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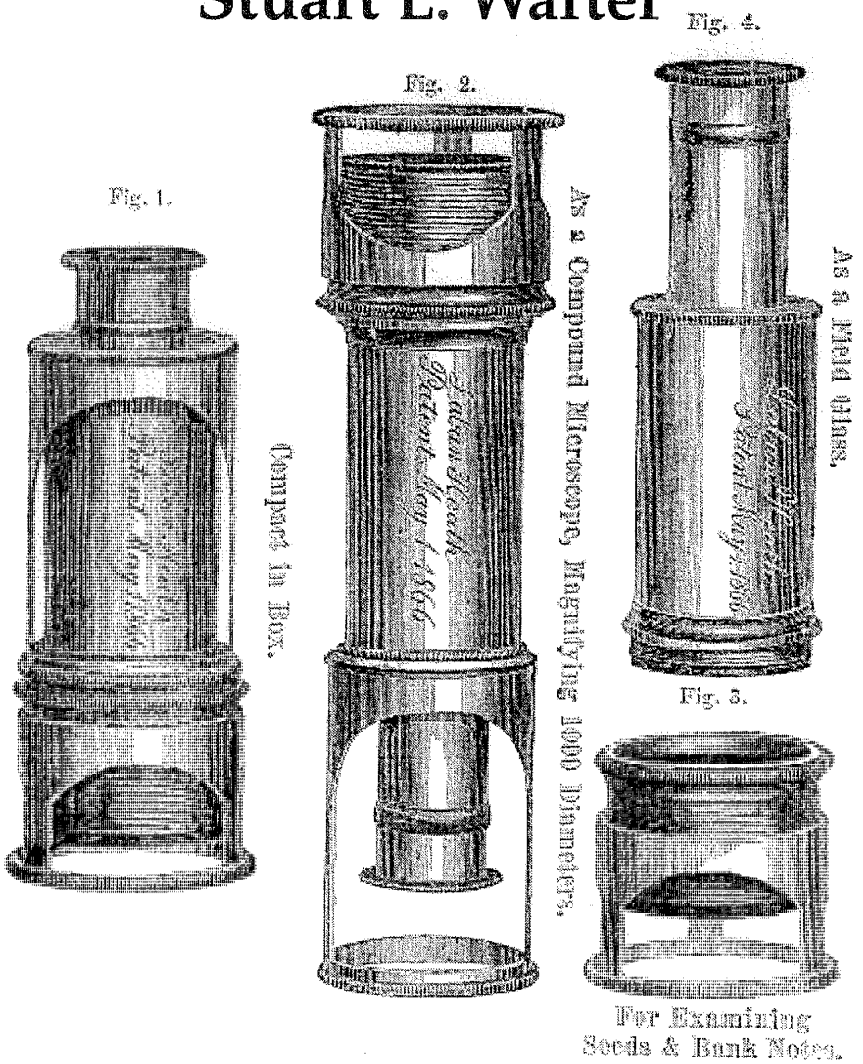
THE MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA
Volume 4 Number 1 January 1999

The Infallible Counterfeit Detector
Laban Heath Revisited

Stuart L. Warter



In March of 1997, this publication carried an article that I wrote about Laban Heath's invention of a combination microscope / telescope / tabletop magnifier patented in 1866. Six months later, in part as a result of the article, I was offered another of his inventions. This instrument, patented in 1877, was still in it's original cardboard box, and labeled (somewhat misleadingly, as it turned out) "Heath's Improved Adjustable Compound Microscope."

At the time, little had appeared in the microscopical literature about the first instrument and, as far as I knew, nothing of the second. Subsequent to the publication of the 1997 article, a catalog from a scientific instrument dealer appeared, offering one of the combination instruments for sale, and citing that article. A recipient of the catalog, a New York City collector of pocketable magnifiers, then contacted me in search of further information on the man and his instruments. As it happened, I learned more from him than he did from me.

I learned that Laban Heath had authored a series of editions, published over many years, of books designed to aid in the detection of counterfeit currency, that these books featured his instruments, and that both the books and the instruments, being popular with coin and currency collectors, were more readily available at stamp and coin shows and through dealers specializing in numismatics, than in scientific instrument trade. I then obtained a copy of the patent of the second instrument, and conducted a search of internet used booksellers. Finding a number of copies of his books available, all in the $250 - $375 range, I decided to try interlibrary loan. After a lengthy search for several editions, I succeed in locating and obtaining a single copy of the 1867 edition. The paper in this copy was so brittle, that I could not duplicate more than a few pages without doing irreparable damage to the book.

The first edition, published in 1864, was entitled *Heath's Infallible Counterfeit Detector* ....The second edition entitled *Heath's Greatly Improved Infallible Government Counterfeit Detector* .... appeared in 1866, reissued in (and dated) 1867, and a third in 1870, dropping the "Greatly Improved." By 1878, the 12th edition had appeared, followed by a 13th, about 1880. The 2nd edition, revised to reflect the recent change to "greenbacks" and National Bank bills, appeared in two forms, a larger quarto "Banking House and Counting Room Edition," and a smaller, 12mo pocket edition (small octavo in 1878). There were 39 pages, with

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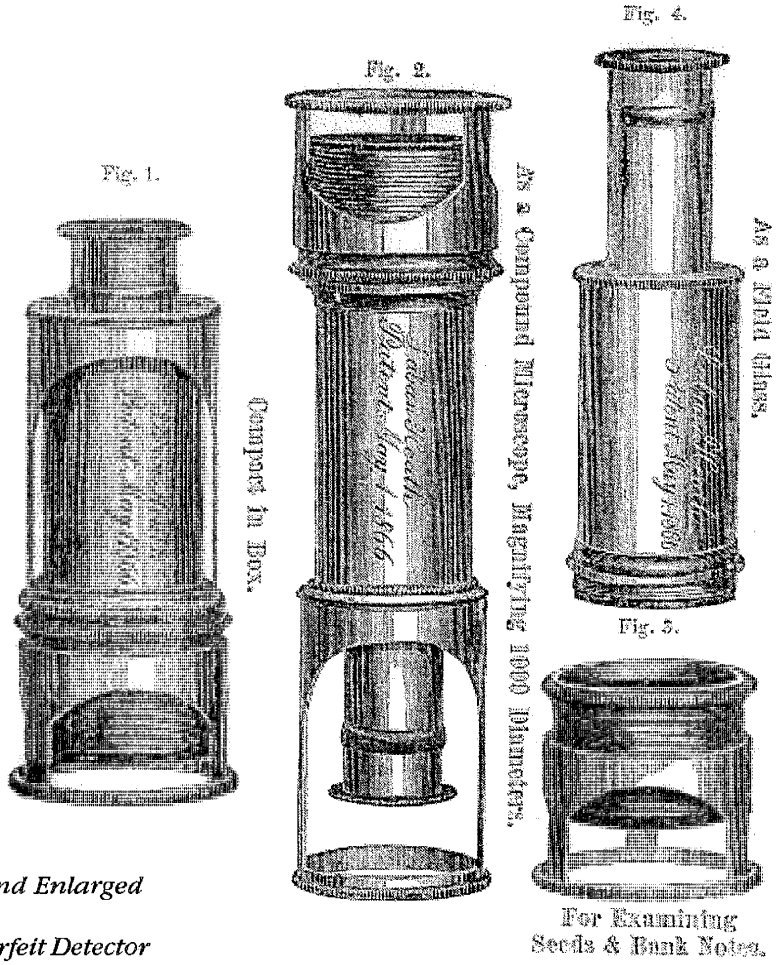
MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA



Text from Heath's
Greatly Improved and Enlarged
Infallable
Government Counterfeit Detector

MICROSCOPIC OR MAGNIFYING GLASS.

The beautiful fine lines required in the engraving of all bank-bills, even in moderately well-executed counterfeits require the aid of the microscopic glass, and sometimes a microscope of great power is absolutely indispensable in order to discern the genuine line, and discriminate between the true and the false work. The ordinary magnifying glass now in use by banks has failed, in many instances, to bring out this delicate work sufficiently to detect some of the late skilfully-executed counterfeits. In order, therefore, to meet this difficulty, I have, after much labor, invented a combination Micro-telescopic Glass, and secured letters patent on the same, which is designed for use and sale with the " Detector."

This glass is a fine magnifier, a powerful microscope, and good field glass. By a simple change, this instrument is convertible into either one of the above-named glasses, and is very useful at all times, and for other purposes than the detection of counterfeits-, and will be worth the cost for family use.

Fig. 1 shows the Glass as put up for sale. Fig. 2 shows it as a microscope. In using it for this purpose you must have a good light, and have it shine direct on the object you wish to examine, first placing the object on a piece of white paper; then adjust the glass to the right focus by sliding the smaller section. Fig. 3 shows the section used for examining notes and other things of a like description. Fig. 4 shows it as used for a spy-glass.

These glasses, now being manufactured in Paris, will be furnished with or without the " Detector," by mail, pre-paid, at the following prices:

Lower Section or Magnifying Portion, $1.50.

Upper Section combining Microscopic and Telescopic, $3.50.

Making the whole " Combination Glass " $5.00.

If only one section is wanted at first, the other portion can be ordered at any future time.

HEATH'S

GREATLY IMPROVED AND ENLARGED

INFALLIBLE

Government Counterfeit Detector,

AT SIGHT.

THE ONLY INFALLIBLE METHOD OF DETECTING COUNTERFEIT, SPURIOUS, AND ALTERED BANK NOTES, GOVERNMENT BONDS, ETC.

APPLICABLE TO ALL BANKS IN THE

UNITED STATES AND CANADAS,

AS NOW IN CIRCULATION OR THAT MAY BE ISSUED,

WITH

GENUINE DESIGNS FROM THE ORIGINAL GOVERNMENT PLATES.

BY AUTHORITY FROM THE UNITED STATES TREASURY DEPARTMENT, AND THE AMERICAN, NATIONAL, AND CONTINENTAL BANK NOTE COS., NEW YORK AND BOSTON.

Banking House and Counting Room Edition.

BOSTON, MASS., AND WASHINGTON, D. C.:

PUBLISHED BY LABAN HEATH & CO.,

No. 30 Hanover Street, Boston, to whom all orders should be addressed.

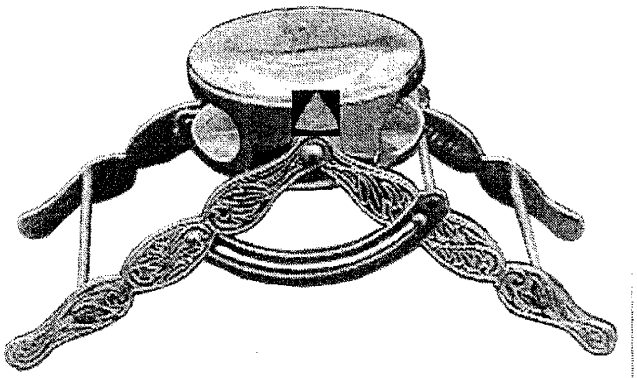
Continued from page 2

16 plates in the larger edition, and 20 in the smaller. The plates were printed (with alterations) from the original engraved government plates and were used in conjunction with text descriptions and hints for detection of counterfeits. Heath apparently was able to hold classes in counterfeit detection in the Treasury building. He used the publicity, thus gained, to help sell his books, which he himself published, and his instruments, which he described, illustrated, and promoted in the books as ideal for these purposes. The convertible instrument, patented in 1866, appeared in the second 4to edition, and the second instrument, patented in 1877, and actually a pocketable table top magnifier (patented as an "adjustable stand for magnifying glasses"), is said to have been included in the later pocket editions (which I have not seen myself).

In the original 1997 article, the 1866 patent of the convertible instrument was reproduced, showing a telescope that could be screwed into the magnifier, and, with the change of an eyepiece, became a microscope to be used in the erect position. The second edition of Heath's book showed an entirely different configuration. As reproduced here, Heath described and illustrated this instrument as being provided with a sleeve, within which the combined instrument could be mounted, and used in the inverted position as a higher-powered microscope. None of the examples mentioned in the 1997 article, or the one offered in the later catalog, possessed this added feature.

In the 1877 patent, reproduced here on pages 6 and 7, the second instrument is described and illustrated as a compound double lens magnifier mounted in an adjustable and collapsible stand. The folded magnifier is housed in a pasteboard box 4 1/8 X 2 3/8 X 1 1/8 in. Unfolded, the nickel-plated instrument stands 2 1/4 in. high, its legs spread to a length of 4 3/4 in., it is 2 1/4 in. wide. Its two biconvex lenses are 1 3/4 in. in diameter. Its legs are stamped in imitation of elaborate Rococo scrolled engraving. In the picture of the boxtop label at the left, it is seen to have been marketed as "Heath's Improved Adjustable Compound Microscope, for Examining Bank Notes, Minerals, Flowers, Seeds, Linen, etc.,etc." One was recently offered on an online auction as a "Nautical Map and Chart Reader," something of which Heath evidently had not thought (or had room for on the boxtop). Inside the boxtop is a label that reads "LABAN HEATH & CO., / PATENTEES AND MANUFACTURERS / 30 & 48 HANOVER STREET, / BOSTON, / To whom all orders should be addressed. / Send for Descriptive Circular." The instrument is stamped inside one leg only with the patent date; unlike the earlier instrument, Heath's name is not on it.

Box cover



Heath's Adjustable 'Compound' Microscope

Opposite-Title page from 2nd Edition, 1867

UNITED STATES PATENT OFFICE.

LABAN HEATH, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN STANDS FOR MAGNIFYING-GLASSES.

Specification forming part of Letters Patent No. **198,542**, dated December 25, 1877; application filed November 30, 1877.

To all whom it may concern:

Be it known that I, LABAN HEATH, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Magnifying-Glasses, which improvement is fully set forth in the following specification and accompanying drawings.

This improvement relates to small magnifying-glasses, such as are used for the detection of counterfeit bank-notes, the examination of insects, &c., and are provided with a stand for their support.

It consists in the peculiar construction and arrangement of the stand and frame, as below described, so that the lens is adjustable vertically, thus enabling it to be brought nearer to or farther from the article beneath it, or upon which it rests for purposes of examination, and also allowing the lens to be turned at any angle.

In the drawings, Figure 1 is a side elevation of a magnifying-glass embodying my invention, its lens being brought as low as the stand will allow. Fig. 2 is a vertical section of the same, the lens being higher than in Fig. 1, and placed at an angle. Fig. 3 is a side elevation of the same folded for packing and transportation.

Similar letters of reference indicate corresponding parts.

a a represent the lenses set, in the usual manner, in the frame *a'*, which is made in a single piece. Upon each side of the frame *a'* is fixed a pin, *a''*, which passes through and turns in the upper ends of the legs *b c*, both of which meet at that point upon each side the frame. The legs *b* are connected and steadied by rods or cross-pieces *b'* at suitable points, and the legs *c* by similar rods *c'*. Pivoted or hinged by the pin *d'* to the leg *b* is the slotted curved bar *d*, while attached to the corresponding leg *c* is a pin, *e*, which runs in the slot in the curved bar *d*. There are, of course, two bars, *d*, extending from the two legs *b* to the opposite legs *c*, and connected by the rod *d''*.

Thus, it will be seen that if the lens is to be raised so as to be brought farther from the object to be examined, (which lies beneath it,) the legs *b c* are brought nearer together, or vice versa; and by means of the pins *a''* in the frame *a'* the lens can be tipped at any angle, so as not to necessitate the moving of the object examined.

The device can be folded into a small space for packing, as seen in Fig. 3.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent, is—

The combination of the lens-frame *a'*, pivoted at each side by means of the pins *a''* to the legs *b c*, the legs *b c*, connected by rods *b' c'*, and provided with pins *d'* and *e*, and the slotted curved arms *d*, all constructed and arranged substantially as and for the purpose herein set forth.

LABAN HEATH.

Witnesses:
HENRY W. WILLIAMS,
B. W. WILLIAMS.

L. HEATH.

Stand for Magnifying Glass.

No. 198,542. Patented Dec. 25, 1877.

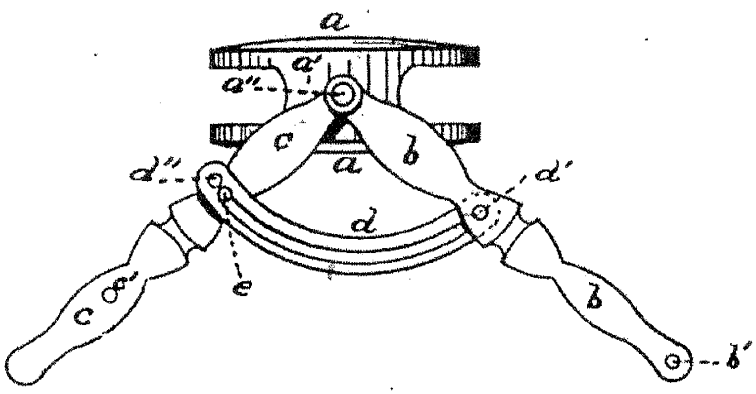


Fig. 1.

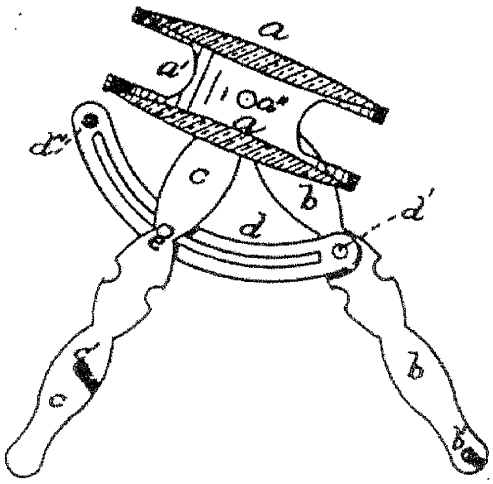


Fig. 2

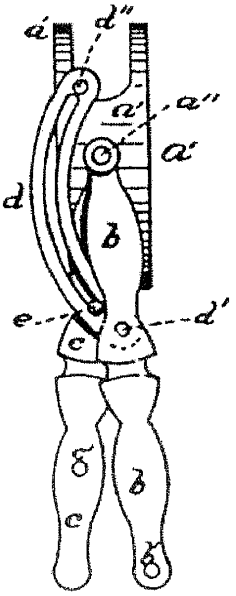


Fig. 3

WITNESSES

B. W. Milling

John E. Fleming.

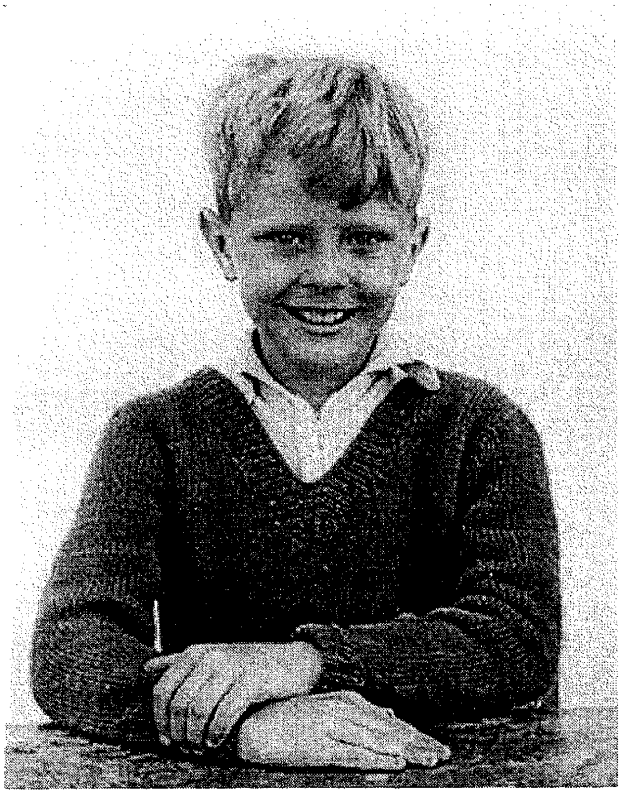
Laban Heath INVENTOR

By his attys.

Henry W. Williams & Co.

Member Profile

Michael Dingley

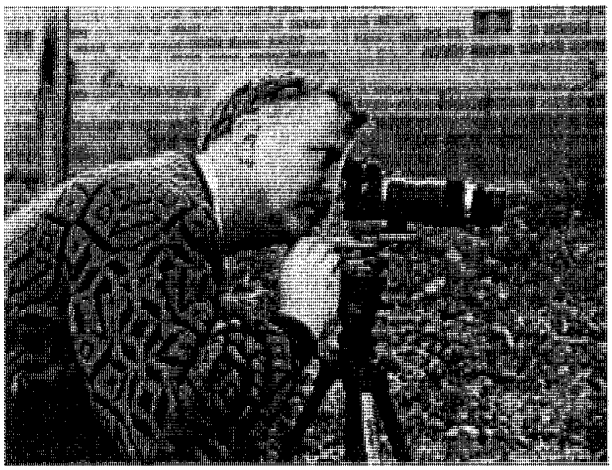


8 years old in 1960

My parents wanted a baby girl, so I was the fourth (and last) son to be born to them. I arrived into this world in 1952 in Hendon, just north of London, England. Within a year, my family travelled to the 'West Country,' a little place called Brockworth. I spent my primary school years there and by the time I finally grew up and went to high school, we had again moved. Before I could get into 2nd year, we had moved again. Even though I moved twice more after that, they were all within 20 miles of each other.

Just before Christmas in 1964 I saw, in a shop window, a toy microscope. It was one of those all plastic things that had a TV screen and came packaged with a couple of prepared slides. This was what I wanted and I hounded my parents for weeks. All this resulted in Santa Clause bringing me the very same instrument. He must have come through the front door as we did not have a chimney!

As is usual when owning a toy microscope with a couple of prepared slides, all the images were fuzzy. This was due to the plastic lenses, badly prepared slides or, as I remember, both. There was no instruction book or list of references in order to get more help so, after



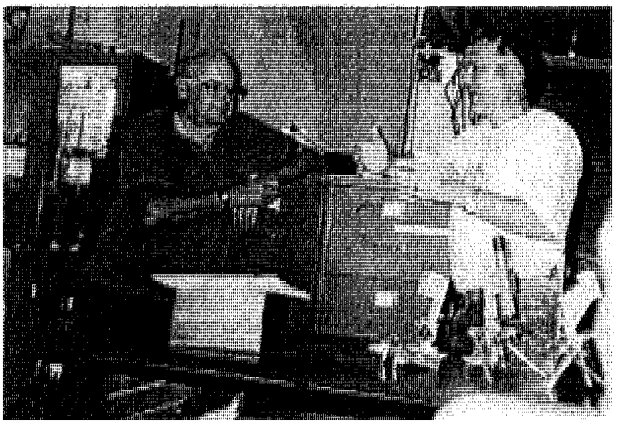
Close-up photography

a week or two, my enthusiasm waned and the microscope was relegated to the back of the cupboard.

When I reached the grand old age of fifteen, I had a very good biology teacher who knew a little about microscopic life and he helped me answer questions that I posed. This in turn rekindled my enthusiasm and so I set about looking for a proper microscope. I found a Japanese monocular with a plain stage, stage clips and triple nosepiece, all of which were housed in a leatherette carry case which was plush lined with red velvet. It cost thirty pounds and I cleaned lots of shoes, walked many dogs and got up at some unearthly hour to deliver papers until I paid it off. Well, was I in microscope heaven? I was until my friends teased me because they couldn't understand why I would waste my money on such a thing.

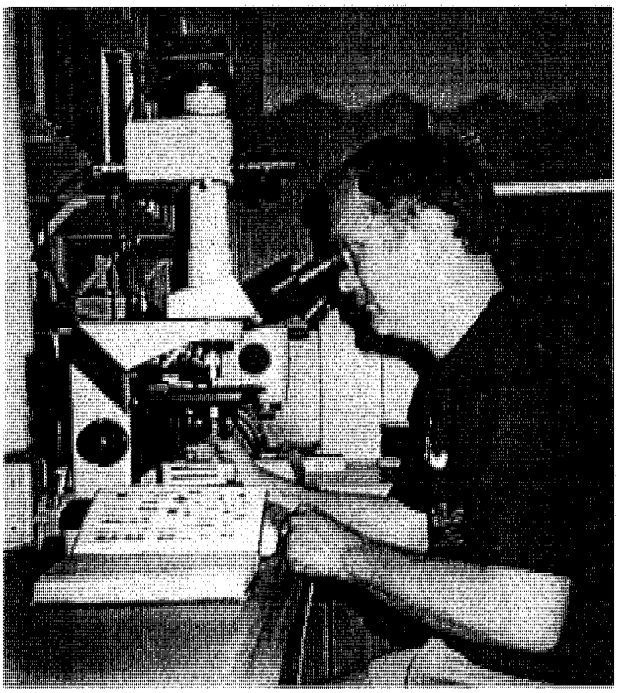
When I reached the even grander age of nineteen years and three days, I emigrated to Australia on my own. To raise money for my new life, I sold just about everything and, yes, the microscope had to go, but not before promising myself that someday I would buy another.

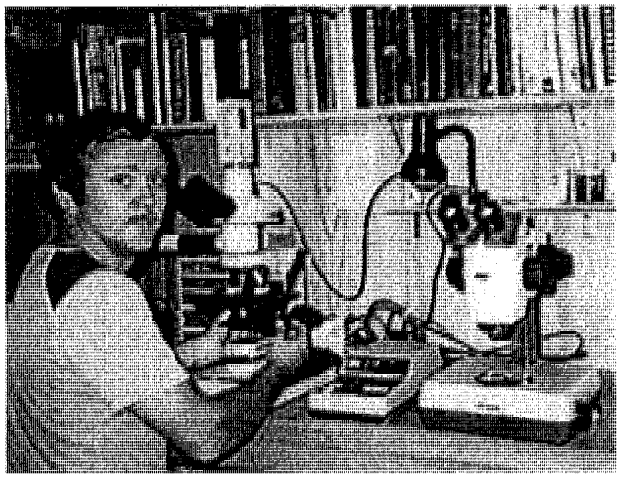
My first secure job was as a laboratory assistant in the Department of Veterinary Anatomy at Sydney University. This lasted for three years until 1975 when I applied, and was successful for, a job at the Australian Museum as a study skin preparator in the Exhibitions Department. This is a sort of taxidermy job. Let me explain. Taxidermy is really the stuffing of animals in a 'life-like' pose. A study skin preparator does all that except we don't put it in the 'life-like' pose. We make a rounded or study skin. One which can be laid in large drawers and studied at a later date. Well, after



Me introducing the late Jack Clark

Me answering questions after collecting samples





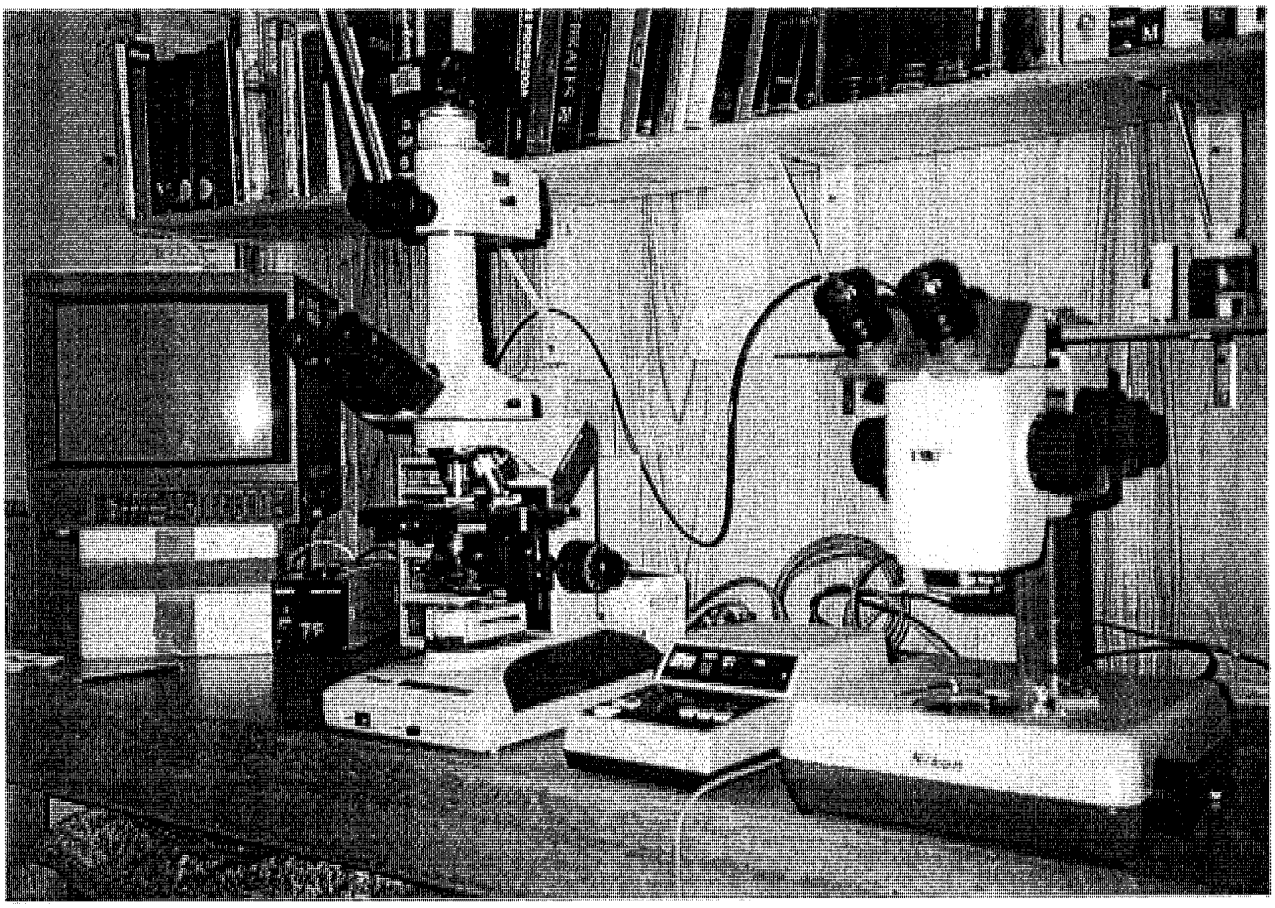
five years of doing this, I managed to weasel my way in to the more creative side of exhibitions work, preparing specimens for public displays. This is where I have remained until the present day. In 1978? I married Julie my wife and we have a son, Jonathan, who is now fifteen.

I enrolled in a local University to do a BSc. as an external student and the first course was Biology, but it should have been called Botany as that was all we seemed to do. Plant microscopic anatomy was the order of the day and guess what? This rekindled my love of microscopes. To help me study I bought my own Olympus BH trinocular microscope and this did wonders for my study as I passed with honours. That, however, was only the first year. My son had come into the world and I felt that I could no longer continue with my University studies and so gave up. But I still had my microscope.

In the meantime my special interest had become Desmids.

When my son was two years old, I decided to start a small business supplying small quantities of stains, chemicals and reagents to hobbyists such as myself. I realised that laboratory suppliers were only interested in selling to laboratories and a 500ml bottle of stain or mounting medium was going to last me a lifetime, if it hadn't already faded or solidified in their respective bottles. To start any business you need capital; yes you guessed it, I sold my precious microscope, promising myself that one day I would buy another, better instrument.

The business quickly built up and I supplied many large institutions, schools, Universities etc. and the poor old hobbyist was left behind. If I had to rely on the hobbyist to make money, I would have gone broke. The business was a part time affair which I managed to do after work and on weekends. After a few years, it became so large that I had to make a major decision. I had to decide whether I was to resign from my full time paid job and look after the business full time or sell it. Well, I thought long and hard and came to the conclusion that if I worked at the business full time I would always chase the magic dollar and not enjoy my hobby, but if I sold it and stayed in my secure job with a nice pension at the end, I could buy the microscope I want AND study Desmids. The choice was



easy. I now have a nice lab with a Nikon Optiphot and Nikon ZM stereo and full 35mm and video capabilities. My only regret in selling the business is that I have lost the regular income to buy more things such as a large format camera and Normarski DIC which I would really like to have. I missed out on buying a Nikon large format camera a couple of months ago that was placed on eBay, the internet auction site. I collect portable microscopes and at the time of writing have 42. I also collect books on Desmids and, to a lesser extent, microscope catalogues, 19th Century books on microscopy, prepared slides and compressoria.

In Australia, we have the Microscopical Society of Australia (MSA) and I am a member. Prior to 1990 I was feeling a sense of loss or well being at where the Society was heading. It seemed to me that it was a society for academics and microscope sellers as all the talks and meetings were centred around a particular company's latest product(s). As a hobbyist, I felt, and still feel, that I am not getting my money's worth for being a member. They do not have their own newsletter any more having been swallowed up in the Electron Microscope newsletter. Membership seems to have a high proportion of electron microscopists and academics and so they have no time for us light microscopists (At a recent meeting a speaker referred to us as photon microscopists!). I had been thinking for a while about how good it would be to have a club or society for beginners or amateurs. To have our own newsletter and where we can meet and exchange ideas etc. I read about the Postal Microscopy Society (PMS) in England and thought that this might work in Australia. After all, we are a large continent and would not be able to organise regular meetings. We could 'do' things via the postal system. I wrote to the Secretary of the PMS asking for information. I was given much valuable information and help and so I decided to start the Postal Microscopical Club of Australia (PMCA). It was deemed important to have the word Club in the title as it would make it sound like a place for amateurs. So in 1991 it was formed. I had hoped to have 10 members but outgrew this quickly and so I thought that 20 members would be nicer. We now have between 60 and 70 members. Quite a few are younger members who seem to last for a year or two before resigning when they are replaced by new young members and so the cycle rotates. Not all members receive slide sets as some are content to receive only the newsletter three times a year. Those members who live around Sydney, NSW have Sunday outings a couple of times a year. We have no formal or regular meetings. We have several overseas members who can only receive the newsletter and the Australian membership is spread throughout every state. I am the Secretary, Treasurer and Editor. Having all these jobs takes up a lot of my time. I keep giving the membership subtle hints that I would like to relinquish some of my duties but I think

that the hints will have to be more forceful in the future.

My personal microscopy life involves writing a catalogue of portable microscopes which is nearing completion and hopefully a publisher will be found soon.This takes up a lot of my time as does the club's activities such as writing articles and collating the newsletter. I also have photographs published in a bimonthly children's scientific magazine. I receive journals and newsletters from around the world, as well as catalogues from scientific instrument dealers and book dealers. Having internet and email access has allowed me to correspond with others who have similar interests and although I live 'downunder' I have found a camaraderie among microscopists around the world. All this and I have a family, a full time job which takes me away from the house thirteen hours a day and am completing the addition of a second storey on the house. My wife can't drive and we live in an area of poor public transport and so I have to take her shopping on weekends. My son also needs my time so as you can see I have a full itinerary.

My area of interest in desmids is to collect and plot a distribution map of all species in Australia. This is a mammoth task (or should that read desmid task?). I have drawn around 700 taxa so far and I have about twenty samples waiting to be examined. I haven't had time for several months to examine the samples so it is a slow process. One piece of research that I would like to do is to collect from many sites in far north Queensland. There was a study done of sites in the Northern Territory and I would like to compare these taxa with those on the same latitude in Queensland to see if there are any noticeable differences. I estimate this to cost more than I have got in the bank. I have been told to try for a research grant but I don't seem to get very far with this idea. So far most of my collection sites have been in NSW as this is the state that I live in.

When overseas visitors come to Australia, I try to make time to meet them as it is nice to put a face to a name. Its always nice to be able to talk to others with the same interests, especially if they are from overseas, as I can get to hear about up-to-date gossip from other parts of the world. From my readings of overseas journals, I get the impression that there is more enthusiasm for microscopy than there is here.

Experiences With Overseas Shipment

Barry J. Sobel

I have purchased instruments through auctions now for several years. Often this is the only way to get certain models at any kind of reasonable price. For the most part these transactions have gone smoothly but on more than one occasion, the entire experience was nothing less than a nightmare.

A few years ago Bonhams offered an early Andrew Ross Microscope
in an auction. As I usually do, I got a condition report from their "specialist." It was reported as being in "fine working condition with very fine lacquer". After the usual 4-6 week delay, the instrument arrived. Much to my dismay, the lacquer was good but certainly not "fine"; worse, the arm was twisted on the limb and as I inspected this more closely, I found that the cap on the arm over the hole supported the main screw which attached the arm to the bar was twisted and separated. On taking all this apart I found the reason was that the knob which attached the arm to the limb was badly bent; if I could not fix this, the microscope would never function since the alignment of the tube with the stage was so bad. When I wrote to them, I did not even get the courtesy of a response to my enquiries. I was stuck then with this broken instrument. In the end I decided to try to repair it myself and after working UPS some courage, bent the threaded shaft of this knob back straight; this seemed to work, but resulted in compress on the threads on one side, preventing it from screwing in. Even worse, the thread pitch was not standard and not even available in any threading die or even on a metal-working lathe. I remembered a trick I learned from a friend and used a triangular file to follow the threads and clean them up; fortunately it worked. Ross's number 165 was rescued and remains in my collection today.

A few years later, a dream of mine since childhood came true. I was successful at purchasing a Grand Orrery. Although new, it included all the movements of the 18th century original including regression of the nodes and the movement of the moons of Jupiter, Saturn and the Earth. When it arrived and I opened the case I unfortunately discovered that the instrument was severely damaged in shipment. Axles were broken and even some of the main shafts. As I have found is typical of English insurance, the insurer refused to take any responsibility for the damage. It seems that the reason that English insurance is so easy to obtain is that they never pay any claim! After many months of aggravation and attempts to fix the thing by tele-

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MSSC Meeting of 20 January 1999

David L. Hirsch

The MSSC membership listened with rapt interest to the subject material presented by our Speaker of the evening, DON WOLPERT. We learned of many things; the similarities between materials, natural and man made; the potential impact of genetic engineering, and other notable advances. Don explained the mechanism by which insects use polarized light as a navigation aid. He then showed how pheromones produced by animals and certain insects serve as a stimulus to other individuals of the same species for behavioral responses. - and all along, I thought it was my aftershave!

Although ALLAN BISHOP and I simultaneously attended the Scientific Instrument Fair in London last October, we managed somehow, to not meet. I took a few photos at the Fair with my Pentax Auto 110; a SLR camera which is about the size of a Mars candy bar. By contrast, Allan shot dozens of pictures which served as the basis for his magnificent slide show. Scientific instruments of every kind filled the exhibition hall. Allan's' slides captured the brassy glitter emanating from the abundance of compasses, microscopes, transits, telescopes and every kind of scientific and technical trash and treasure, that exists.

MEMBER PARTICIPATION. Talks and demonstrations by individual members are most welcome. Similar communications by Corresponding Members also apply. If you people out of shouting distance have access to camcorders, your Los Angeles area based fellow members would like to see and hear about what you are up to; microscopical-wise. RON MORRIS regularly and faithfully shlepps the many miles to Santa Monica, all the way from Santa Ana, to attend MSSC meetings and workshops. This evening, he showed a number of slides based on photomicrographs of a diamond solitaire in a simple gold mount. He showed how the brilliance or 'fire' of a stone is enhanced by the number, configurations and other relationships of the facets on the stone surface. Ron also showed slides of the advanced photomicrographic setup which enables him to produce work of the highest quality.

Y2K OR NOT, DUES 'R DUE! All members-of-record have been notified that dues for the 1999-2000 fiscal year, are forthcoming. It is gratifying to report that to date, more than 50% of the MSSC membership have crossed your affable Treasurers' palms with silver! By the way, please make sure that your checks are made out to David L. Hirsch/MSSC. - AND NOW, COMES SHOW AND TELL. In addition to his Slide presentation, ALLAN BISHOP brought in a Zeiss Jena, circa 1889, Stativ (stand) I. A noteworthy feature of this fine compound monocular microscope, was the rotatable upper arm. The instrument and its' many accessories were fitted into an expertly hand crafted hardwood case. An Ellis aquatic type microscope, signed: Cary London was displayed by BARRY SOBEL. The microscope mounts on the cover and stores into its' wooden case. It features a horizontal arm containing a single lens. The arm adjusts vertically through a rack and pinion, as well as horizontally, to access all parts of the square stage. Pres. GEORGE VITT brought in a Bausch & Lomb projecting microscope. The base contained the power transformer and a column on top of which was the head assembly comprised of the light source and the lens system. Three objectives mounted on a revolving nosepiece offered a range of magnifications. The head is tiltable to allow for horizontal or vertical projection. Getting back to business, KEN GREGORY showed vintage optometric instruments. His B&L Morton type ophthalmoscope, circa 1930 has a mirror, centrally perforated for use in viewing the interior of the eye, especially the retina.

COMIC RELIEF - AN OPTICAL JOKE. Did you hear about the oculist who fell into a lens-grinding machine? He made a spectacle of himself. BACK TO BUSINESS. Another instrument of Ken's', also circa 1930, consisted of two eyepiece assemblies on a stand, for measuring dioptic correction for astigmatism. Ken also offered for sale, a B&L stereobinocular microscope from the 1960's. STEVE CRAIG is mending nicely and is in good spirits, as always. All MSSC members are urged to contact Steve and further speed his recovery. Phone Steve at: (310) 397-8245, or by email at: scraig@leonardo.net

SPEAKING OF EMAIL. More and more MSSC members are "seeing the light" as they sign up for the Internet. The many perks include the countless hours one can spend poring over the limitless scientific goodies featured on ebay. Email also provides one with the opportunity to communicate with people the world over. If you have recently joined the Internet army, please contact Gaylord Moss to add your email address to the MSSC roster. Gaylord's' email address is: gmoss@mediaone.net A PARTING SHOT. The ad on page 250 in the December 1999 issue of this Journal features the Scientific and Technical Antique and Collectible Show held on January 30. The picture in the ad shows a Norremberg Polariscope, shown in the excerpt from the 1870 edition of the James W. Queen & Co. Optical Instruments Catalog. A few years ago, I purchased one of these instruments in an English antique shop, as mentioned on page 243 of the December MSSC Journal. My polariscope is in need of reconstructive surgery, after toppling from its' perch during the January 1994 Northridge quake. KUDOS OF THE NTH DEGREE. A rousing MSSC cheer for the ERNIE MEADOWS's, who have so graciously provided us with the use of their patio for our Workshop during STEVE CRAIGS' convalescence; more proof that Brotherhood and Fellowship have taken on new meanings since the rebirth of MSSC.

How Old Is That Microscope in the Window?

Herbert A. Gold

One of the first things a collector wants to know about his newly acquired prize is how old it is. Without the actual bill of sale or other reliable documentation it may be a difficult question to answer. There are many clues to age including configuration, materials of construction, provenance, signature and a serial number. Then there is the matter of the difference between when it was made and when it was sold. Serial numbers, when there are supporting records are a pretty good, albeit far less than perfect, indication of age. This article will be concerned with serial numbers found on stands of two American makers, Spencer and Bausch and Lomb, for which some reasonably authoritative documentation has been found.

Michael Benz of Benz Microscope Optics Center in Ann Arbor, MI is a third generation microscope dealer. He also happens to have a fine collection of microscopes and an overwhelming collection of microscopical literature. His family has represented Spencer and many other makers in their various incarnations over many years. Michael has been kind enough to share the following tabular material with us.

The Spencer Lens Company was acquired by American Optical in 1935. In 1962 AO formed a partnership with Reichert Scientific Instruments. Early in 1986 Reichert launched a sales promotion to find the earliest "Spencer" microscope. The grand prize was a weekend trip to Paris on the Concorde with dinner at Maxim's. I don't know what microscope was the winner or who ate the goose livers but Michael does have a copy of the documentation that was used to determine the winner.

Reichert published two tables of serial numbers. The first table showed the serial number range and date range associated with nine different models. It has been published in Dr. Brian Bracegirdle's 1996, *Notes on Modern Microscope Manufacturers*, page 70. What I believe to be of more interest is the second table which is shown below.

For Spencer/Spencer Lens Co./American Optical

Serial Number	Approx. Date of Shipment	Serial Number	Approx. Date of Shipment	Serial Number	Approx. Date of Shipment
10,000	About Jun. 1909	210,038	Sep. 14, 1944	410,000	Jan. 1959
20,000	Apr. 27, 1913	220,000	Nov. 20, 1945	420,000	Nov. 1959
30,000	About Jun. 1916	230,000	1946	430,000	Feb. 1960
40,000	Nov. 8, 1917	240,000	1946	430,010	Jan. 1958
50,000	Mar. 12, 1919	250,000	1947	439,954	Aug. 1958
60,000	Jun. 23, 1920	260,000	1947	448,000	Dec. 1957
70,000	May 23, 1921	466,745 - -478,492	Assigned in error. Serial Numbers duplicated in 1962	450,000	Mar. 1960
80,000	May 21, 1923	270,000	1948	458,000	Mar. 1960
90,000	Aug. 6, 1925	280,000	1948	460,000	Mar. 1962
100,000	Approx. 1932	290,000	1948	470,000	1962
110,000	Approx. 1933	300,000	1949	480,000	Feb. 1961
120,000	Approx. 1933	310,000	Sep. 1950	490,000	1961
130,000	Sep. 31, 1934	320,000	Sep. 1951	500,000	Jul. 1963
140,000	Apr. 12, 1937	330,000	Sep. 1952	510,000	May 1964
150,000	Sep. 22, 1938	340,000	Aug. 1953	520,000	May 1964
160,000	Nov. 29, 1940	350,000	Feb. 1954	530,000	1964
170,000	Sep. 12, 1941	360,000	Mar. 1955	540,000	Oct. 1964
180,000	1942	370,000	Sep. 1955	550,000	1964
190,000	Mar. 2, 1943	380,000	Jun. 1956	560,000	1965 1944
200,000	1944	390,000	Sep. 1957	570,000	Feb. 1965
210,000	1944	400,000	1957	580,000	Aug. 1965

Note the range from about 430,000 to 470,000 contains several unexplained sequencing anomalies. Perhaps these are a consequence of the numbering errors in 1947. Remember that the shipping date does not necessarily coincide with the date of manufacture. Number 10000 was the earliest stand shown as many records relating to the very early period of the company were destroyed in a factory fire.

On a B & L factory visit a number of years ago, Michael had the opportunity of going through their files and finding a copy of serial numbers and their date of manufacture. There is a note on the list indicating that these are approximate dates of manufacture and not necessarily dates of sale.

For Bausch & Lomb

Serial Number	Year of Manufacture	Serial Number	Year of Manufacture	Serial Number	Year of Manufacture
1	1876	32000	1900	170000	1924
150	1877	33000	1901	175000	1924
350	1878	35000	1902	180000	1925
800	1879	40000	1903	185000	1926
1100	1880	45000	1904	190000	1926
1450	1881	52000	1905	195000	1927
1750	1882	57000	1906	200000	1928
2000	1883	63000	1907	205000	1929
2500	1884	69000	1908	215000	1929
3000	1885	76000	1909	225000	1930
3800	1886	82000	1910	230000	1931
4500	1887	86000	1911	235000	1932
5300	1888	89000	1912	240000	1934
6375	1889	95000	1913	244000	1935
7600	1890	98000	1914	247000	1935
9200	1891	104000	1915	250000	1936
10000	1892	110000	1916	260000	1937
11700	1893	120000	1917	270000	1938
13900	1894	129000	1918	280000	1939
17000	1895	135000	1919	290000	1940
20000	1896	140000	1920	300000	1940
25000	1897	148000	1921	310000	1941
28000	1898	155000	1922	320000	1942
30000	1899	160000	1923		

In 1941 it became a bit more complicated when B & L went from a numeric to a two letter designation. The first letter represented the year of manufacture and the second letter was the class designation. Class designation is the number used in the official B & L price list for roughly similar equipment. See the table below.

First Letter

Letter	Year	Letter	Year	Letter	Year	Letter	Year
A	1941	G	1963	N	1962	V	1944
B	1945	H	1959	P	1958	W	1948
C	1949	J	1955	R	1954	X	1952
D	1953	K	1951	S	1950	Y	1956
E	1957	L	1947	T	1946	Z	1960
F	1961	M	1943	U	1942		

Second Letter

Letter	Class	Letter	Class	Letter	Class	Letter	Class
A	51 & 53	G	61 & 91	P	31 & 33 - Objectives only (3/17/53)	W	61 &91
B	31 & 33	H	71	R	41 & 42	Y	41 & 42
C	21	K	31 & 33	S	51 & 53	Z	51 & 53
D	31 & 33	L	31 & 33	T	61 & 91		
E	41 & 42	M	31 & 33 - Gratings only (1/2/53)	U	61 & 91		
F	51 & 53	N	31 & 33 - Micro	V	61 & 91		

Class Designation

21	unknown
31	Microscopes, microtomes, accessories
33	Colorimeters, refractometers, saccharimeters, spectroscopes, spectrometers
41	Balopticons (projectors)
42	Photomicrographic equipment, micro-projectors, accessories
51	Photographic lenses
53	unknown
61	Binoculars, spotting telescopes
71	Transformers
81	Magnifiers
91	Magnifiers, loupes

I'd like to thank Dale Beeks, collector, dealer and historian, for first making me aware of the Spencer list and MSSC giant, Jim Solliday, for his help in decoding the B & L two-letter codes.

Overseas Shipment - Continued from page 11

phone, through the kindness of Jon Baddeley, the maker was flown here to fix it. After four full days of work, he completed his task. The ordeal was such a nightmare for me that I subsequently sold the instrument.

More recently I purchased another instrument from Bonhams. It was a Smith and Beck "Best Plain Student" Microscope with a low serial number. Upon picking up the box, I was a bit concerned by the fact that I could hear the contents rattling inside. Unfortunately upon opening it, it was even worse than it sounded. The case of the instrument was broken into hundreds of pieces; glass parts were literally powdered, and the microscope itself severely damaged. Considering my previous experience with Bonhams, this time I wrote directly to the managing director and this time the instrument was taken back unconditionally and they offered to pay the shipping as well. Unfortunately, this fine instrument is virtually lost to the world.

Most recently, I had a shipment which I had obtained two months ago at auction. Unknown to me, even though I was told it would ship within three weeks it was not shipped until 5 weeks after the purchase. After six weeks had passed I inquired as to what had happened and was informed it reached New Jersey 2 weeks ago, but had not cleared "Fish and Game" nor U.S. Customs. It seems that because the keyhole plate (escutcheon) was possibly made of ivory, even though 200 years old, it had to go through fish and game. This being said, it then had to clear the U.S. Customs service department of antiquities in New York City. What I did not understand, is, that despite all the proper paper work, it was still sitting in New Jersey two weeks after it arrived. After contacting Federal Express, I was first led to Fish and Game; I spent considerable time phoning all over the country trying to find out why they kept delaying it. I eventually determined that they were not! I finally connected with the U.S. Customs agent who said she sent the paper work to antiquities and they had not returned it. She was most adamant that she could do nothing else. I eventually tracked this down to the antiquities department and they told me they had cleared it weeks ago (ugh!!!). As it turned out, the person who cleared it apparently did not sign the form, and the original agent ignored the form when it returned unsigned!! Now that I had made this known, it was to take two more days to be resubmitted. As of the date of this writing, I still do not know when I will receive it.

Although auctions are sometimes a good way to get a rare or valuable antique instrument, one must be prepared for the worst and expect long delays or even possible damage. Caveat Emptor never had more meaning

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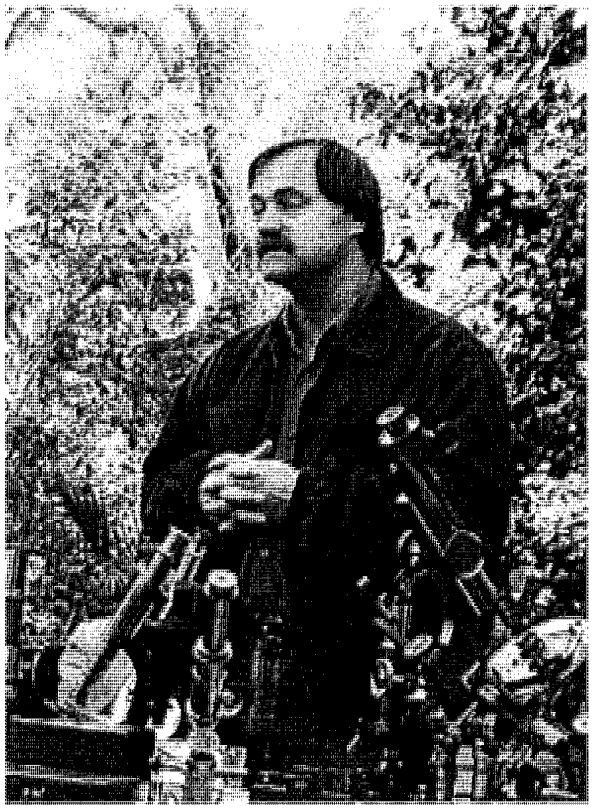
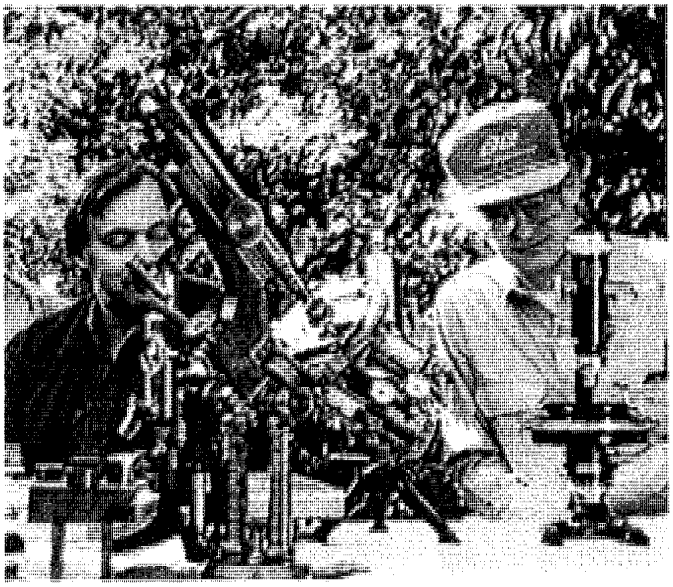
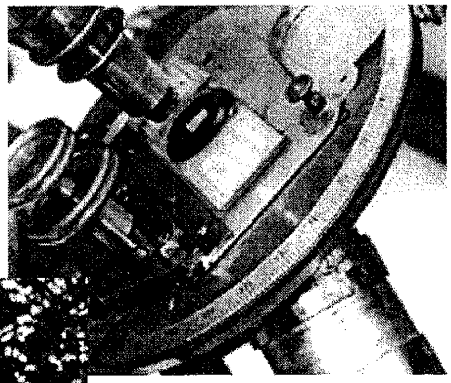


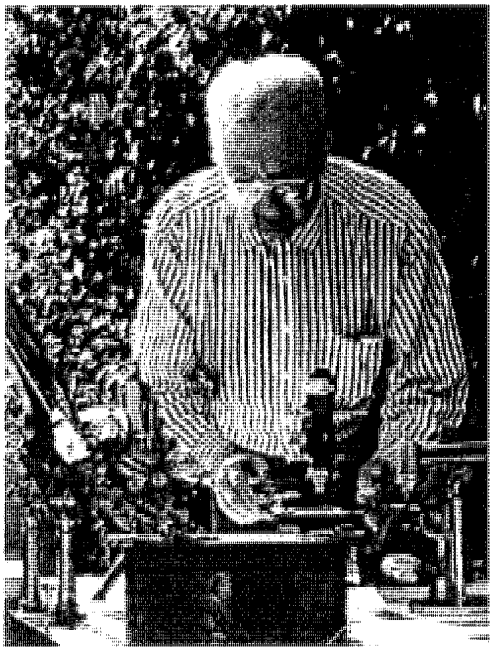
Jim Solliday



Jim Solliday and Barry Sobel

PHOTOS OF THE 9 JANUARY WORKSHOP by Larry Albright





George Vitt

Peter Fischer

John deHaas

MSSC WORKSHOP

Date: 9 January 1999

Place: Ernie Meadows' residence

by: George G. Vitt, Jr.

1. **Jim Solliday** gave us an update on the state of health of our well-loved Workshop Chairman, Steve Craig.

2. **George Vitt**, seeing that there were several new faces in attendance, asked if they would introduce themselves and tell us a bit about their interests and activities.

3. **Ed Jones** showed his "first microscope" - a plastic toy - which elicited many humorous quips! He then demonstrated how a mechanically stressed polyethylene sheet exhibits birefringent colors when placed between two crossed polarizing sheets, the stress figures going out to the blue. Ed then described a B&L fingerprint microscope stand. It consists of a 4.5X achromatic triplet through which one views a fingerprint on white paper which is placed on the stage. This sort of microscope is used for identification by the "ridge count" method.

4. **Dave Hirsch** displayed a microprojector, with 50X and 100X objectives, which he had obtained on ebay and which he had restored, adding a light control and some re-wiring. It had been used for hair research by the Redken Labs.

5. **Bill Blitch** informed us that the residence of his father, Norm, is available for Workshop meetings if and when that need might arise.

6. **Stuart Warter** displayed a Tolles Student model microscope, Jan 1868, which he had obtained on ebay. This date was finely inscribed by hand on the inside rim of the objective! The short body tube contains a correction lens, which decreases the effective optical tube length, and there is a substage multi-diaphragm disc. Coarse focus is by movement of the very substantially built body tube and fine focus is by turning the objective in its screw mount.

7. **Ken Gregory** displayed a c.1923 B&L binocular dissecting microscope He then displayed a B&L model KW microscope, c.1928, equipped with a drum-type objective changer, reminiscent of the Zeiss and Russian LOMO stereo microscopes. It was interesting to note that the heads of both microscopes are removable and interchangeable, making the two a very flexible pair of instruments.

8. **Jim Solliday** displayed a c.1886 Watson X-Y stage with concentric controls which can be added to any microscope having a flat stage. He then showed a "mica selenite stage" by Watson, which display blue, yellow and green birefringence colors and where each of the three selenites are rotatable. Jim then showed the Watson "Edinboro H", c.1920, with large body tube, 3 objectives, an X-Y stage. The high NA Hollis objectives began to be used because of the then recently published work by Abbe, which set the scientific basis of microscope objective performance. The stage has a large round aperture to enable the use of highly oblique illumination. As a final 'piece de resistance', Jim showed a Watson beam splitter used to provide vertical incident illumination.

9. **Barry Sobel** exhibited and described three extremely interesting and rare microscopes which caused quite a stir and brought on many discussions:

a) Charles Chevalier's Universal Achromatic Microscope: French. C 1845. Signed: "Microscope Achromatique Universel / de / Charles Chevalier / Ingenier Opticien / Palais Royal 163 Paris" This microscope dates from the early years of the achromatic microscope, hence the label as such. It is universal in the sense that it can be used in 6 different arrangements, and for more than 6 widely differing purposes. When set up as an ordinary microscope, but with the tube horizontal, it allows the stage to be kept flat while at the same time using a camera lucida. The objective assembly can be rotated 90 degrees to the side, allowing inspection in a vertical plane. The prism can be removed and the tube put up to replace it, thus providing a traditional vertical microscope which can also incline, when the bottom pin is removed. Also with that pin out, the microscope may be used inverted. This could serve to allow views of pond life at the bottom of a glass container. It also allowed chemical reactions, which gave off fumes, to be observed from below, thus sparing the optics from the fumes. Likewise, the stage could be heated and again, observing from below the source of heat is much preferable! The compound assembly could be replaced with a single lens to be used as a dissecting microscope. Two different types of stage were available as well. This instrument has no fine focus but does have a drawtube. The achromatic objective is of the Chevalier type, with three air spaced achromats below a diaphragm, which Chevalier used to reduce the spherical aberration, which was still inherent in the arrangement. Charles Chevalier died in 1859. M-282.

b) Rare George Wale Microscope: American c. 1877. Signed: "GEO. WALE PAT'D JUNE 6 1876" on the foot and inscribed on the tube sleeve: "N.Y. Homo.

Med. College FACULTY PRIZE for HIGHEST STANDING awarded to JOHN L. MOFFAT B.S. M.D. March 8th 1877". It stands 9 3/4 inches tall (minimum). It features many unique and innovative features. Focus is by gradual screw adjustment of the tube which has a V-shaped groove which rides through a wedge shaped sprung guide on a pivot, making for very accurate alignment during adjustment. Fine focus through the continental style triangular pillar of the bar-limb, which rides between two short uprights, the tension, adjusted via a T-shaped control. The plano-concave substage mirror may be moved in a swinging or up and down motion. The stage is glass and slides hand driven with adjustable spring tension on the guide. The centerable substage is attached to the underside of the stage and the two supplied substage fittings anchor to it via bayonet fittings. One contains a very finely adjustable iris. There is a drawtube. The stand may rotate 180 degrees on the foot to allow for better support when sharply inclined or horizontal. The instrument is complete with two original Wale objectives (numbered 15 and 52), the higher power with correction collar. There are two eyepieces, a unique camera lucida and a stage forceps on a plate, which can rest on the glass stage. George Wale was known as an innovator, and is best known for the invention of the Wale Limb, a design copied by famous makers all over the world. #m-281.

c) Walter Bulloch's Congress Stand: American c. 1883. Signed:"W. H. Bullock Chicago Pat'd 1879 262." on the flat tripod foot. This is the version of the Congress stand described in the Journal of the Royal Microscopical Society in 1882. It was, almost certainly, the most complex stand available at the time from an American maker. The name of the instrument derives from the exhibition of its first version at the National Microscopical Congress in Indianapolis in 1878. It continued to be made (in small numbers) until about 1890. At one time this instrument was considered one of the 3 or 4 best made microscopes in the world. Although Bulloch understood optics, he apparently only made the stand and objectives were usually supplied by those such as William Wales, with whom Bulloch was in partnership for a time, as well as other makers. The stand is 19 inches minimum height. It has a dual swinging substage and a versatile mechanical stage calibrated in x, y, and rotational axes. The new stage and the arrangement of the substages, such that they rotate on a rod, which is not attached to the stage, were the major new features of this instrument as described in 1882. In original condition it has nickel stage plates and silvered scales on the foot, fine focus, around the circular stage, and around the dials of both substage movements which are separate (substage mirror independent of condenser assembly). The condenser assembly also had a sophisticated control using rack and pinion for vertical and forward and back motion, and a worm gear for left-to-right adjustment. It also featured the ability to use extremely oblique illumination from below the stage, allowed by the stage's thin dimensions. There are sprung stops to set up the substage assemblies vertically. The substage may also rotate completely out of the optical axis. There is a rack and pinion adjustment for fine focus and also for the drawtube. The long-lever screw fine focus is within the Lister limb similar to Zentemeyer's. The Mirror is 3 inches in diameter and articulated. It came to the present owner with a 1/8 inch Tolles objective (labeled 0.2 *) and a 2/3 inch William Wales objective. It currently has a double nosepiece. It weighs over 21 pounds. #M-283.

10. **Herb Gold,** bearing more that his usual expression of the 'cat that ate the canary' (and justifiably so), exhibited his latest prize - A Spencer Mod. 37A polarizing microscope, complete with all accessories (except the Becke plate) in a mahogany case, into the inside top of which fits a sub-case containing the several original Spencer objectives and accessories. The Hamilton Watch Co. had used the instrument. The entire outfit is in pristine condition, the microscope cleaned, lubed and adjusted and the cases having been expertly re-finished by Alan Bishop. Alan de Haas and George Vitt were among those who lauded and explained the precision and quality of this series of Spencer microscopes, giving details as to its construction and its mechanical and optical functions.

11. **Alan Bishop** was congratulated roundly for the excellent job of restoration of the above mentioned Spencer 37A. Alan then described the possible uses to which Hamilton had put this instrument.

There was a coffee and pastry break between 10:45 and 11:20

12. **Jerry Bernstein** reminisced about his 'very first microscope', the Aloma, of some 40 years ago, and that he was able to find a duplicate on ebay for $20. This started a round of reminiscences concerning 'the first microscope'.

13. **George Vitt** told of his first microscope, given him by an uncle on his 11th birthday. It was a small Japanese monocular that cost $2.00. Two years later George had made of sheet copper (soldered) an adapter to balance his Zeiss folding roll film camera (2.25x3.25") on top of the microscope With polaroids swiped from the GM 3-D movie exhibit at the New York World's Fair (1939) he took his first photomicrograph - of amidol crystals.

14. **Dave Hirsch** then told the story when, as a boy, he pointed out to his mother the presence of 'vinegar eels' in their vinegar bottle! From that moment, vinegar was forever absent from the household!

15. **Larry Albright** showed two microscopes: A Betz, made in Chicago, and a very fine Hartnack double pillar microscope

16. **Alan de Haas** told of the high price of microscopes in the 'good old days', giving as an example the fact that a small Leitz type SY polarizing microscope with synchronous rotation of polarizer and analyzer (a la Dicke) cost $1,300 in 1936! Alan then related the following startling fact: In his book "Studies in Marine Biology" by Harnell, there was enclosed a handwritten letter which tells of a 40 year gap when no Marine Biology research work was done in the Jersey Islands. There followed a discussion on the original high cost of certain books.

17. **Larry McDavid** showed an 1893 alcohol lamp with spherical container, and two Nikon "Small World" calendars. He then showed a "Mercury phosphorescent tube" which illustrated the Thiebold luminescence effect, mentioned in the book "History of Luminescence". There was a brief discussion of the triboelectric effect. Larry then showed a sample of a thick plate of acrylic plastic, which had been subjected to a dose of 1 megaRad of radiation, producing within its volume the intricate, dendrite-like, "Lichtenberg Figures". He then passed out copies of a paper on this subject. Larry also mentioned that the super-accurate clock he had shown at a previous Workshop is available for $25 (!) at Fry's in their toy microscope department and at their checkout counter.

18. **Fred Hantsch** showed the book "Gold of Troy" (which related the archeological excavations of Heinrich Schleimann and the finding of 2.5-cm diameter plano-convex lenses! These were of rock crystal and dated 2200-2600BC. There was a discussion of the presence of lensmaking lathes in Greece around 200BC where lenses must have been made for use in engraving their extremely detailed and fine seals and seal rings. George Vitt related having seen such seals in the collection of a friend in NJ, and he attests to the fact that these could not possibly have been engraved without the aid of optical magnification.

19. **John de Haas** recommended the use of 98% or better methyl alcohol as a fuel in alcohol lamps, otherwise the flame will 'spit'. John announced that he has available a Zeiss trinocular microscope and electronic microbalances.

20. **Gaylord Moss** described how "Octavo" is publishing, on CD-ROM, classic works and books by famous investigators. The imagery frame contains 8,000 X 10,000 pixels, compressed to 10MB, and there are 3 levels of resolution per image. The CDs cost between $35-$70. Octavo's Web Page is <http://www.octavo.com>. Then, Gaylord brought up a very important and disturbing subject: the loss of information in the 'information age'! With terabytes of every conceivable form of data being recorded worldwide, the archival storage of this information is being done on media, which have only short-term permanency. Unless technology for permanent storage is developed soon, we may be in for a New Dark Age - and this is no laughing matter! This subject spurred a lively discussion.

21. **Jim Clark** related that his first microscope was the same as a 2-pillar Hartnack, and that his two sons used it through their schools. It was a Swift with a Travis stage c.1894. Jim told us that he is working on a historical research on the typical American instrument maker's shop of the 19th century. To this end he has been making trips to the Smithsonian Institute and Rhode Island to get information. (Rhode Island has Brown & Sharpe, while New England was the center of machine tool manufacturing. It was in Whitneyville, CT where the concept of interchangeable parts was born.) In comparing instrument makers of America, England, France, Germany and Switzerland, in his opinion, the most creative were the Americans and English.

We all wish to thank Mr. and Mrs. Ernie Meadows for their marvelous warm hospitality to the Workshop. The setting was idyllic. We were surrounded by a veritable botanical garden in this serene outdoor setting of incomparable trees of great age and uncountable types of flowers. It was indeed a memorable meeting!

MSSC February Meeting

Wednesday, Feb. 17 at 7 PM
Crossroads School
1714 21st Street
Santa Monica, CA

The Stories of Forensic Science and Where to Find Them

Ed Jones

The featured speaker will be our own Ed Jones who will honor us with the talk that he gave as the dinner speaker to the California Association of Criminalists in 1998.

Ed will discuss the forensic science in several famous cases including the 1923 Siskiyou train robbery which Ed considers one of the ultimate examples of using science to solve a case. He will also include examples from the Lindberg kidnapping, the Sacco & Vanzetti and Sam Shepherd case. "The Fugitive" was a spin-off of the Shepherd case.

Ed will also bring over 100 books from his library to show the depth of available information.

There will also be the usual exhibition of the microscopes and related items as well as the, much encouraged, showing of slides or ongoing projects from the members in the second half of the proceedings.

DUES

If you have forgotten to pay your 1999 dues, please send them now to avoid missing a Journal issue. Make your check for $40 corresponding or $50 regular member to our treasurer, David L. Hirsch. Do not make the check to MSSC. Send to:

David L. Hirsch
11815 Indianapolis Street
Los Angeles, CA 90066-2046

ELECTIONS

In spite of the heroic best efforts of our esteemed secretary, Ron Morris, the excitement and general hubbub at the end of the last meeting made it impossible to conclude our annual election of MSSC officers. Therefore, at the start of this meeting, there will be candidates for each office proposed and seconded from the floor after which each member will fill out a secret ballot for his choice for each office. All the officers for this year should be congratulated for their successful guidance through a wonderful twelve months.

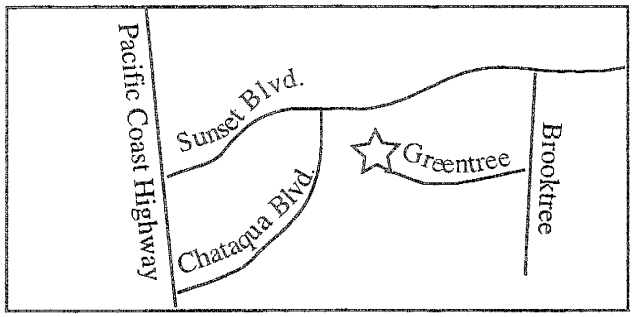
E-Mail Addresses

This issue includes the mailing list for the Journal with telephone numbers and some e-mail addresses. If you do not see your own e-mail address listed, or know of someone elses that is not listed, please e-mail the address to me at <gmoss@mediaone.net> and I will include it in a special list in the next Journal. Also, if you see any mistakes in the current address list, such as the ever-changing telephone zip codes, please let me know so that I can publish a correction.

Gaylord Moss Ed.

Saturday Workshops

As we cheer on Steve Craig's recovery we have been fortunate to have a venue for our beloved Saturday Workshops thanks to the generosity of Marj and Ernie Meadows who have welcomed us to their lovely home in the Pacific Palisades. The photos on page 18 show the members enjoying the sun on the patio under the sycamore trees. What does not show are the fragrance of the camellia blossoms nor the bird songs that punctuate our relentless California winter. As before, the workshops will start at 9 AM on the first Saturday of each month. A map to the Meadows' residence is shown below.



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