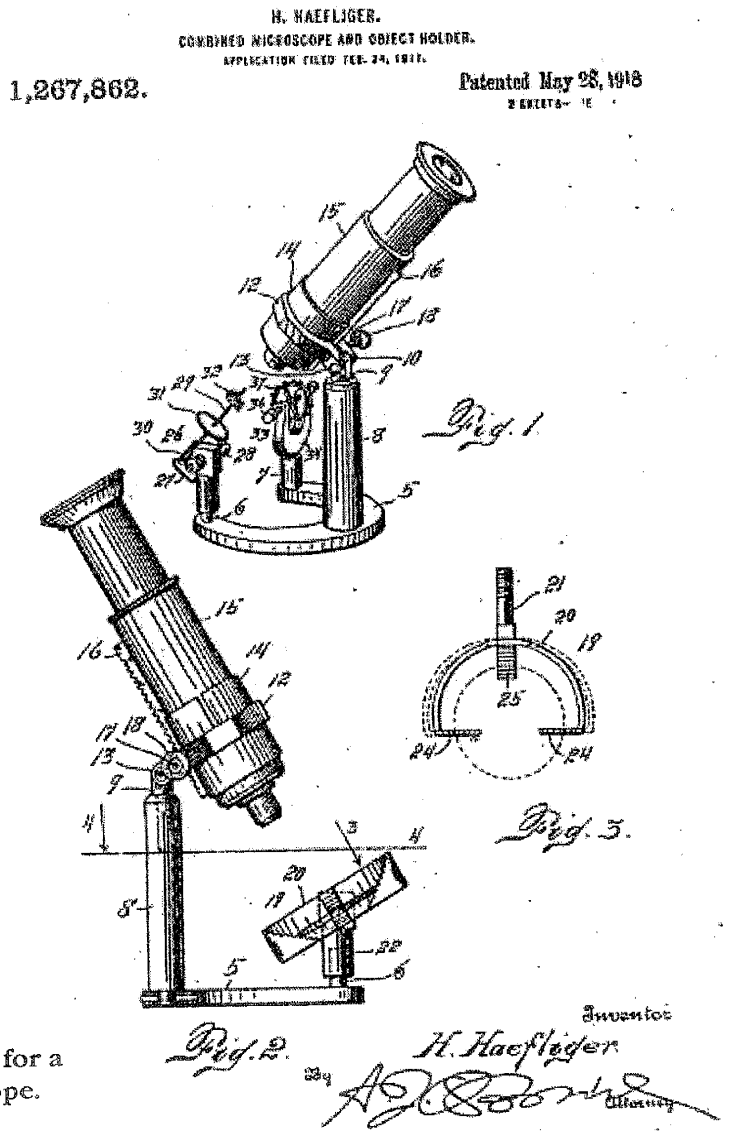
Journal of
THE MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA
Volume 3 Number 9 September 1998

A Watchmaker's Microscope

Herbert A. Gold


H. HAEFLIGER.
COMBINED MICROSCOPE AND OBJECT HOLDER.
APPLICATION FILED FEB. 24, 1917.

1,267,862. Patented May 28, 1918

Fig. 1.

Fig. 3.

Fig. 2.

Inventor
H. Haefliger

Fig. 1. Patent drawings for a watchmaker's microscope.

The family name, Haefliger, is not well represented in the world of Swiss watchmaking[1]. However, at the turn of this Century, one of the clan found Denver, Colorado as the place to ply the watchmaker's trade. He was Herman Haefliger, a Swiss citizen, who was living and working in Denver around 1917. While doing so he perceived a major inconvenience plaguing the artisans of his day. In his words, "Heretofore, so far as I am aware, it has been customary for jewelers to hold a magnifying glass in front of one eye and the article to be examined or repaired with one hand, whereby the operator never has more than one hand free while inspecting an article, and also every time he moves his head the range of vision is changed."

Fortunately for us, Herman was absent on the day the use of the eye-loupe was demonstrated in his Swiss watchmaking class. The use of this device had been standard operating procedure for Swiss watchmakers since at least the 16th Century. Unbound by tradition he went on to invent the *Combined Microscope and Object Holder* as embodied in United States Patent Number 1,267,862 of May 28, 1918. Please see the patent drawing in Figure 1.

Herman describes the construction of his device in deathless Swiss[2] prose suitably circumlocuted[3] for the benefit of the U.S. patent examiners as follows:

> "My construction briefly stated [there's an exaggeration] comprises a curved base plate upon the extremities of which holders of various types are adapted to be adjustably mounted and these holders are so constructed that the articles which they are adapted to support can be adjusted to various positions upon the same. Also mounted upon the base plate intermediate the extremities of the latter is a post upon which is adjustably supported a microscope and the arrangement of the said microscope with relation to the holders is such that the said elements coöperate to allow a most thorough and efficient examination of the article and at the same time render the latter most accessible for repairing purposes."

I guess May 28 was a slow day at the Patent Office. While hardly a brilliant innovation, it is a nice tool. Look at the holder with the numbers 20 - 24 in the patent's figures 2 and 3. The close-up in my photo, figure 3, probably best shows the detail. The steps in the ring are designed to very nicely hold various sizes of round watch movements. The U-shaped holder, numbers 34-37 in patent figure 1 holds a balance wheel for closer examination.

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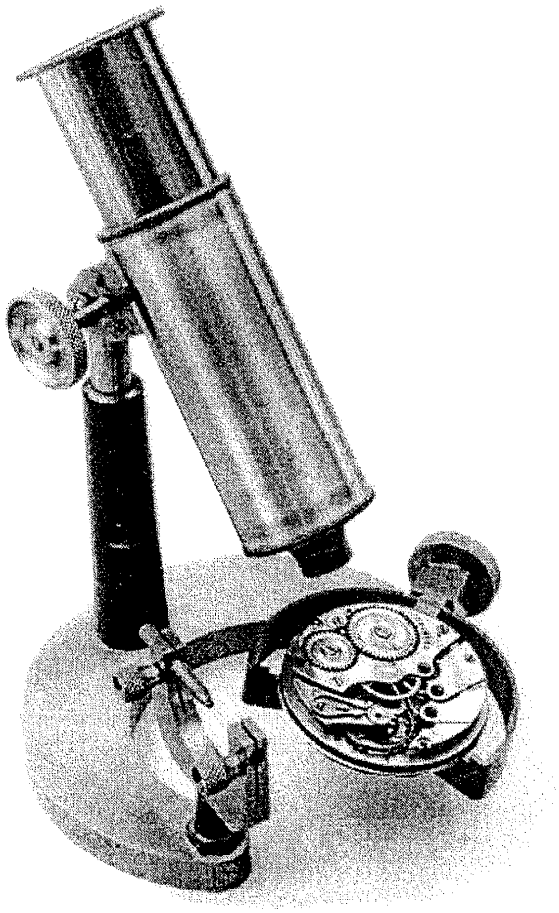


Fig. 2. Haefliger's microscope holding a pocket watch movement for examination.

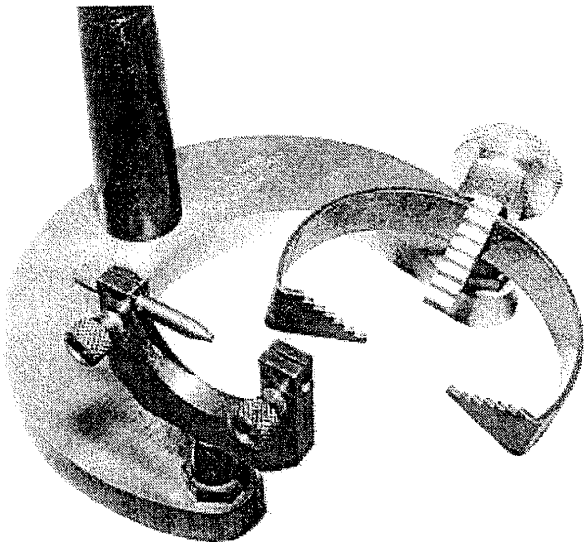


Fig. 3. Close-up showing holders for watch movement and balance wheel.

I rescued this specimen of Haefliger's handiwork from the horological Huns bidding at a New Hampshire auction of clock and watch stuff. It is a very well made little instrument that stands about 6-1/2" from ocular to bench top when fully extended. The brass components, that's most of the instrument, are still nicely lacquered. Focusing, both coarse and fine, is managed by a single rack and pinion.

The base plate is engraved, "PAT. MAY 28 - 18", "OTHER PATS PNDG.," "MADE IN U.S.", "WATCHMAKERS DOCUMENT." Intrigued by the possibility that Herman might have other interesting patents, I searched the U.S. indices from 1900 to 1925 and found only one entry for our hero. On July 20, 1920 he was granted a patent for a balance wheel pivot straightener. Nothing microscopical here, but it was noted that by then he had moved on to North Platte, Nebraska. Perhaps he found the wheat farmers of Nebraska more interested in his inventiveness than the silver miners of Colorado. I am at a total loss to explain the "WATCHMAKERS DOCUMENT" inscription.

We can't end a microscope article without some comment on the instrument's optics. I'd estimate the magnification to be somewhere between 10x and 15x. The ocular and objective screw in and are easily removable. I doubt that interchangability was on anyone's mind as the lenses are of a non-standard size and there is the matter of the fixed inverter lens in the tube. The field of view is bright, flat and surprisingly free of visible aberrations. The supplier of these optics knew what he was about.

Even today, the majority of watchmakers rely exclusively on an eye loupe for their magnification needs. Serious craftsmen, however, will have a stereoscopic 20x binocular microscope near at hand as well. It's apparent that Haefliger hoped to supply that more enlightened worker of his day.

[1] Pritchard, K., *Swiss Timepiece Makers 1775-1975*, Phoenix Publishing, 1997.
[2] I know Swiss is not a language even though our former Vice-president thought Latin was the language of Latin America.
[3] "Eschew obfuscation!" That's my motto.

POWELL & LEALAND "IMPROVED" LARGE FIRST CLASS MICROSCOPE

Barry J. Sobel

Stands of the English firm of Powell and Lealand are regarded by many as the finest microscopes of all time. This firm produced microscopes of the highest quality. The fact that they were actually used as such until as late as the mid twentieth century attests to their excellence.

Recently the author was fortunate to obtain an important instrument by this firm. It is dated 1856. Signed "Powell & Lealand 4 Seymour Place Euston Square London 1856." Minimum height is 39 cm with eyepiece. Accessories include 6 P & L objectives, one eyepiece, and a (later) substage chromatic oil immersion condenser. This is one of the earliest examples of this version of a larger P & L, larger than the original model* and smaller than the later number 1. Although not a number 2, the microscope pictured here is clearly the prototype for that much later instrument. This instrument differs from the later number 2 in that the housing for the triangular bar is a 2-tier round housing. It differs from the earlier first class instrument*, in that it is much larger, has a different, larger foot, and the 2-tier housing for the triangular bar is found on some but not on other examples of the original "number 3." It also differs in that the stage has a manually rotatable motion in addition to the horizontal and vertical motions of the Turrell mechanical stage. The back top of the foot is also unlike most number threes, being a smooth thicker and continuous curve much like the later Number 1 and Number 2. Another unusual feature was the rectangular bottom of the feet, present on the microscopes from 1853 to about 1860; following that, rectangular feet were found only on the number 1 and number 2 stands. The number three had rounded feet and the first class microscope prior to 1853 also had rounded feet. This stand also has a double articulated extendable mirror, another feature not seen on earlier examples.

According to Nelson's classic paper on P&L stands, a stand introduced in 1851 had some features similar to the example depicted here, but the substage attached to the stage directly; he also notes that Thomas Powell had in his possession one of that type (i.e. substage attached to stage) dated 1855. Since the example here has a separate substage assembly attached to the tailpiece, and is dated 1856, it may be that was the first year this model was produced. Another example dated 1858 was sold by Sotheby's in March of 1996. This instrument was first described (without an illustration) in the first edition of *The Microscope and its Revelations* by Carpenter in 1856, the same date as this stand. An example dated 1857 is number 30 on page 42 of *Microscopes from the Frank Collection*. Another example, dated 1855, which belonged to Lionel S. Beale is in the collection of the Royal Microscopical Society (number 123, page 132).

*This model is similar to the later number three, but this an inappropriate use of the term since it was the only model made at the time and was regarded as the firm's best first class stand.

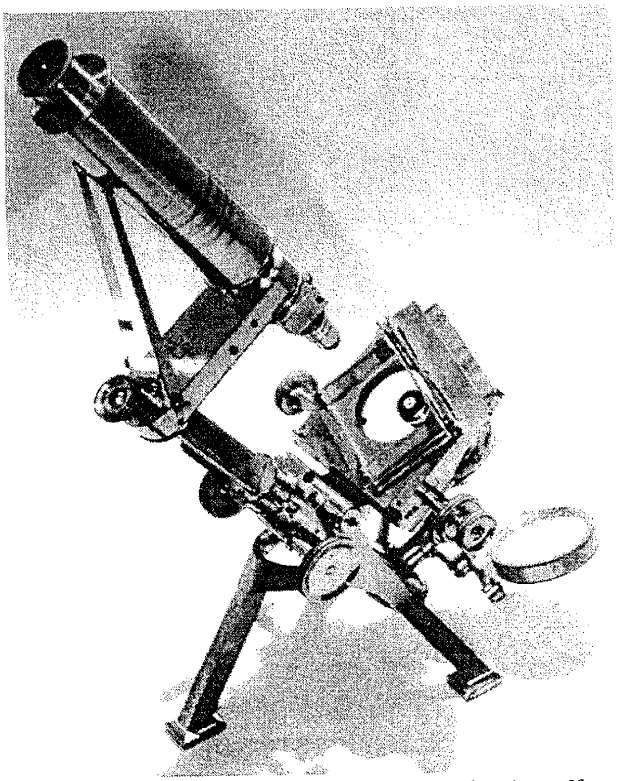
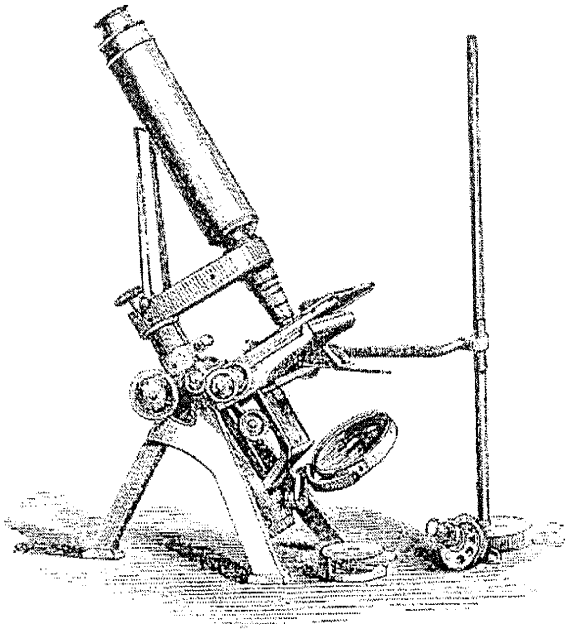


Fig. 1: Powell & Lealand's "Improved" First Class Microscope from 1856. Note the different foot, a rack & pinion substage and other unique features as described.



Powell and Lealand's Microscope, with Amici prism, arranged for the oblique illumination of test-objects.

Fig. 2: Illustration from Hogg, 1859.

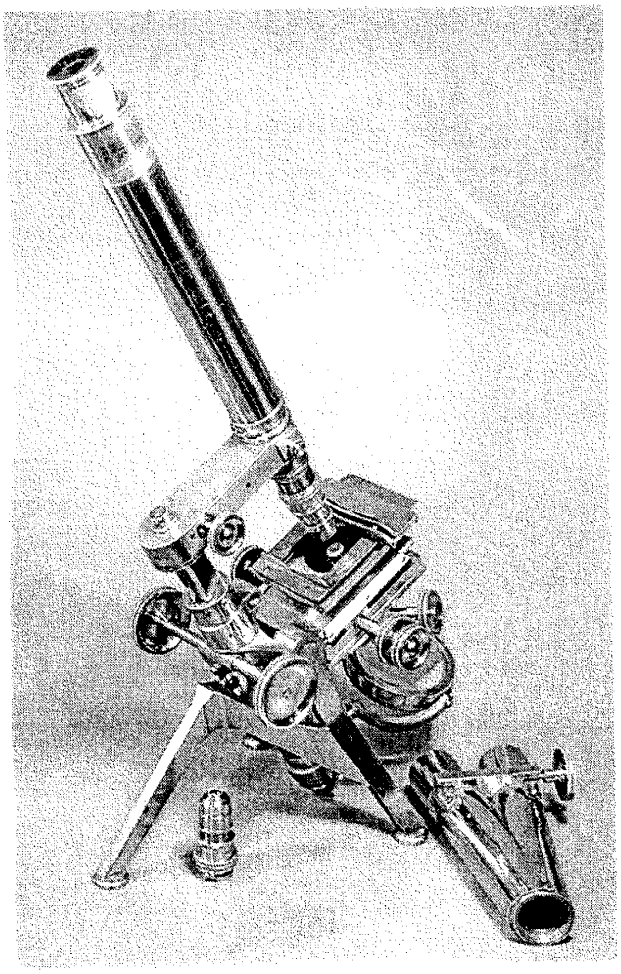


Fig. 3: The original model of P&L stand dated 1846. Note in particular the construction and features of the foot and the absence of a focusable substage.

The author would like to thank fellow members Budd La Rue and James Solliday for their helpful advice and additional information contained in this article.

References:

1) Hogg, J: *The Microscope, Its History, Construction, and Applications,* 3rd ed. Routledge, Warnes, Routledge, London. 1859. pages 64-67.

2) LaRue B: The Powell and Lealand Number Three Microscope. *Microscopy.* Vol 36. July-Dec, 1990.

3)Nelson EM: The Microscopes of Powell, Ross, and Smith. I. Hugh Powell's Microscopes. *J Royal Microscopical Society 1900;*282-297.

4)Catalog: *Good Clocks, Watches, Wristwatches, Barometers, Mechanical Musical Instruments and Instruments of Science and Technology.* Sotheby's, London. March 1996 (Lot 565) page147.

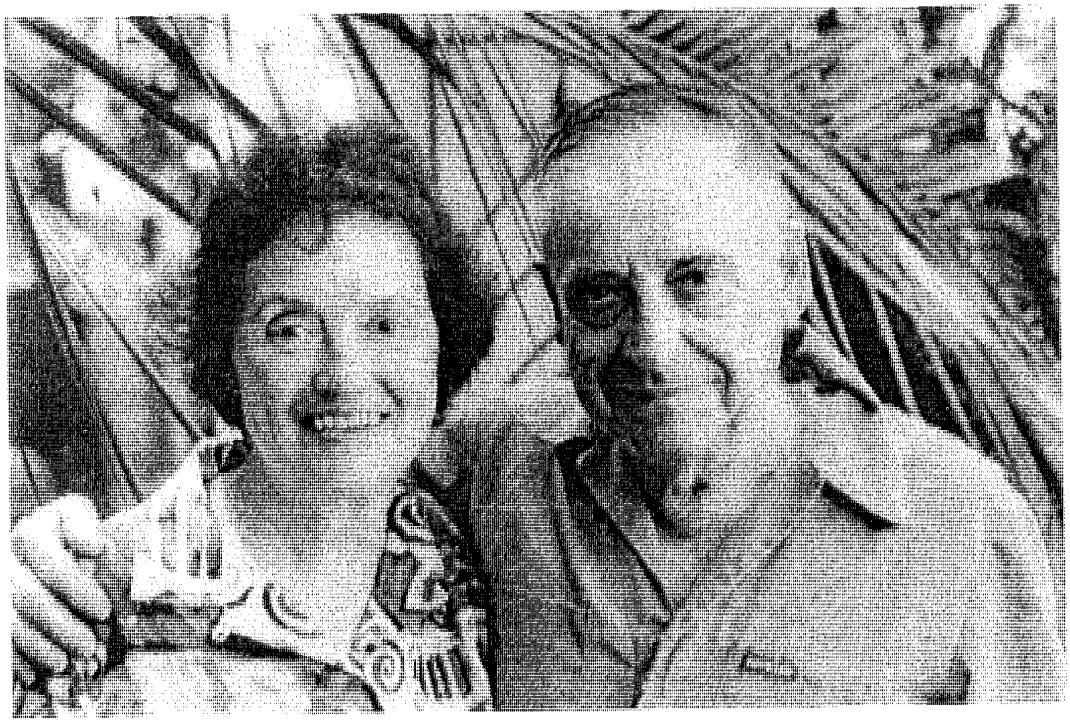
5)Turner G L: *The Great Age of the Microscope.* Adam Hilger. Bristol and New York. 1989. Page 132.

6)Nuthall RH: *Microscopes from the Frank Collection.* A Frank. Jersey. 1979. page 42.

7) La Rue B: The Powell and Lealand Number Two Microscope. *Bulletin of the Scientific Instrument Society.* 1989. Vol 23, 7-8.

Member Profile

Dario Solares



Dario & Maria 1998

I was born in Argentina on December 22, 1919. I was just a good student in primary and elementary school, but I became inspired in secondary school. I had taken a test for the Otto Krause industrial school, which was modeled on schools in Germany. I was surprised that I failed the test due to poor math scores, which was my strong subject. My parents then sent me to a private Catholic school, which had very high scholastic standards. The classes consisted of theoretical lectures in the mornings with practical workshops in the afternoon. The cost of the school was high for my parents and the priests agreed to lower the tuition by 30% if I did well. Along with this incentive and the fact that the priests encouraged and stimulated learning, I made great progress. I did well enough that I was able to enter the free Otto Krause School for the second year.

In that year, the mathematics class instructor, a former principal of the school, sent me to the blackboard to simplify an algebraic equation. I asked him if he wanted me to write down the intermediate steps, or to just write down the final answer. He was surprised that I could do this until he learned that I had been in the Catholic school. He said, ah yes, the standards are higher there than in the state school.

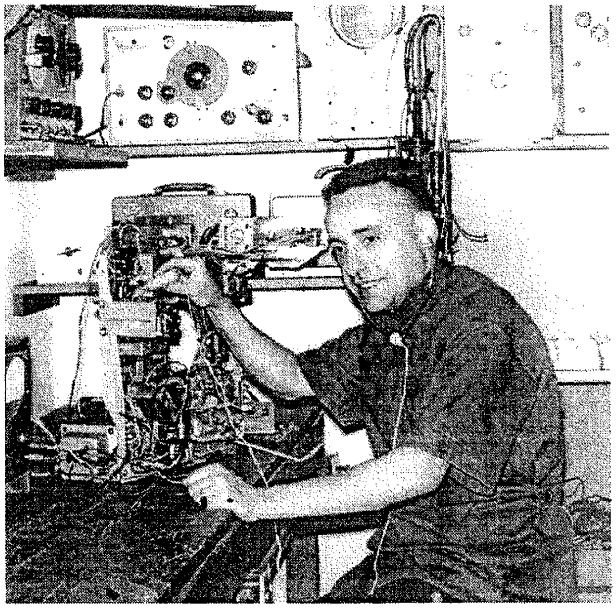
In high school, we learned calculus through triple integration. All students took the same course work, during the first two years, but in the last two years we could specialize in mechanics, electricity, construction or chemistry.

After graduating in electricity, six of us graduates took a qualifying test for two jobs that were available with the Telephone Company. I had the highest grade and was hired. I started in the drafting department and after six months was transferred to switching equipment and later to the design of exterior systems. After ten years with the company, I was promoted to supervisor of design for all the exterior plant of the company for the northern half of Argentina.

I met Maria, my wife to be, in 1941, walking on the street at a masked Masquerade carnival. She was dressed in gypsy costume and I was a Cuban musician. According to her strict Spanish family custom, I had to ask her father and mother for permission to visit her two evenings a week. We were married in 1943 when she reached her 20th birthday. We have a son, Carlos, daughter, Ana Maria, and a grandson, Ricky,

Mar del Plata 1933

Fencing 1945



Electronics shop 1960

who is 21. We celebrated our 50th Anniversary 5 years ago.

While I worked for the Telephone Company, I continued to take classes in telephony engineering. At the end of 17 years with the company, I decided to leave. This was a bold decision because in three more years I could have retired with 60 percent of my base salary. I went to the Zenith Company when they opened an assembly plant for B & W television sets, and where the general manager had been one of my instructors. I was put in charge of final inspection. After four months, I was disappointed with conditions there, so left to open my own small shop where, between 1957 and 1964, I not only repaired TV sets and other electronic equipment, but also assembled and sold TV sets from kits imported from the U.S.

There were many problems with running my business in Argentina. The Telephone Company was in chaos, and in seven years that I had the shop, I was never able to get a telephone in my business address. Another problem was the inferior quality of the vacuum tubes that I was able to buy. Also, I had a fundamental problem with life in Argentina. From my Italian ancestry, I inherited an explosive temper which was not helped by my tendency to see everything as black or white. This was often not compatible with the easygoing attitude in Argentina.

As a result of these frustrations and wishing for a better future for my children (my son was near graduating from high school) I applied for an immigration visa at the U.S. consulate in 1962. My mother was so devastated by the thought of my leaving that I put it off for a while. Finally, fed up, I went back to the Consulate in 1963, where I found the same official who very kindly reinstated my immigration papers. So, in April of 1964, I came alone to the U.S. leaving my wife with the difficult task of selling all our possessions. This was especially difficult, as since everyone knew that she was forced to sell, they were not willing to pay much for anything.

I took a test at Lear Siegler for a technician position where, in spite of my weak English, I received the highest grade and was paid the highest wage of the 13 technicians. It was an exciting time, installing decoder boxes in customer's homes to connect them to a central station for cable TV service. I often worked more than 12 hours a day, along with a companion who was also my English translator. This job ended when Siegler lost its temporary FCC permit and laid everyone off. Now I was in desperate straits; I was 45 years old, my family had arrived from Argentina, and I had no job. I worked at whatever I could, including repairing B & W TVs and painting houses. I began repairing rejected B&W portable TVs for Warwick Electronics that manufactured sets for Sears Roebuck. Then the company decided to start a new plant to assemble color sets. They instituted a review of B & W technology and I was able to teach a course in sync separation and AGC circuits; because of my previous experience in Argentina, I was able to give confident presentations that won me respect and promotion to the laboratory for signals and calibration. This job ended when the company moved that work to Tijuana and I was transferred to the musical organ engineering department.

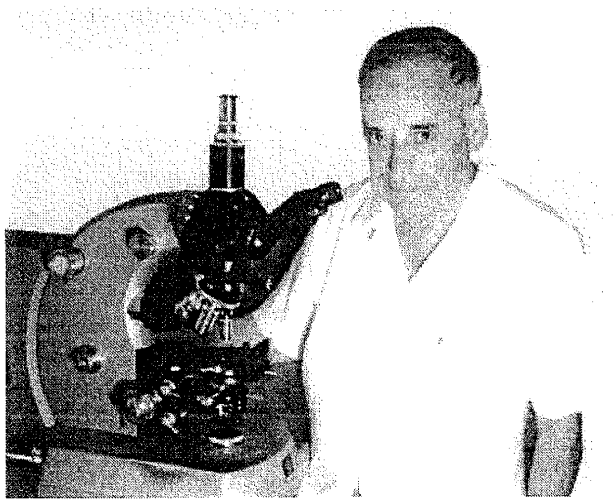
My last job was with Western (eventually Delta) Airlines, a fine company, where I stayed 14 years working in instrument repair.

I have many hobbies and interests. In my youth, I was

Just before leaving Argentina 1964. With Son Carlos, Wife, Maria, and Daughter Ana Maria.

an avid fencer, studying foil, epee and saber with two teachers who were on the 1928 Olympic team. I now play golf and practice archery with a 150-lb. crossbow and a 75-pound compound bow at our mountain lodge near Gorman. I am also interested in guns. I continue to take classes every semester at the Santa Monica City College and am probably their oldest regular student. Last semester I studied microbiology.

One of the items that my wife had to sell in Argentina was a microscope that I had constructed when we were first married. I carved the brass casting mold from wood and then machined the rest myself. In 1966, in the U.S., I bought a Spencer biological microscope and now I have several other microscopes including a well equipped Zeiss Photo 1 with video attachments and

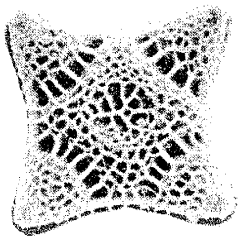


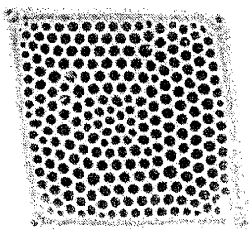
At home with my Zeiss microscope. 1998.

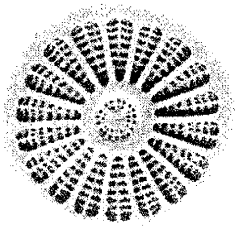
other accessories that I have constructed for my laboratory and darkroom.

My wife, Maria, is also very active. She is a fine oil painter, and goes to yoga and gymnastic classes three times a week. She was a bulwark through the early difficult years in the U.S. Her determination is exemplified by her secretly arranging for driving lessons after my attempts to teach her left her in tears. She had the driving school pick her up at work and drop her off on a corner near home. After one week of lessons, she passed the driving test with flying colors.

When I was young, I wanted to be a doctor. From my life's experiences, I made up the following story. I was walking on the street when an old man fell on the sidewalk. I helped him and he then revealed that he was God and he wished to reward me. I said "please make me a doctor." God said, "no, you do not want to be a doctor, that job is all hard work, with low pay and little respect for what you do." I replied "no matter what it takes, I still want to be a doctor because I want to help someone in his or her life and contribute to the world." God took a notebook out of his pocket, consulted it, and said, "too bad, but the doctor quota is full." I looked crestfallen, so God told me that he had another profession that was just as difficult, just as valuable and had the same humble rewards as being a doctor. God said "you will be a father," and that is what I am today.







Queckett Dissecting Microscope

Leon Stabinsky

Prior to going to London to attend the Scientific Instrument Fair, I have made it a practice to call upon several instrument dealers who exhibit at the fair. I normally do this to avoid returning home empty handed (very unlikely) and to have first choice in selection. One of the dealers I called on this year was Desmond Squire, who e-mailed me several photographs of a rather odd dissecting field microscope which I liked and so told him that I would pick it up when I arrived in London.

When I returned home to California, I found, with the help of Dr. Barry Sobel, that I had acquired an early form of the dissecting microscope that was invented by Professor John Queckett,a histologist and famous microscopist, for whom the Queckett Microscopical Club was named. We have dated this model to the second quarter of the nineteenth century.

My microscope shown in Figs. 1 and 2 consists of a base piece of fine mahogany 14cm x 9cm x 2.5 cm. Two overlapping hinged covers pivot open to reveal recessed compartments that contain two eyepieces, a brass tube with a right angle extension to hold the eyepieces and other accessories. A square brass plate is provided as a dissecting surface. By inverting the assembly, the unfolded covers form legs to support what becomes a dissecting table. The brass tube is inserted into a hole in the top of the block and a bar is inserted into the tube underneath to make a focusing lever. Some of the later examples of the design had more complex focusing methods and included a mirror.

Although the wonderfully elegant and clever design was made by several manufacturers, examples are now rare because of the perishable wood construction.

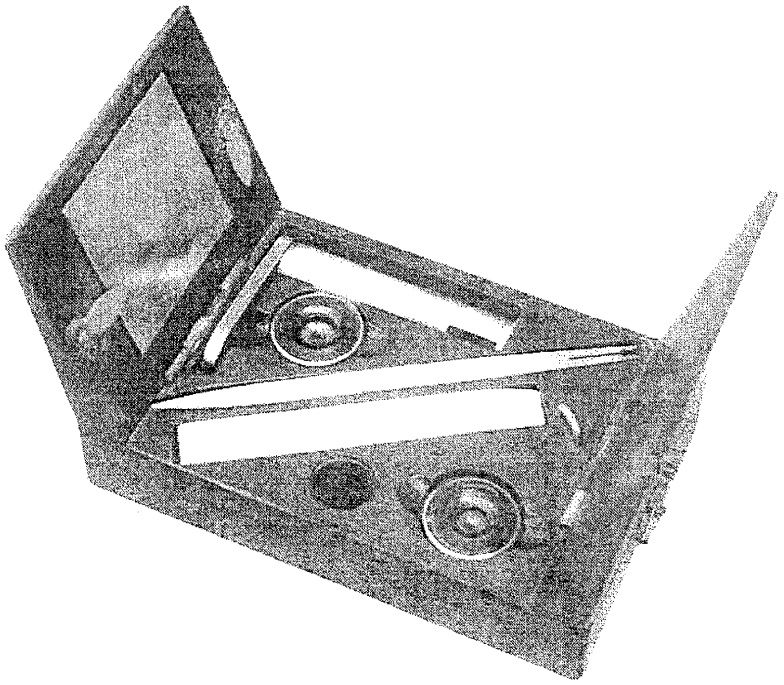


Fig 1. Open covers, showing recessed compartments holding focus lever, lenses and other accessories.

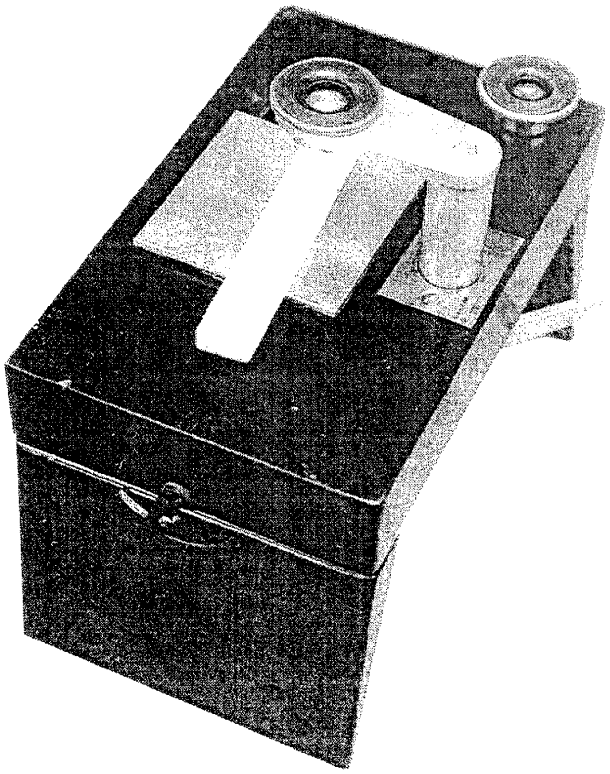
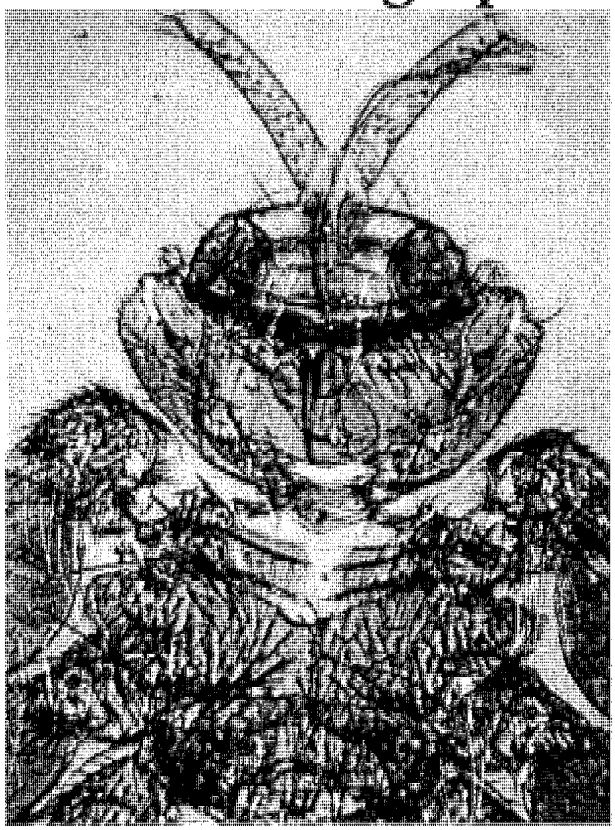
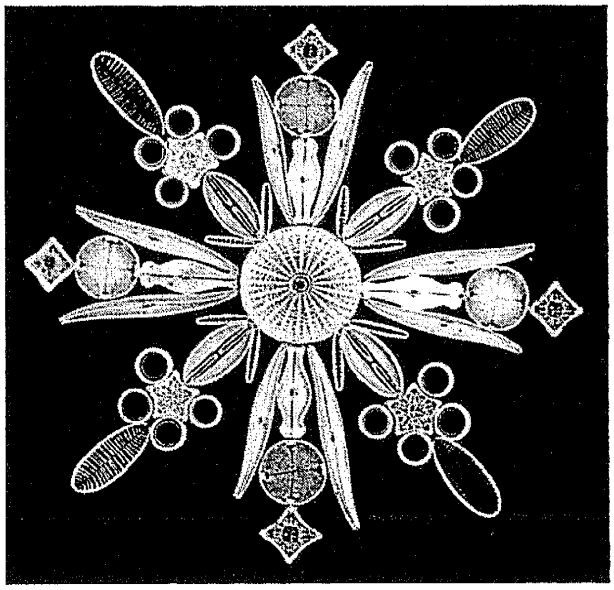


Fig 2. Inverted for use, with slab legs folded down and lens in place.

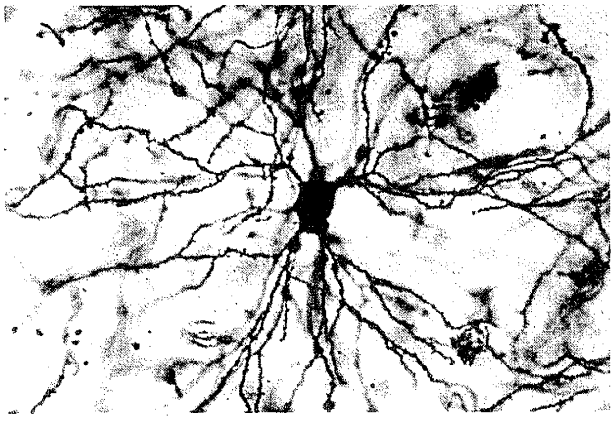
Some Photographs from the MSSC Show



Larry Albright



Leo Milan



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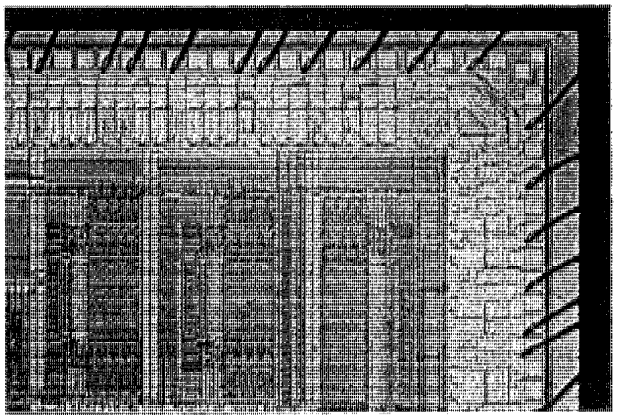
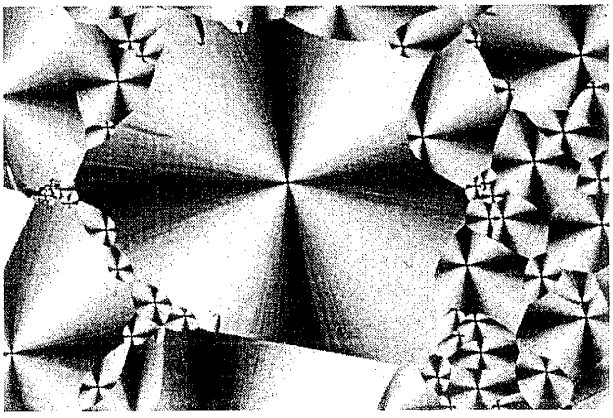


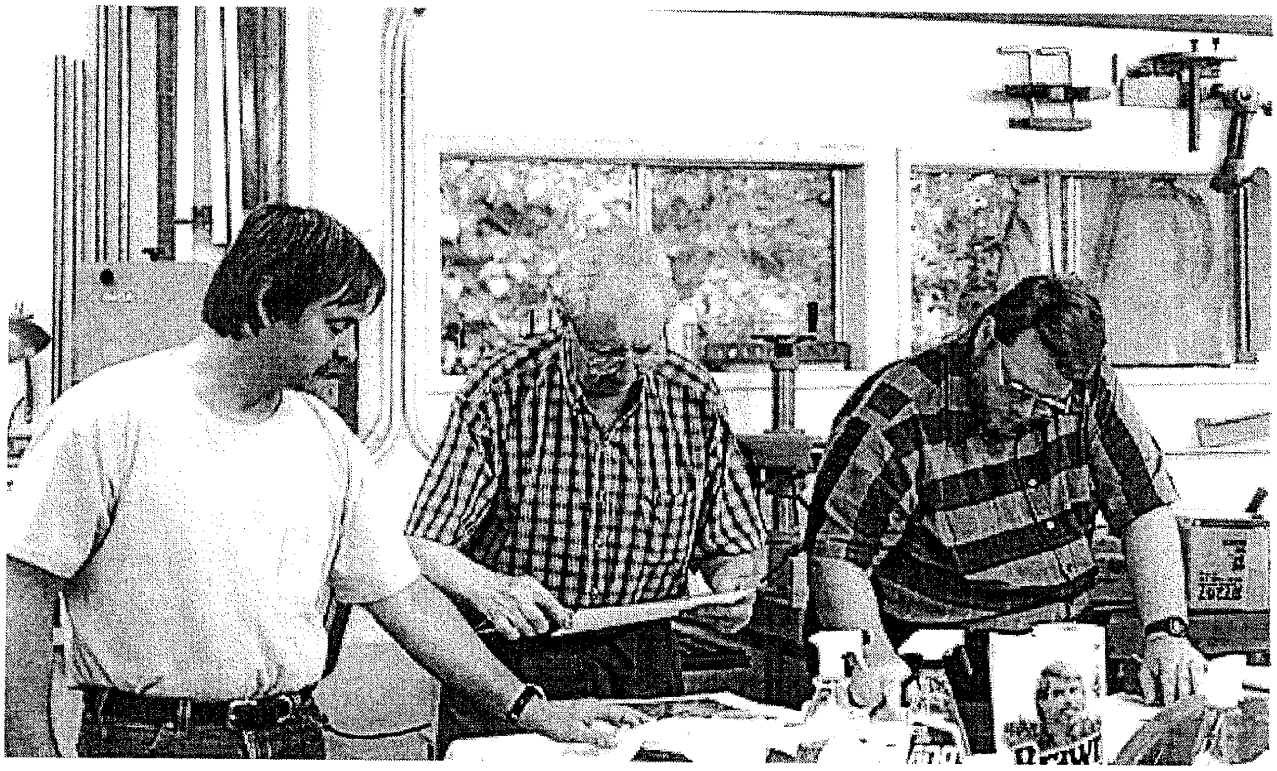
Ron Morris



Jim Solliday

George Vitt

Framing Photographs for the MSSC Art Show at Ernie Meadows' Workshop



Jim Solliday, George Vitt and Ron Morris.

Steve Craig, Jim Solliday, Phil Lohmann, Ken Gregory and Larry Albright.

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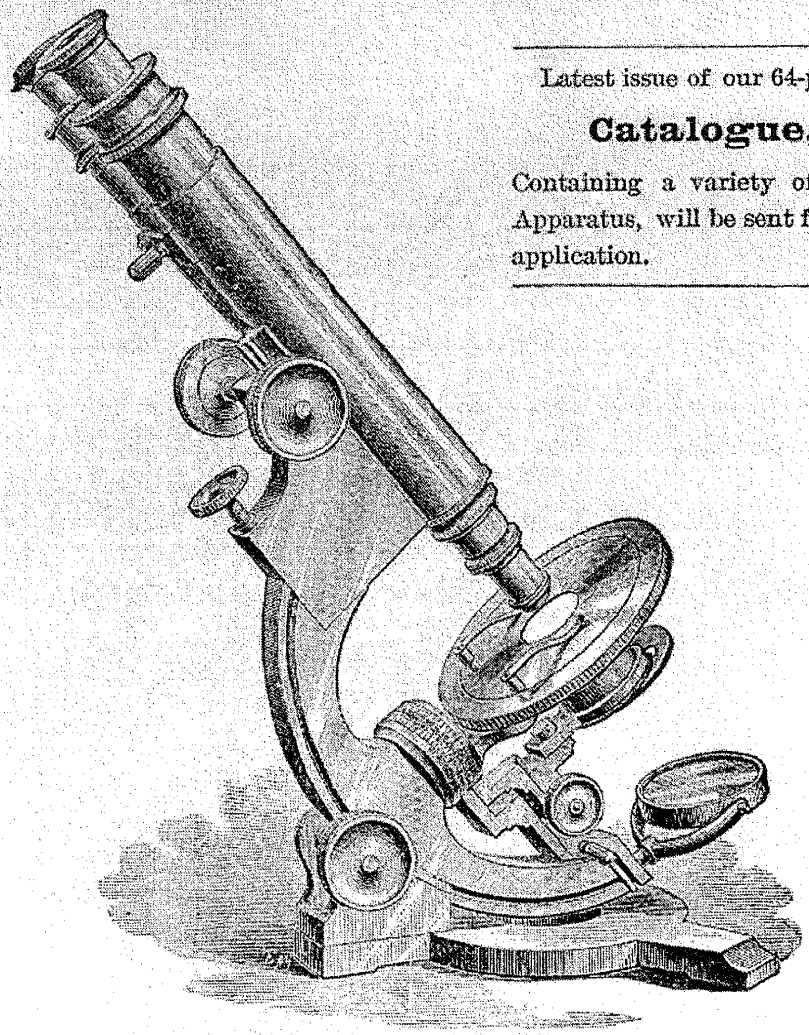

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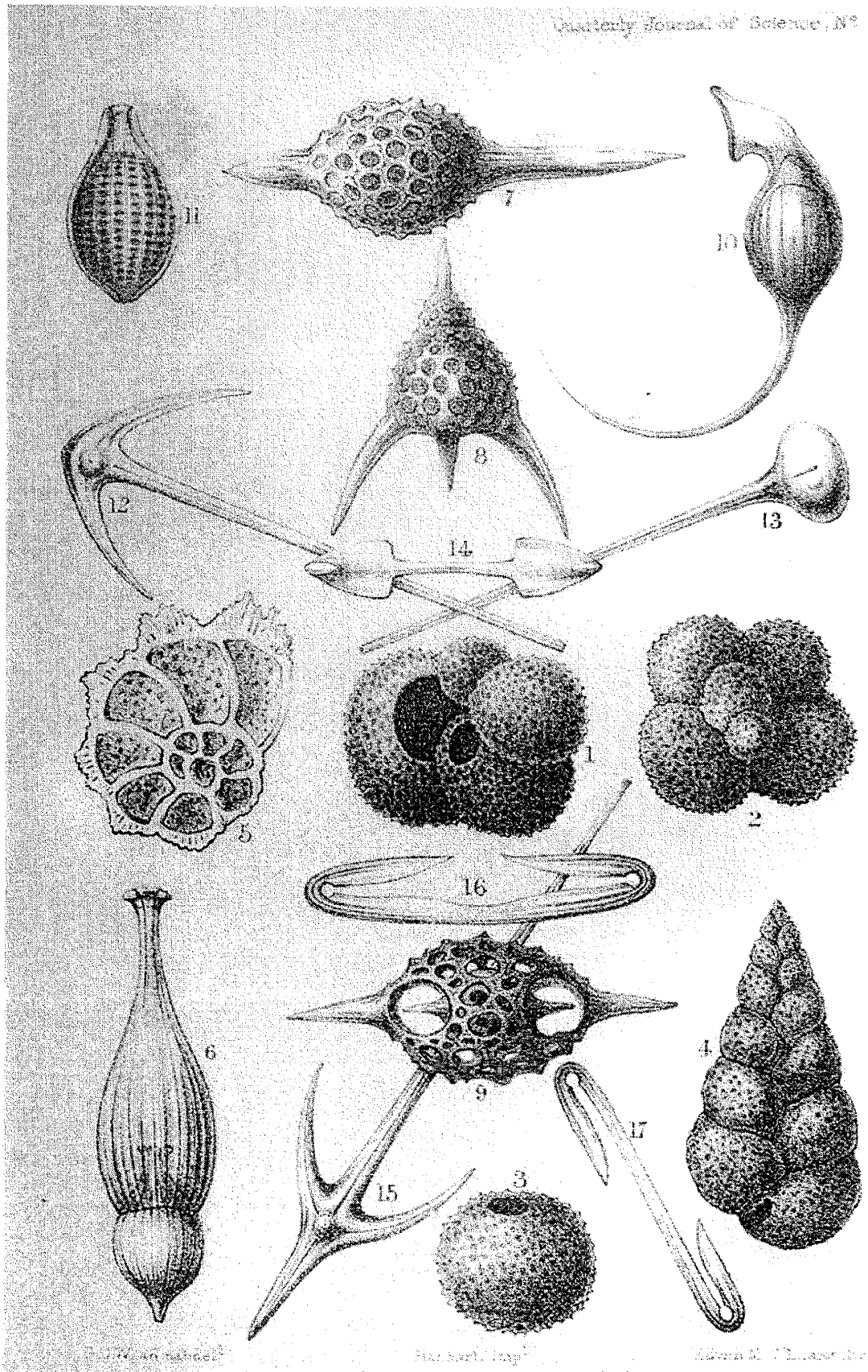


From the 1864 Edition of the Quarterly Journal of Science. Volume 1. London. Edited by James Samuelson and William Crookes, F.R.S. Courtesy of Alan deHaas

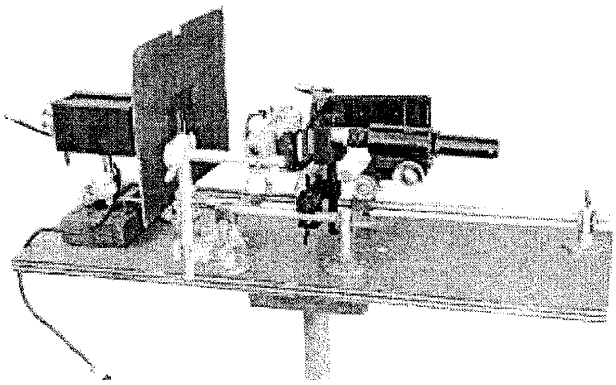
WORKSHOP of the Microscopical Society of Southern California

by: **George G. Vitt, Jr.**
Date: **Saturday, 1 August 1998**
Location: **Steve Craig's Lab.**

1. **Steve Craig** reminded us that MSSC has for loan a cased Spencer monocular student-type microscope which is in excellent condition.

2. **George Vitt** brought the 35mm color photomicrograph slides that had been chosen to make prints for exhibition at the Palos Verdes Art Center during Sept. 1998. Members retrieved the slides they had contributed.

3. **Richard Jefts** showed and described an apparatus he had designed and constructed for the purpose of making microphotographs. It is of an adjustable optical bench configuration and required considerable imagination, ingenuity and improvisation (see illustration). Richard photographed 35mm color slides, at a desired de-magnification onto high resolution film held in a cleverly focusable 35mm SLR camera. He showed some examples of his results which we viewed with a hand-held magnifier.



Microphotographic apparatus constructed by Richard Jefts.

4. **Jim Solliday** gave a complete and detailed report on the procedures being followed, including a breakdown of all costs involved, and the work remaining to be done in preparation for our photomicrographic exhibition at the Palos Verdes Art Center. Among other information, he gave detailed schedules and the possibility of car-pooling for the work team.

Jim then displayed and described a cased and signed Cary microscope c.1870-80, which included a pointer eyepiece, frog plate and slides. He then showed a c.1820 Cary compendium, or Gould-type, portable microscope which mounts on the case cover and is free-standing. He stated that Gould made short tube microscopes which were optically equivalent to the long tube types and that composite multi-objectives were fitted on top of the arm for changing magnification.

5. **Barry Sobel** gave a history of the Carys (John & William) who originated the pocket microscope trade, and pioneered in the use of achromatic objective lenses. He showed a Cary microscope and two boxes of Gould slides which also contained slides used as test objects during that period, pointing out that diatoms were not then used as test objects. The microscope had a half-yoke holding the substage mirror which has the Varley/Hugh Powell ball & socket holding arrangement. Barry then displayed a mechanical device he uses for manually tapping small holes in metal, which assures that the tap is properly aligned with the workpiece and that the possibility of taps being broken is minimized. He stated that the unit is available with a set of collets for $300-400 from Marshall Tools Co. There followed a general discussion on tapping techniques.

6. **Leon Stabinsky** showed a miniature microscope, the Leitz "minor-microscope," Model #1, c.1925. Fine focus was by a screw collar around the body tube. It folds very compactly and has a maximum magnification of 250X.

7. **Dave Hirsch** described an RAF "escape compass," and showed a replica microscope that he had made.

8. **Ken Gregory** showed a cased R&J Beck microscope, c.1920-30, on the tube of which is engraved "LSHTM" (London School of Tropical Medicine). The microscope is supplied with three objectives, the longest being 50mm! Its dovetail arrangement for mounting the condenser had been first introduced by Beck. Ken had gotten the microscope through an ebay Internet auction.

9. **Stuart Warter** showed a French microscope by Raspail, c.1825. It is a box mounted portable simple microscope developed on the Ellis aquatic microscope pattern, but differing in several ways, making it more usable for dissections, histological work, and other "nonaquatic" uses. The lens is driven in and out by a knurled thumbscrew for more precise control, although it swings freely from side to side on its arm; the large immovable dovetail-mounted round stage has a solid glass top over a black disc with a central aperture, below which is a large mirror; focusing is by rack and pinion, and the entire instrument disassembles and packs with its accessories into a drawer which slides into the box; the drawer is accessable at all times during use of the assembled instrument. It was designed in 1825 by the famous French scientist - physician - politician Francois Vincent Raspail. It proved very popular in France and was made over a period of many years by several manufacturers, although it failed to compete successfully with the popular Cary type microscopes in English dominated markets.

10. **Izzy Lieberman** had just returned from a trip to Scandinavia. He described the Tycho Brahe statue he saw there and then described a "microtome cheese cutter." Izzy then exhibited a 1-ft. diameter astronomical clock sold in the 1960s by the Edmund Scientific Co. in New Jersey.

11. **Gaylord Moss** described his impressions of the "Exploratorium" in San Francisco, which he visited two weeks previous, and which he highly recommended. There was a general discussion on the scientific exhibits there. Steve Craig described the exhibit showing the effect on biological magnetic sensors in the presence of a strong magnetic field.

12. **Leo Milan** exhibited a flashlight-like pointer and showed the book, *Diatoms in Polar Regions*.

13. **Chris Brunt** reported on his progress in the design and construction of a sensitive log-response (6 decades!), highly accurate digitally controlled (32 bits) photometer of his very original and complex design. We all look forward eagerly to the time that this useful instrument will become available in kit form to members of MSSC.

14. **Dario Solares** described his method of keeping bacteria cultures in petri dishes at the correct temperature while on the stage of a stereo microscope as he records with a video camera attached to an eyepiece. He uses a glass dome and a circular controlled heating element.

15. **Jim Clark** reported on his recent trip to Europe where he visited Paris, Normandy and Interlaken, Switzerland. He described the Mueller Machine Co., makers of super-precision machine tools.

16. **Ed Jones**, who specializes in every conceivable sort of micro-object, described his method of making glass microspheres in various colors for his extensive micro-object collection. He described the many problems involved in conventional methods of making small spheres - such as drawing capillaries, and the fact that the color vanishes if the piece is overheated. Ed's method to obviate all these problems is simple, but not at all obvious. He holds the micro-chip of colored glass lightly with fine tipped stainless steel forceps and heats it gently in an alcohol burner flame. The instant the glass softens, the great surface tension instantly forces the now plastic glass to form a sphere which is not significantly distorted by the forceps and retains the color of the original chip due to the minimal temperature involved in the process. Alan deHaas described the possibility of placing the glass chip on a pyrolytic graphite plate and using a micro flame torch. There was a general discussion on the process.

17. **John deHaas** described a method he has been using to determine the dimensions of certain types of depressions and elevations on a surface being examined under a microscope. He stated that the method had been developed by Zeiss many years ago. The specimen surface is illuminated by projecting onto it the image of a fine bright slit, from a known angle, considerably off the vertical. This source is a tungsten lamp which illuminates a slit, which is then imaged by a projection lens onto the specimen, with the microscope axis tilted in the opposite direction off the vertical. The slit image appears to be a straight line on a perfectly flat surface. Surface elevations, especially abrupt ones, are seen as discontinuities in the straightness of this projected bright line. Knowing the geometry of the arrangement, magnification, etc., one can calculate the depth or elevation of many forms of surface irregularities.

18. **Alan deHaas** showed a c.1952 cased Nikon binocular microscope with the rare Nikon illuminator which he had found at the Santa Monica Antique Mall. It was all original and in brand new condition. He then showed a cased pre-WWII Zeiss-Winkel microscope from Erb & Grey. He also exhibited several scientific monographs and had for sale two types of planimeters - one of which is now in the good care of member Herb Gold.

19. **Alan Bishop** donated to MSSC a binocular stereo microscope of Chinese manufacture, which has built-in incident and transmitted illumination. Thanks Alan.

20. **Larry Albright** showed a banknote with an engraved picture of a microscope thereon.

21. **Larry McDavid** showed a German-made glass instrument to determine specific gravity by measuring the volume and weight of the specimen. Unfortunately, the glass stopcock on it was frozen, and many suggestions were offered as to the best method of 'unfreezing' it. Alan deHaas raised the possibility that, with the passage of time, the parts may have 'cold-welded' one to the other, making the removal of the stopper impossible.

22. **Phil Lohmann** said that he is looking for a Dioptometer, so that he can measure the eyesight correction necessary for camera eyepieces.

23. **Ron Morris** told about the Internet sites that feature the Lomo (Russian made) stereo microscope, and gave some addresses.

Some of the presentations were somewhat lengthy, but no matter; they were all instructive, and synergistic. It is the discussions and the informal and relaxed sharing and interchange of information and ideas on all sorts of scientific subjects that makes the MSSC Workshops so popular and well attended. And, of course, the outstanding hospitality of Millie and Steve Craig, our Workshop Chairman, is unsurpassed.

A Simplified Phase Contrast Technique

John deHaas

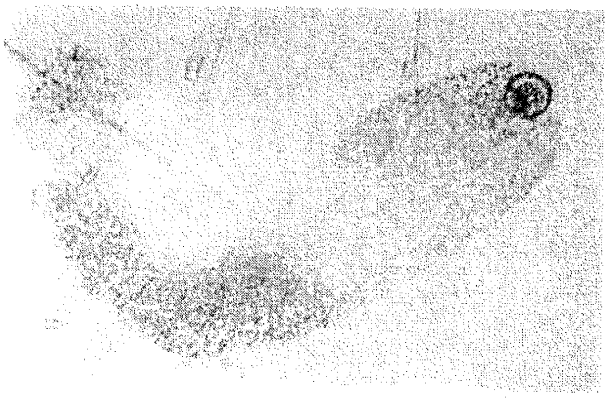


Fig. 1. Amoeba limax photographed with ordinary illumination.

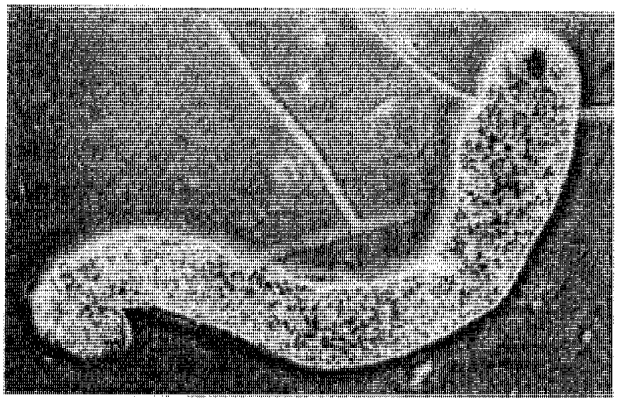


Fig.2. Same specimen as in Figure 1. photographed with the simplified phase contrast technique described in this article.

In 1954, I reported on a simplified phase contrast technique that I had developed with support from a grant from the Pennsylvania Academy of Sciences.[1,2]

Until Zernike's invention of the phase contrast microscope, it was necessary to stain transparent objects to obtain enough light absorption to make them visible under the light microscope.The killing and staining of living materials inevitably changes their structure.

Unfortunately, the cost of phase microscopy equipment is too high for many amateur microscopists. My technique, which approximates a phase viewing system, is very low cost and can be put together in an evening.

The items needed to make the system are:

1. A three-lens substage condenser with the top lens removed.
2. An objective lens, or lenses.
3. A field stop for each lens to be inserted in the filter carrier. Each field stop has to be made from a clear, medium shade of daylight filter, which fits the substage filter carrier.

To make the field stop, paint an opaque spot on the precise center of the the daylight filter. Use an opaque paint so that no light is transmitted through the stop.

The diameter of the required stop depends on the objective used. The stop size for best contrast will have to be found by trial and error. As a guide, the optimum stop sizes for two particular lenses were the following: 7.5 mm diameter for a 4x Leitz objective, N.A. 0.25, and 17mm diameter for a 40x Leitz objective, N.A. 0.65.

The procedure for aligning the system is to first place the stop for the given objective in the filter holder. and to remove the eyepiece. Now, by looking down the microscope tube, center both the illumination and the stop in the optical axis. Replace the eyepiece.

Looking through the eyepiece, adjust the condenser up and down to achieve the best image. Unlike the adjustsment for dark field microscopy, the condenser is not set to focus the light in the plane of the object.

It should be possible to make the details of the object stand out in high contrast, either lighter or darker than the surrounding field, depending on the condenser adjustment. This is different than for dark-field microscopy in which the object is always brighter than the field. A comparison of an amoeba photographed in ordinary transmitted light and with this system is shown in Figs. 1 and 2.

Although, to my knowledge, a complete theoretical analysis of this system has not been made, it was speculated[2] that the diffracted wavefronts from the edge of the stop and from those of the object combine to transform phase information into intensity variations in an approximation, for large phase differences, to the Zernike system.

1. deHaas J, Wotton RM: A Simplified Method of Obtaining Phase Microscopy. *Proceedings of the Pennsylvania Academy of Science*. Vol. XXVIII, 1954.

2. Ross, SA: The Amateur Scientist. *Scientific American*. July 1955.

Microscopy and the World Wide Web

James D. Solliday

This month, I would like to bring to your attention a few sites that can be considered sources for microscopes and supplies. This includes a number of auction sites that allow the user to bid for items that may be of interest. Check out the following web-sites.

http://www.Labx.com AUCTION site featuring scientific instruments including microscopes.
http://www.ebay.com AUCTION site featuring antique instruments including microscopes.
http://www.pnc.com.au/~biology/ THE BIOLOGY SHOP, cabinets, prep-slides, Naphrax medium.
http://www.wlamicro.com/ WEST LA MICROSCOPES, equip. close to home, see Bernstien.
http://www.medmarket.com/tenants/sobel/web1.html THE ON-LINE MICROSCOPE STORE.
http://www.gemmary.com/index.html THE GEMMARY Antique Scientific Instruments Old & Rare.

The Site of the Month

One of the most useful and interesting sites for the microscope historian is THE GEMMARY <http://www.gemmary.com/index.html>. This site is more than just a dealer outlet. Mr. Blankenhorn not only provides the collector with antique microscopes but the books to accompany them. Not only can one find the rare and unusual but the latest publications are also kept in stock. This month something new has arrived, the latest book by Brian Bracegirdle. Bracegirdle has published a number of books that are of interest to our members. For those interested in microscope makers, he recently authored *Notes on Modern Microscope Manufacturers (1996)*. In 1978, he published his well known account of *A History of Microtechnique*. This month, the Quekett Club has released Bracegirdle's newest masterpiece entitled, *Microscopical Mounts and Mounters (1998)*. There are 225 pages and 60 full page color photo plates. This book is an indispensable reference work for all collectors of antique microscope slides. The book will be known as the definitive reference for those needing to know the identity of slide-makers of the past. The process of dating old slides will now be considerably easier. Almost every known maker has been included, with descriptions and plates of their work. Close to 1000 preparations are illustrated at near life-size in the book. This new publication is now available at THE GEMMARY, at the cost of $42.50 plus tax & shipping. The Gemmary is the sole American distributor of the book.

As mentioned above, The Gemmary is more then a simple store; the site has become one of the most important locations for the dissemination of information. Mr. Blankenhorn has generously provided space for what has become known as "The Antique Scientific Instrument Forum." This feature was set up to satisfy the needs of collectors and historians of scientific instruments to keep in touch and exchange information (the cyber bulletin board). Users can post announcements, comments, questions and answers, as well as For Sale/Swap and Wanted-to-Buy ads. The Forum is free and open to all.

Minutes for the August 1998 MSSC Meeting

David L. Hirsch

Although James Dwight Dana had gone to his rest in 1895, his *Manual of Mineralogy* survives; the 21st edition being published in 1993. MSSC member Wayne Moorhead recounted the remarkable career of Professor Dana and his contributions to the science of mineralogy. Wayne, a Dana scholar, had several original editions of Dana's works on hand. He also handed out a list giving the 1848 through 1993 history of Dana's *Manual of Mineralogy*. As an aside, your correspondent has a copy of the 5th edition (1853) *Manual of Mineralogy*, found a few years back in a Boston book stall for the stiff price of 25 cents! Such is the price of fame. Coincidentally, Professor Dana (1813-1895), was the contemporary of Richard Henry Dana (1815-1882), the author of *Two Years Before the Mast*. Both James Dwight and Richard Henry were East Coast lads. Does anybody know if the two Danas were related?

Following Mr. Moorhead's talk, we trundled out the MSSC birthday cake, sang "Happy Birthday" and blew out both candles. The rich cake, loaded with chocolate chips, was slathered with thick cream cheese icing. Our new logo was accurately reproduced, including the highly detailed microscope. Sadly, a man's got to do what a man's got to do, so GAYLORD MOSS performed elective surgery on the cake, cutting it into precisely equal segments. The rest is gastronomic history.

THE THOUSAND CALORIE LOGO. Tempus sure does fugit. Can it be two years since we emerged alive and kicking, from the repressive confines of the 'other' society? The lusty MSSC infant is in reality an old codger who first saw the light of day, way back in 1938. Our quest for knowledge and appreciation of things microscopical, and the strong interpersonal bond, which characterizes us, are what MSSC is all about. Enough with the politicking - now, let's chomp on some cake!

KNOW YOUR NEIGHBOR. Every month, another MSSC member is featured in a biographical profile. In this way, we get to know one another as we pursue our common interest of microscopes and microscopy. Likewise, every member is requested to fill out an application form for the MSSC database, the rebuilding of which is now in progress. Although a number of current applications are now on file, the task is far from complete. MSSC members sans applications will be contacted. Applications are CONFIDENTIAL, so members need not be concerned about getting their names on renegade mailing lists and such.

MSSC ANNUALS. GAYLORD MOSS displayed the MSSC Journal Annuals for the years 1996 and 1997. Each volume is a compilation of articles and other material appearing for that given year. Elsewhere in this issue, Gaylord tells more about the back issues of the Journals, and how to obtain copies.

LABORATORY GLASSWARE. STEVE CRAIG brought in a large collection of glassware in some odd configurations, I tell you. Donations derived through sales of the glassware and other items serve to bolster the MSSC Treasury. Thank you Steve, Alan and all those among us, who contribute saleable items.

GREENHOUSE - GREEN THUMB. LEO MILAN, horticulturist par excellence, brought in an orchid with the appellation: "Wanda Kesson's Delight." Leo received the Merit Award for his creation from the Malibu Orchid Society at their show, which was held last night.

SHOW, TELL AND SELL. It comes in a cushioned canvas case reminiscent of those used for dropping combat materiel during airborne invasions, and such. Dropping a microscope under such conditions is unlikely but our sales table held a cushioned case containing a Nikon model CH2 binocular stand. The microscope is in pristine condition, featuring 4 objectives and all of the bells and whistles associated with a well-engineered instrument of quality. The microscope is for sale at $600.00. It is worth looking into (another pun). Seller Alan deHaas may be reached at: (310)475-5623, or by e-mail at: doemicro@earthlink.net.

THE INWARD LOOK. Medical instrumentation, especially cystoscopes have undergone notable changes in design since the introduction of fiber optics. KEN GREGORY displayed two sets used in the mid 90's for exploring body cavities; endoscopic and cystoscopic arrays. Related instrumentation is used in the engineering profession for examining the insides of mechanisms.

MOST IMPROVED. The "Most Improved Microscope," circa 1830, by Carpenter, has three fan-out feet which fold, enabling the instrument to fit into a flat case. LARRY ALBRIGHT displayed such a stand. BARRY SOBEL will seek further provenance on this popular microscope.

CONSERVATION. After a few hundred years or so, the most pristine instrument may become haggard and worn. Sweaty hands, dampness, bird droppings, heat, careless handling and other adverse situations cry out for the tender ministrations of the conservator. HERB GOLD spoke of Benchmark Instruments, an East Coast firm, well versed in the conservation of

scientific instruments. Interested? Call David V. St. John, Technical Director at: (508)528-7427, or e-mail them at: www.benchmarkinstruments.qpg.com

PHOTOMETER. Chris Brunt reported on the developmental progress of his photometer. An engineering prototype was examined by the membership. Chris is preparing an article on his photometer for future publication in the MSSC Journal.

TOOLS OF THE TRADE. Contemporary medical technology provides the tools needed by today's neurosurgeons and practitioners in other surgical disciplines. By contrast, the crude medical instruments of antiquity; forebears of modern instrumentation, are dramatically portrayed in a soft cover book that belongs in the library of every microscopist. This fine book was shown after the meeting.

C. Keith Wilbur, M.D., did a yeoman's job in preparing his book, *Antique Medical Instruments*. The first nine pages of the book are devoted to vintage microscopes. A wealth of hand drawn illustrations appears throughout the book. The rest of the book shows an orderly classification of other medical instruments and devices. For further information contact: Schiffer Publishing, Ltd., Box E, Exton, Pennsylvania, 19341-9990. You net surfers might try to access the book via Amazon or other booksellers. Cowabonga!

C'EST FAUX? At the August workshop, I gave a demonstration of methods used by firms such as Replica Rara to prevent their fine reproductions from being construed as genuine. An example was shown, where a strip of ferromagnetic material was concealed beneath a paper tape sheath covering the body tube of a hand held demonstration microscope. The needle of a small compass was deflected when it was placed in proximity with the ferromagnetic substance.

As the number of scientific instrument collectors proliferates, so do the legions of counterfeiters who see the chance to make a fast buck. An article covering this vital subject is in the works for future publication in your MSSC Journal.

September Meeting

Wednesday, Sept. 16 at 7 PM
Crossroads School
1714 21st Street
Santa Monica, CA

THE MICROSCOPE REVERSED

Telephotography of Nature in Action

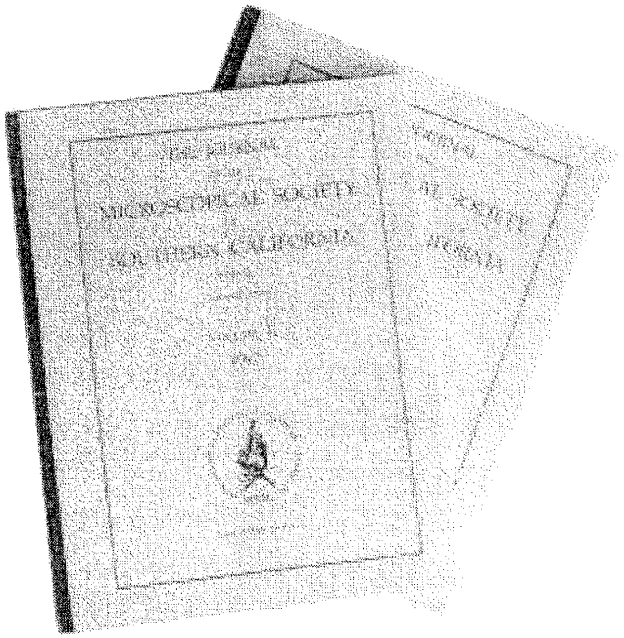
Stuart Warter

Stuart Warter, in his 32 years as a Professor of Biology at Cal State University at Long Beach, has had a keen interest in the study of the functional morphology and evolutionary biology of vertabrates, especially birds. He will show a selection of vertabrates in action, taken with long lenses in nature. The latest predictive auto focus cameras and high speed shutters allow remarkable freeze shots of scenes such as diving pelicans entering the water, or seabirds in running takeoffs. leaving footprints on the water. The glimpses of nature frozen in time, although not microscopical, promises to not only entertain with their beauty, but to reveal a part of the natural world that is normally inaccessable. Dr. Warter's camera gives us a view of a fast and distant world in an analagous way to that in which a microscope lets us into a slow and small world.

CRITICAL AND KOHLER ILLUMINATION

Alan deHaas

Alan deHaas has been looking through microscopes since he was four years old. Anyone who has worked with him has been astounded at his facility in adjusting illumination to coax images from a microscope system that sometimes seem beyond what is possible. Wednesday night, Alan will share with us some of his thoughts on both Kohler and Critical Illumination. Alan's rich experience and historical and technical knowledge gives him a unique perspective and ability with which he can help us to become better microscopists.



Editor's Notes

A number of MSSC members bind their yearly issues of the Journal in some form for permanent reference. For those who want something more durable than a loose leaf notebook, a cover sheet for Volume II for the year 1997 is included with this issue of the Journal. Later mailings will include covers for Vol. III, 1998 and for Vol. I, 1996.

The photo above shows one of the low cost bindings that is available at Kinko's copy store. This is their "Velo" binding which I prefer for its apparent ruggedness. Plastic pins are pushed through the plastic end plates and are heat sealed in place. Kinko's also offers a plastic spiral binding and one with flat plastic rings that some members prefer because they allow the pages to be opened flat. Each style of binding currently costs $3.00 at the local store here in Los Angeles. They all include a clear plastic cover sheet and an opaque plastic back sheet.

As before, the December issue will include an index for the year, listed by both author and subject.

All back issues are available for a cost of $3.75 each. There were four issues in 1996, the year that the organization was reformed. Subsequent years have 12 issues.

If you order a complete year's set, we can bind the issues here with the Kinko's style of your choice for the $3.00 cost.

Please send any requests to me, or to Dave Hirsch. Make all checks out to David L. Hirsch, our treasurer. The addresses are given on page 170.

Gaylord E. Moss