MicroNews

San Francisco Microscopical Society — Volume 1, #2 Dec. 2000

President's Message

Welcome to the second issue of Micro-News !

Although it is obvious that we have enough contributions for this second issue, we need to have more members contribute materials for future issues if we are to continue.

Similarly, we need to have more members become involved in presenting suitable programs at meetings or recruiting others to make such a presentation.

Our society includes members with vastly different levels of expertise in a great variety of subject areas. Although I taught a variety of biology courses for 41 years, SFMS meetings of the past have taught me many things that were not part of my education, even in biology. And some of the most valuable have come from members who regarded themselves as absolute beginners but had developed ingenious practical techniques for specimen collection, preparation, and/or illumination.

Nearly everyone has something to contribute, be it a full meeting program, half or a quarter of a program, or a MicroNews article

Please share your knowledge with the rest of us.

Robert D. Griffin, President

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ARCHIVES

OF THE

SAN FRANCISCO

MICROSCOPICAL SOCIETY

San Francisco, CA

Hygiene

Water=Tanks on Tops of Houses

A.B. Stout, M.D.

Cubery & Co., Book and Ornamental Job Printers, 414 Market Street,
Just Below Sansome, SF

[The following paper was presented to the San Francisco Microscopical Society on December 4, 1873. Presumably, this presentation was given to the members in the Rooms of the SFMS located at that time at 531 California St. This is the first in a series of publications of the papers presented at meetings of the SFMS between 1873 and 1900. The papers are part of the Archives of the SFMS now housed in the Bancroft Library of the University of California as part of the History of Science and Technology Collection. The publication of these papers is with the permission of the Bancroft Library]

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Critical Illumination

In the early days of transmitted light microscopy, practically the only light source available was the oil lamp. It was placed in front of the microscope and a tilted plane mirror below the stage reflected the light up toward the specimen to illuminate it. Needless to say, a marginal solution at best. Even after the backside of the tilted mirror received an additional concave mirror, not much additional brightness was achieved. Neither did a wheel (below the stage) with fixed apertures for matched objectives sometimes with a collector* lens for the high power objective.

The first successful illumination system was developed by Nelson, a contemporary of Newton, in England, still using the oil lamp as light source. Nelson placed a collector lens in front of the oil lamp to produce a parallel beam of light. The mirror below the stage reflected the light upward toward the second collector lens (the in-stage condenser), which focused the light beam on the object. In other words, the image of the flame of the oil lamp was focused into the specimen plane. Since the flame was never uniform, the object was never illuminated evenly. To improve on that, a frosted glass filter was inserted between the two collector lenses usually near the oil lamp. Therefore a more even illumination was achieved at the expense of light inten-sity. Critical illumination was improved when the focusing Abbe sub-condenser was introduced. This in turn made it possible to change objective magnifications easily by engaging the revolving nosepiece and only a quick adjust-ment at the aperture diaphragm of the Abbe condenser was required to match it to the numerical aperture of the objective to be used. With the development of the electric light bulb, intensity was no longer a problem.

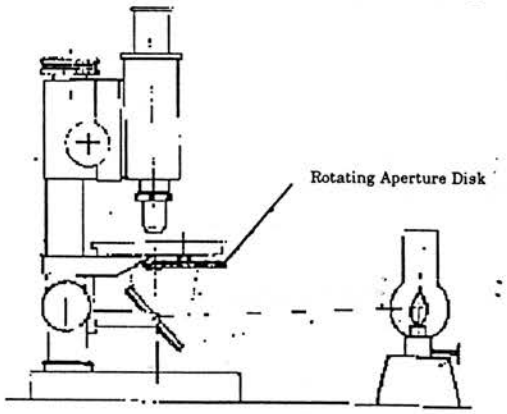
In setting up the older microscope, the microscopist had to move the light source back and forth, and tilt the mirror until he could see the image of the flame or the filament of the bulb in the field of view. Then the frosted filter was inserted, and now he knew that it was properly aligned. Many mocroscopists, once their setup was complete, fixed the microscope and light source on a base plate, to elimin-ate realigning in the future.

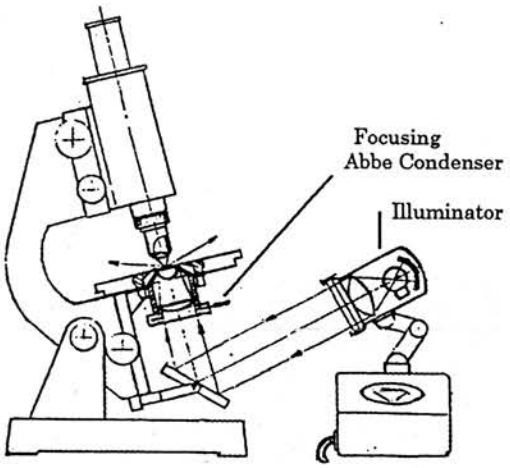
Critical illumination became very popular. It is still in use today with modern microscopes, mostly on the lower end**, and with student and laboratory microscopes. However, they are now produced with a built-in adjustable integrated electrical light bulb. The latter allows the microscopist to change the intensity of the light without disrupting the setup or the alignment.

** A more frequent, modern term is Condenser Lens. (Editor)*
*** Compared to the finest Research Grade Microscopes. (Editor)*

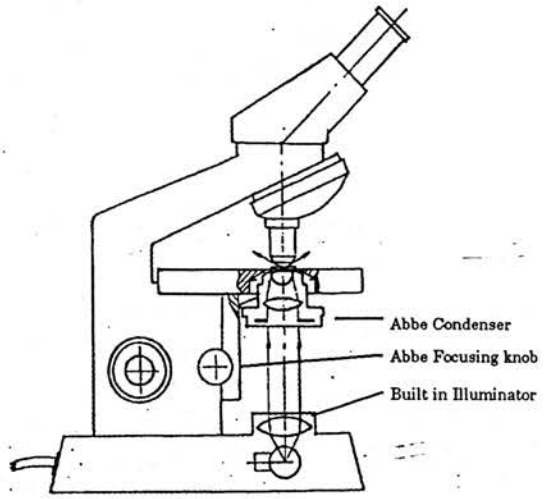
By Helmut Will

Nelsonian Microscope Setup





Older microscope, Critical Illumination



Modern Microscope, Critical Illumination

The Beginner Corner

This is a section to help the beginner deal with the apparent complexities of microscopy. These complexities are more apparent than real. Good Practice makes the Master.

"Under his arm he carried an old music book to press plants; in his pocket his diary and pencil, a spy glass for birds, microscope, jack-knife and twine." Ralph Waldo Emerson, essay on "Thoreau", 1862.

SELECTING THE FIRST MICROSCOPE:

The "microscope" mentioned above was probably a hand lens. Any device for "seeing small" was called a microscope from early times until about 1900. And that brings me to the range of devices for "seeing small". I will inventory my own eclectic collection, as I know it best.

Everyday, everywhere I carry my purse with keys, wallet, notebook, and purse-loupe. I leave the "spy-glass" for birding sessions. At home, I use a "dissection scope" (***anything*** *that leaves my hands free*) for preparing specimens, slides, etc. Among these is an inexpensive 20x stereo binocular, more used for careful looking at raw material of minerals, mushrooms, lichens, fungi, and algae on sticks and rocks, etc. My compound microscope (*a reconditioned 1950 Spencer Lab 'scope with substage condenser, costing $280*) is used for closely examining the fine details of fungi, algae, lichens, mineral-crystals and such with the greatest feasible resolution (*measured in tenths of microns, 1/10000 mm*), but also for photomicrography *(10x to 2000x)*, polarized light and other "special lighting effects." *(Professional (and well endowed) laboratories will extend this list to include high-resolution, special effect microscopes. These effects are fluorescence, phase and interference contrast, etc. I have never* ***needed*** *this sort of thing, although it would be nice to be able to afford them!)*

Which scope to buy? The one that suits your needs best. For years I got by with a purse lens, a high resolution compound microscope, and a 6x linen tester for a dissecting scope. My list of uses above will indicate to you what the instruments are used for. Specialized or professional users will want to consult people who practice in that specialty.

A few comments will save grief:

1) Leave toys and "school" microscopes alone. There is no resale value, and little "use value". If money is a problem, get the best quality reconditioned microscope you can. (This is not necessarily the fanciest.) Get specific advice.
2) The "full sized" mass market things are often usable. These are the house brands of Ward's, Carolina Biological, etc.) (*My 20x Edmund stereo is such, and I have recommended one or two other microscopes from them and others.*)
3) If a compound scope is indicated, be certain it has a substage condenser that focuses, is marked "N.A.=1.0" (or greater), and ***learn to use it***. The substage condenser is not just to control brightness, or serve with the oil immersion lens . See Helmut Will's article, facing, for some uses. More will be revealed in future columns. . . . .
4) The binocular-compound microscope is nice. So are built-in base-illuminators But I chose the monocular mirrored Spencer over a binocular, illuminated microscope (with an unfocusable substage condenser), that wouldn't let me adjust the substage, or safely take pictures.
5) If the "collector lens" (the field condenser) in the illuminator is frosted, pass it up. Unless, that is, you are not interested in fine details.
6) Leave alone those "bargains" at pawn shops, flea markets, and University Junk Outlets, unless you love to give your money away, or are quite knowledgeable. (*The still usable equipment from Universities is traded in on newer equipment. The junk is better used for parts by collectors and others, than for frustrating beginners. Some individuals have had good luck, but the days of ignorant dealers seem long past.)*

By Mikki McGee

REFERENCES (*and sources, etc.*):

Stehli, Georg, 1960; *The Microscope and how to use it.* (Dover reprint, Edmund Sci. Corp.)

Edmund Scientific Corp. (800)363-1992 (www.scientificsonline.com) (www.edmundoptics.com) *Good for books, loupes, mass market optics and scopes.*

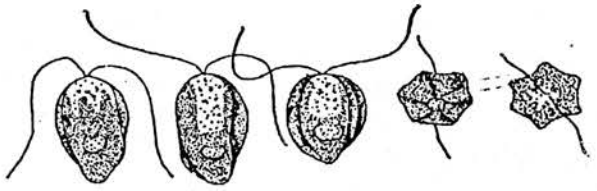
Carolina Biological Supply (800)334-5551

Ward's Natural Science Est. (800) 962-2660

These are better sources for slides, coverslips, forceps, etc., and ***reference prepared slides.***

Swift Instruments
Technical Instruments
(see phone book, ***Microscopes***)

Future columns will detail beginner's needs for Setting up a scope, slide making, clearing and mounting, making special effects, etc. Please note that there is a workshop in January, on fabric fibers, and ANY workshop is good practice.



Continued. from p. 1.

HYGIENE

Water = Tanks on the Tops of Houses

By Arthur B. Stout, , M.D. , MEMBER STATE BOARD OF HEALTH

[Read before the San Francisco Microscopic Society]

The water supply of San Francisco is derived chiefly from the Spring Valley Water Company's works. A few other sources exist: certain it is that others should be devised. This water is introduced to houses in two different modes.

1st. By direct communication with the main pipes to the emission faucets in the houses. This method supplies the water under the entire pressure from the head of the reservoir. The pressure in many parts of the town is far too great for the convenience of consumers. Accordingly no other mode of introduction is resorted to.

2nd. In order to moderate the force of the stream, tanks are built on the tops of the houses, which receive the water from the street mains, and the water is thence conducted through the houses by the usual pipes. To regulate the supply in the tanks, and prevent overflow, a spherical copper vessel floats upon the water and connects with stop-cock in the water-pipe. When the tank is full the float rises, turns the valve and shuts off the supply of water. And again as the water is withdrawn from the tank, the float descends and allows the valve to open. The ingenious apparatus serves a good purpose; but it has the great disadvantage in a hygienic point of view, - that in interrupting the free and constant flow of fresh water from the mains, it creates a little lake of stagnant water on every house top where it is employed. The water is detained in the tank by not being steadily drawn out and is exposed to the rays of the sun for indefinite periods of time, and all the organic operations of vegetables and animal germination, and decomposition have the same opportunity to occur as in stagnant pools. Months, sometimes years, elapse and no thought is given to clean and sanify the tanks. These remarks are equally applicable to those larger tanks in the Mission plain, which are elevated in the air and filled from wells by the aid of windmills. In this latter, the water often remains for a long while, for the owners are induced to economized the water in ordered to maintain their supply, when during the summer season there is often quite a length of time in which the wind does not blow strongly enough to work the windmill.

It not infrequently happens that these house top tanks are inaccessible, except at considerable trouble and expense, and are not supplied with covers. Housekeepers, who otherwise would be careful, are consequently deterred from taking the proper precautions to sanify their tanks. Persons unacquainted with these facts, and find the water impure, would be disposed to inculpate the reservoirs of the Spring Valley Water Company; when in truth the noxious swamp is on the roof of their own houses.

The question of the purity of water, and strictly careful analyses of the varied ingredients which the analytic chemist can detect, are from time to time urged upon the public, doubtfully appreciative of the scientific skill displayed; but let any house-keeper, not too lazy to take the trouble, enter a searching the contents of the tank on his house roof; let him collect a bottle full of its *soil*, and put one drop of it under a proper microscope and then pronounce - having seen it with his own eyes - upon the *soup* which he drinks.

Many observers know that these house top tanks are the birthplace of mosquitoes, like any other swamps, only on a smaller scale. And that their offspring migrate into the apartments below them; that various devices of window screens and mosquito nets are resorted to, and that one house will be infested while adjacent ones will be exempt, - and yet the hint of the mosquito, truly piquant, fails to awake them to the quality of their beverage.

The water when first drawn from tank may appear clear and pure, but in a short time it becomes cloudy, emits a faint odor and soon turns to a greenish color. After a time green vegetable matter forms, some of which floats on the surface and also gathers on the bottom of the containing vessel. This vegetable growth now becomes the nidus or homestead of innumerable microscopic animalcules of many different species. In due time these plant and animal creations die, and decompose, adding thereby another noxious ingredient to the water. Air and water for human use should be pure, or nearly so; anything short of purity is an incentive to gastric disorder, and unfavorable digestion. We may not be able to specify with precision if all these vegetable and animal products, are actually poisonous when taken into the stomach; nor yet how far the heat of the organ may destroy them, and the gastric juice assimilate them like other vegetable and animal food, but we do know that such infected water when drank produces nausea very promptly. The stomach revolts, and indicates to the mind that something unhealthy has been swallowed. We also know that certain of them escape destruction in the stomach, and are absorbed into the blood, and give rise to toxaemia. It is not our object here to discuss these questions, but accepting the well admitted fact that water under the above conditions in unwholesome, to show that these tanks when neglected are the prolific generators of septic fevers, and other diseases of anaemic type not necessarily febrile.

Mycological Society of San Francisco

December 9-10, 2000 : Fungus Fair 2000. This annual event is held at the Hall of Flowers (the S.F. County Fair Building) at the corner of 9th Ave. and Lincoln Ave., San Francisco (one block from the 9th and Irving Stop, of the N-Judah car. Parking will be difficult.) Each year, the MSSF surpasses itself in educating the public on the Wonderful World of Fungi at our feet, the delights of safe mushroom gastronomy, and the oddities of the fungus world. There will be displays, lectures, slide shows, instruction for those inclined, and food available. $5.00 entry for adults, reduced rates for children and seniors or by coupons available Call (415)467-5285.)

California Lichen Society (CALS)

Lichen Walks:

Dec. 17, 2000: Beginner Lichen Walk, San Bruno Mt. CA. co-sponsored by Native Plant Society and Friends of San Bruno Mountain. Mikki McGee will lead the walk. Meet at the Bank of America Parking lot, Bayshore and Old County Road, Brisbane, at 10 A.M.. An easy walk.

January 27, 2001: Sweeney Ridge Lichen Walk. Janet Doell will lead a walk on the Sea Bluff called Sweeney Ridge, starting from Student Parking Lot #2, Skyline College, San Bruno CA. at 10 A.M. This is a very scenic and lichen rich walk, involving a steep ravine descent and ascent, both ways, with stairs. To reserve place call Janet Doell (510)-236-0489.

Lecture Series 2001

Held at UC Berkeley Life Sci. Bldg., Herbarium Room 1001 (basement) 7:00 P.M.

Wed. Feb. 21, 2001: "The Secret Life of Mushrooms." Mike Bloom of MSSF on what mushrooms really are.

Tues. Mar. 20, 2001: "Different Oaks Like Different Folks." Charis Bratt of CALS on varying flora of lichens on differing oak trees.

Wed., Apr. 25, 2001; "Lichen Close-Up." Richard Doell on "how to's" of Lichen Photography.

"Whatever it is, it's very, very little."

Calendar

2000 —

December ~~14~~ 13, 2000 - ***Holiday Party !!***
at the Randall Museum

Bring a microscopical show-and-tell to share with other members.
Refreshments will be served.

2001 —

January 10, 2001: ***Beginner Focus: Mounting Specimens for the Microscope.***

This session will be devoted to helping beginners. The prime focus will be making mountings that work. Samples will include things on and in the clothing you wear to the meeting. These are good objects on which to begin mounting practice. Bring your own microscope and illuminator, if you have one, hand lens, slides and cover slips, forceps, and eyedropper. Mounting media and other supplies as necessary will be available. The evening will conclude with a little exercise in forensic detective work – so wear your best detective clothes.

February 13, 2001: ***Beginner Focus: Selecting the Microscope.***

This session will also be devoted to helping beginners. The prime focus will be the criteria for selecting microscopes, and the sources of good and inexpensive instruments that will fit your needs. Help with setting up microscopes you already have will also be available.

March 14, 2001: To be announced.

April 11, 2001: To be announced.

May 5 (tentative) - Microscopic arrangements

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