magnitude for many years.

The Vice President, Bill Hill, who did not stand for election for this office, announced that the next meeting will be held at Merritt College, on Wednesday, March 10, 2010, at 7:30. We will meet with the teacher and students of the Microscopy Program. The evening class meets Monday and Wednesday, thus, Tuesday was not an option for this meeting..

The main presentation of the January meeting addressed fluorescence microscopy. Joseph Mosley, a chemical engineer, became interested in microscopy and decided to go through the Merritt College Microscopy Program to expand his knowledge. His PowerPoint presentation on Fluorescence Microscopy covered the basics of filters and spectral qualities of the process and ended with a number of illustrations that he had produced in his classes. He was accompanied by students Ellis Seawell and SFMS member, Nan Gray .

Fluorescence involves using a beam of light, usually ultraviolet light, that excites the electrons in

molecules of certain compounds and causes them to emit light of a lower energy, typically, but not necessarily, visible light. A complementary technique is absorption spectroscopy.

It is easy to confuse fluorescence with phosphorescence. chemiluminescence and bioluminescence. A number of substances, including many minerals, absorb energy and then glow in the dark. Their slow release of absorbed photons is phosphorescence. Some chemicals are able to release photons as a result of chemical activity that may continue for some time but eventually the reaction reaches equilibrium and the release of photons ends. Chemiluminescence is irreversible and is seen in glow-sticks. Fireflies and glow bugs produce the most common type of terrestrial bioluminescence. They utilize ATP to produce light and since ATP can be regenerated in the Krebs cycle and in mitochondria these organisms can regenerate the ability to produce light.

When a fluorophore, a substance that fluoresces, is combined with an antibody that conjugates with a specific protein, fluorescence can

(Continued on page 3)

COMMUNICATION: Polyclad Flatworms

(Dr. John Holleman was a Merritt College colleague of the editor, H. Schott. He taught courses in microscopic technique as well as being the lead teacher in Biology 1A & 1B before becoming an administrator and eventually taking the position of College President in another district. Now retired, his work with flatworms requires extensive microscope work to identify characteristics of internal structures used to key out genus and species. John is an SFMS member.)

Henry: January 11, 2010

...I just finished pruning fruit trees, 2 plums, 2 apricots, 4 figs and 1 apple... We had 6 inches of snow in December.... I'll start pruning the vineyard either this week or next week....It usually takes me a good 2-3 weeks to prune the whole vineyard. It's out at 6:30 am finishing at 4:30 pm. It keeps me active.

Flatworm work goes in fits and starts – right now it's fits. I've been working on a key to the polyclad flatworms for the Pacific coast of North America to the coast of Central America to Panama. I've just added three recent species, one from Costa Rica and two from a sea mound in the north pacific which means that the

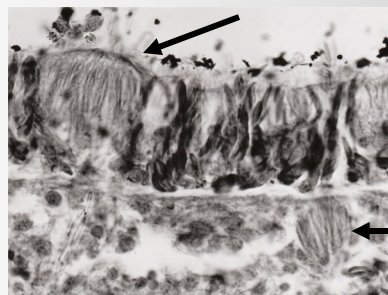
key has to be revised. I scan in the diagrams and then rework them adding consistent text symbols. When the work is identified in the key, a click on the name takes the individual to a description of the worm with references, synonyms, diagrams and photographs if available. I intend to put this on a CD and distribute it to the Pacific coast Marine Labs, researchers, etc. [This is] my major contribution to the study of flatworms. I did the last key in *Light and Smith Manual: Intertidal Invertebrates from Central California to Oregon (2007)*. Like you with SFMS this activity keeps my mind active. As soon as I get this done, I will be back to describing flatworms. I figure that I have four more years to go. ...

Cheers John Holleman

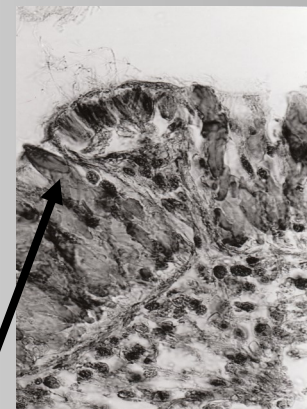
“There appears to be no limit to how far down the food chain the accumulation of plastics and their toxic chemical baggage can go, reaching even the microbial swarms that dominate life in the sea. Plastics eventually break up into smaller and smaller pieces, but it appears they are remarkably stable, retaining their identity and properties as plastics, even to the microscopic level. The consequences to ocean chemistry are simply unknown, but they need to be understood and factored in to the growing number of issues directly affecting the ocean's health, and thus our own.”

“Those who consume seafood should be asking another question: How far up the food chain do ingested plastics go?” pp 106 *The World is Blue* by Sylvia Earle

Polyclad images by J. Holleman



A. multivirilis. The dorsal epidermis shows a bundle of nematocysts in the epidermis. In the right lower area a bundle is observed in the parenchyma prior to moving into the epidermis layer.



A. kaikourensis Next to the bundle of nematocysts are rhabdites. The function of rhabdites is uncertain.

(Continued from page 2)

be used to identify the location of that protein in a cell. A number of fluorophores have been developed that glow in different colors, such as blue, red, green, or yellow.

Invitrogen is a company that sells fluorophores. On its web site are five tutorials that give an overview of the process that results in fluorescence in a clear and easily understood animated slide show.

<http://www.invitrogen.com/site/us/en/home/support/Tutorials.html>

Nematocysts - Peculiar Singing Cells

Nematocysts (**cnidocyte**) are cells that can shoot out a thin thread-like tube through which a toxin can be injected into the prey. They are found in the tentacles of Jellyfish, sea anemones, hydra and most coelenterates. The cells have a trigger bristle that when it is bent by contact with another organism causes a rapid change in hydrostatic pressure

within the cell resulting in the ejection of the thread.

A few higher organisms, the flatworms, have adopted this mechanism by eating the coelenterates, digesting most of the cells but not the nematocysts. They instead transport these ingested cells to their surface where they become part of their defense mechanism.

How do the flatworms prevent the discharge of the nematocysts while they are ingesting them? How do they move these cells from their gut to the epidermis? How do they align them so that the trigger is facing outward? And finally, how do they maintain the correct balance of foreign nematocysts to the indigenous epithelial cells? These are some of the unanswered questions. HS

MICROSCOPY Education at Delta College in Stockton

“There is a computer at the seat of each student in the classroom and more in the technical library that houses a large collection of electron microscopy books and journals.”

Sara Blauman, a member of SFMS, has been attending Delta for the past two years. She has graciously provided this report for Micro News.

San Joaquin Delta College in Stockton CA is the only institution in the US that offers certificates in Biological Electron Microscopy and Materials Electron Microscopy. A certificate may be earned by a high school graduate or others that already have degrees. Delta College is a community college so the tuition is very reasonable, currently at \$26 per credit hour. All ages are represented

by the microscopy students; many students are returning to the workforce or changing careers. A certificate can be reasonably attained in 4 – 5 semesters. I am currently finishing my last semester in the biological certificate program. I can highly recommend the program.

The Electron Microscopy program began in 1970 and currently is housed in a new state of the art teaching facility and lab. The building is spacious with a microscope wing, a laboratory wing and a classroom wing. There is one lab

for biological specimen preparation and another for materials specimen preparation. Each contains various light microscopes and other equipment useful in specimen preparation. A utilities lab houses sputter coaters, vacuum evaporators, centrifuges, ovens, refrigerators, a huge chemical cabinet and other miscellaneous equipment. There is a separate lab for the 10 ultramicrotomes, and another lab for light microscopy that contains fluorescence, reflected, stereo, DIC, phase, and darkfield/brightfield

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Sample of Delta College Facilities and Equipment



Zeiss Axiostar Plus light microscopes



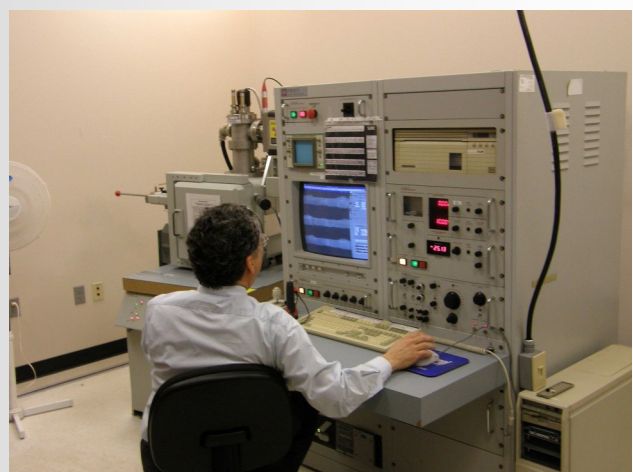
RMC MT-XL Power Tome Ultramicrotome



JOEL 100CX TEM SCAN TEM



Ambios Q AFM on vibration dampening table and platform



FEI 611 FIB (Focused Ion Beam)

Delta Community College continued

(Continued from page 4)

microscopes. A huge main lab is general purpose as is the computer lab. There is a computer at the seat of each student in the classroom and more in the technical library that houses a large collection of electron microscopy books and journals. There are 9 electron microscopes (TEM, STEM, SEM, FIB, AFM), each housed in its own room. The labs are all equipped with beautiful new wood cabinets and lab furniture as well as up to date fume hoods, eye washes, showers,

and other safety equipment.

Students can pursue both certificates or one or the other. The education is of the highest quality possible. In addition to learning operation of the microscopes and specimen preparation, students also learn digital imaging, scientific paper writing, poster development, oral presentation skills, and equipment maintenance. Course work in mathematics, physics, chemistry, and, for the biology students, biology and biological ultrastructure are also required to earn a certificate.

You can find out more about the program from the website, <http://www.deltacollege.edu/dept/electmicro/whatis.html>, or by calling to arrange a private tour of the lab (209) 954-5246, or by attending the open house that is held each April.

Sara Blauman
(sblauman1@yahoo.com)

(Received 1/9/10)

Communication: Re., Amateur Microscopy

Dear Helen Gourley:

I was delighted to receive your note in the mail today. I was also interested in the copy you sent of the *Micro News* from the San Francisco Microscopical Society. I plan to sit down and read it in detail later today. At your suggestion, I will indeed contact Henry Schott. I have many thoughts on how we might work together to advance the cause of microscopy.

Meantime you might want to have a look at the Yahoo! Amateur_Microscopy discussion forum I started - see http://groups.yahoo.com/group/Amateur_Microscopy/ - and consider joining. I will issue you a formal invitation, and hope that you will take advantage of it. An explicit part of our mission is to encourage folks to join or form microscopy clubs wherever they happen to live. You need a Yahoo email account, but if

you do not have one already, it is easy (and free) to setup. The first time you log on they have an annoying popup asking you to customize your profile, but if you make some trivial change and save it, it will not pop up again. We have four moderators and over 200 members in the US, UK, Australia, and a few other countries. The discussions are lively, interesting, and civil.

I have other microscopy-related connections in this area, including some friends at McCrone Associates, who have been very good to me. Although I have joined the Midwest Microscopy and Mi-

croanalysis Society (M3S), I have not yet joined the State Microscopical Society of Illinois. I hope to remedy that oversight this coming year.

Let's stay in touch! And thanks so much for contacting me. Always happy to make the acquaintance of another microscopy enthusiast!

Glenn Shipley
(Chicago, IL)
glennshipley@comcast.net
Editorial Board,
Microscopy Today

FIB, AFM, TEM as defined by Wikipedia

Focused ion beam, also known as **FIB**, is a technique used particularly in the semiconductor and materials science fields for site-specific analysis, deposition, and ablation of materials.

Atomic force microscopy (AFM) or scanning force microscopy (SFM) is a very high-

resolution type of scanning probe microscopy, with demonstrated resolution of fractions of a nanometer, more than 1000 times better than the optical diffraction limit. The AFM is one of the foremost tools for imaging, measuring, and manipulating matter at the nanoscale.

Transmission electron microscopy (TEM) is a microscopy technique whereby a beam of electrons is transmitted through an ultra thin specimen. An image is formed from the interaction of the electrons transmitted through the specimen; the image is magnified and focused onto an

imaging device, such as a fluorescent screen, on a layer of photographic film, or to be detected by a sensor such as a CCD camera.

An Ultramicrotome is used to prepare specimens for viewing by producing very thin slices.

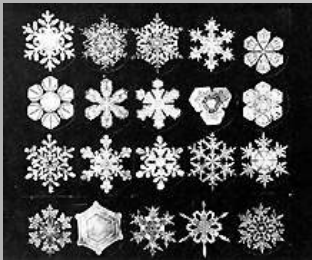
Three Sources of Microscopic Snowflake Images

There is, in each of us, a desire to communicate with others in a meaningful way. This becomes particularly evident when you have a lot of space to fill in a newsletter and no advertising with which to fill it. Thus, if my eye catches a



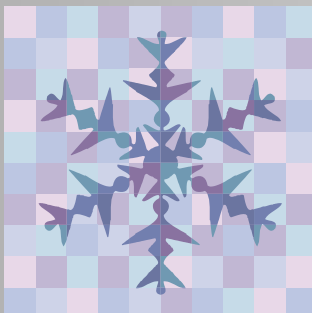
Wilson A. Bentley

small news item that relates to microscopy, I tend to pounce on it and consider how to turn such a mote into something that you, our readers, might find interesting.



Occasionally, the San Francisco Chronicle will report events that by themselves do not seem much of a lead. The sale of 26 photographs some weeks ago was so unremarkable a notice that it was easily passed over except for the tag line: **Snowflake man.**

You may recall that in the April 2009 issue of *Micro News*, Linda Wraxall described the exhibit of microphotography at the San Francisco Museum of Modern Art, (MOMA). *Brought To Light: Photography and the Invisible 1840-1900*, included a number of prints of snowflakes taken by Wilson Bentley who was also known as the Snowflake man. Twenty six of his images went on sale in January.



Bentley is not the only person to have photographed snowflakes. That challenge has been taken up by quite a number of people but none have made it more profitable and have offered more choices than Kenneth Libbrecht, Ph.D., who has published several books and collections in the form of postcards of his photographs. His microscope, as revealed in a photo in the booklet I have, is in an insulated case mounted in the back of his hatchback SUV. The microscope is connected to a small (8"?) LCD so that the image is captured electronically. He is the head of the physics department at Caltech. His web site is full of interesting information about snowflakes.

Bentley, (1865-1935), however, was the pioneer and his fascination with these transient bits of crystallized water drove him to produce more than 5,000 images of single snowflakes. He was a Vermont farmer and in order to capture his specimens had to work in the cold outdoor winter environment of Vermont since you cannot bring a snowflake indoors where it is warm and still have a snowflake. How he became interested in microscopy and photography is not known but in 1884, at the age of 19, he rigged a microscope to a bulky bellows camera to photograph snowflakes. As best we know, he was the first to do so.

Not all snowflakes are regular and symmetrical but because of the way water molecules arrange themselves when they change from a liquid to a solid, there is a tendency for them to form a hexagonal pattern. They begin, at a microscopic level, in a symmet-

rical arrangement that we find pleasing and beautiful. Symmetry is a recognized feature of what humans associate both with order and with beauty. Disorder in a snowflake develops over time as the snowflake passes through different atmospheric conditions and is buffeted by wind and other snowflakes. Capturing a snowflake in an early stage of development but before it hits the ground must be one of the more frustrating and challenging aspects of securing a specimen.

The photographs of Masaru Emoto in his book *The Secret Life of Water* are amateurish and lack depth of focus. They do include a series of images that show the growth of what may well be called a snowflake as the crystal appears under his microscope and then melts away. Emoto is a Doctor of Alternative Medicine and the book is full of stories that involve "Alternative" thinking and acting. My concern is only with the photographs which are given titles such as "You're beautiful", "Innocence", "Helplessness", and several "Thank you" in different languages. It is not reasonable to compare these images to those of Kenneth Libbrecht who set himself the task of making images with the best available portable equipment. Masaru Emoto explores an entirely different realm, the healing power of water with only peripheral interest in the photography. The contrast between Emoto and Libbrecht, the two modern photographers, is so obvious that we realize how good instruments in the hands of skilled operators yield far superior results.

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 2010 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

*Cell Phone

URL

Occupation

Age or Birth date

If you own one or 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

SFMS will meet on Wednesday, March 10, in the East Bay at Merritt College. See the detailed description below. We meet on Wednesday because that is when the class meets. Get to know future members of the Society, do some recruiting, bring specimens to be photographed through fine instruments.

SEE YOU THERE!

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

FROM:

Micro News

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

TO:

MEMBERSHIP INFORMATION

To join the Society, fill in the form in this issue and mail it to
SFMS Treasurer
435 Melrose Ave.
San Francisco, CA 94127-2217
with your annual 2010 dues of \$12.— made out to SFMS.

Life membership is \$144.00

**March 10, 2010
Meeting of SFMS**

The Society will meet in Oakland at Merritt College, located at 12,500 Campus Drive. Go to the D building, second floor, Room 247.

We will join the students who are in the microscopy program and have a chance to see the advanced equipment that they are using. Professor, Gisele Giorgi said *“The students can show you the scopes, and I’ll have them introduce themselves and vice versa. Then we can all play on the scopes. Folks can bring specimens to look at, if they wish. They should bring a flash drive to take images with them. I look forward to it!”*

This is a unique opportunity to see a successful program that is putting people to work in industry and laboratories. This is the type of program in the Bay Area that we, as a society,

should support and by participating in this evening’s activities you will be showing that support. I particularly encourage those of you who are in educational institutions to join us and learn if it makes sense to form some sort of articulation with this program at Merritt College. The Microscopy program is no longer a start-up program. It has graduated a class and has put its graduates to work in their chosen field.

**HOW TO GET
TO MERRITT COLLEGE:**

Public Transportation
Merritt is accessible by public transportation from the BART Fruitvale Station to AC Transit Bus Route 54. The AC Transit bus loads and unloads in front of the campus near the flagpole.

From 580 East (from the Bay Bridge or I-80)

Take the 35th Avenue exit and turn left.

Proceed up 35th Avenue traveling towards the hills. Note: 35th Street becomes Redwood Road before you go over the HWY. 13 overpass.

Continue up the hill to Campus Drive and turn right. The campus is approximately $\frac{3}{4}$ mile on your left. Parking on campus requires a ticket (4 x 25 cents) from a nearby machine. The buildings are identified by large letters painted high on the corners of the each structure.

Please car-pool if you can. See you there.

The Tuesday, May 11, 2010 Meeting of SFMS will take place at the Randall Museum at 7:30. The next Micro News will be mailed to members in late August. You can visit our web site for more information.

www.sfmicrosoc.org

Comet’s Microscopy

**By David Perlman. 2/26/10
SF Chronicle
(a short extract)**

***Tiny particle helps
date comet’s birth.***

Background: Six years ago a NASA spacecraft called Stardust collected particles from a comet and returned them to earth. Now, analysis at Lawrence Livermore has revealed its age and chemical mix

“The particle” Jennifer Matzel “and her colleagues analyzed was small —its diameter a thousand times thinner than the width of a human hair, Matzel said. The scientists examined even thinner slices in an electron microscope.”

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