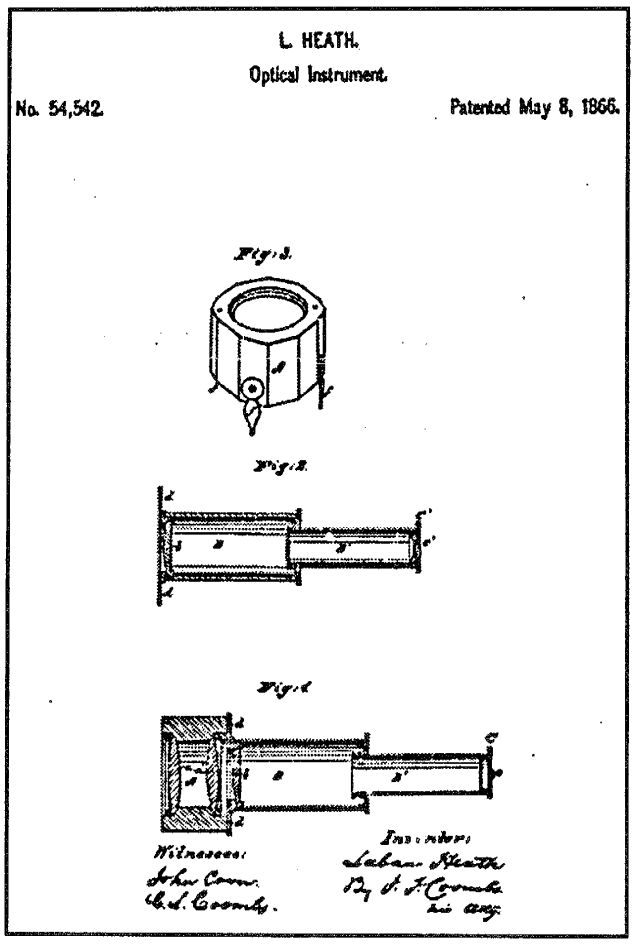
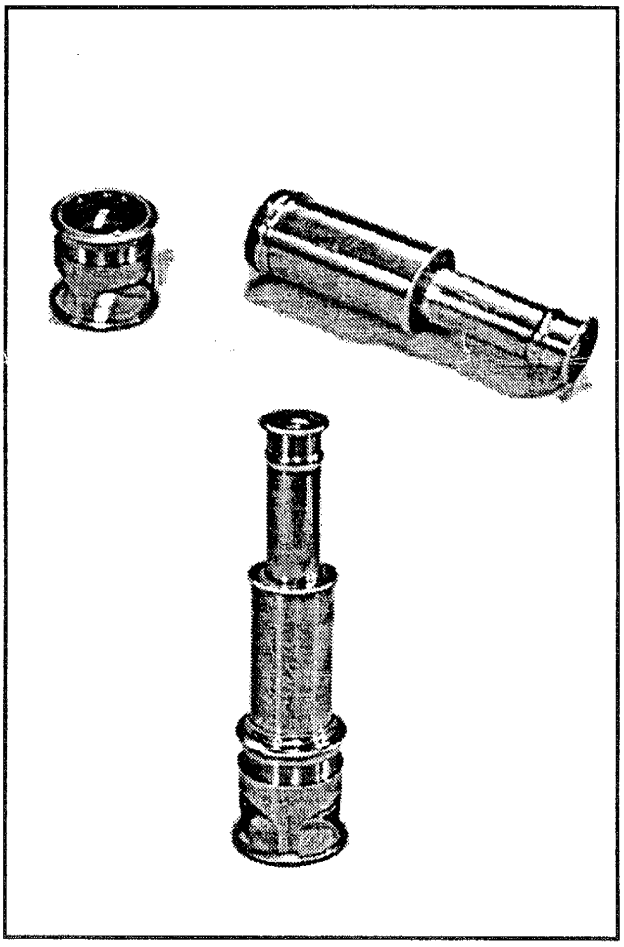
Bulletin of
THE MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA
Volume 2 Number 3 March 1997

LABAN HEATH'S "INVENTION"

AN AMERICAN ORIGINAL — OR WAS IT?

Stuart L. Warter


L. HEATH.
Optical Instrument.
No. 54,542. Patented May 8, 1866.



On May 8, 1866, antedated to May 1, the United States Patent Office issued Letters Patent No. 54,542 to one Laban Heath of Boston, Massachusetts, for an "Improvement in Optical Instruments." In the specification therein, Laban Heath writes: "Be it known that I, Laban Heath ... have invented a new and useful Optical Instrument Easily Convertible into a Microscope, a Telescope, and a Magnifying-Eyeglass ...."

As originally conceived in the accompanying drawings, the pocket-sized single draw Galilean telescope would attach via a terminal annular ring "by pins and slots" to a substantially constructed tabletop magnifier to become a microscope. It was further necessary to exchange the concave-lensed telescope eyepiece with a planoconvex-lensed microscope eyepiece. The fixed focus magnifier contained two biconvex elements. All

lenses were to be achromatic. There was no slide holder, nor was there any provision for transmitted illumination, so the microscope was intended only for direct examination of opaque objects. The actual patent text and drawings are shown in Appendices I and II on pp. 44 and 45.

As finally produced for Heath by its evidently French manufacturer, the telescope component screws into a screw-focusing magnifier, which is considerably flimsier than that in the original conception. (fig.1). The telescope tube and magnifier each are stamped (the tube in large script letters and the magnifier in small block letters) "Laban Heath/Patent May 1, 1866," and "Depose' No. 5082" (the latter a French registration number). When assembled and fully extended, the microscope stands six inches high (fig.2).
While there may be some elements of originality in Heath's execution of the concept of convertibility, that concept itself was by no means invented by him. Optical "compendia," as they were known, with multiple instruments sharing a variety of components, had been around since at least the early 18th Century. A specific telescope-microscope combination of far greater utility and practicality was in fact described and illustrated in 1787 by none other than George Adams in the first edition of his *Essays on the Microscope* (fig.3). Undiscovered examples of this ingenious instrument may in fact exist today unrecognized, masquerading as simple pocketable refracting telescopes. All it was necessary to do to convert this three-draw telescope to a microscope was to remove the wooden outer tube from the brass drawtubes and extend an inner sleeve from within the last draw tube. This sleeve could be rotated to expose an upper opening for direct illumination of opaque objects, but it also had provision for transmitted illumination through a lower opening. The outer lens cap of the telescope was itself a container which held, beneath one of its own screw-caps, a mirror which could be inserted in the lower opening of the sleeve to provide the transmitted illumination (or the microscope could simply be held horizontally and pointed straight towards a light source). A second screw cap on the other side of the "lens cap box" contained two circular ivory sliders, each containing nine cells; one set with open apertures, the other with opaque wells. A slot in the sleeve between the upper and lower apertures served as a stage and received the discs, which could be rotated on a pin to expose one cell at a time for viewing.

Apparently little is known of Heath or his products; in 1975 Padgitt was unaware of any surviving instruments. Since 1988, at least three of the convertible instruments

MSSC BULLETIN
Volume 2 Number 3 March 1997
CONTENTS

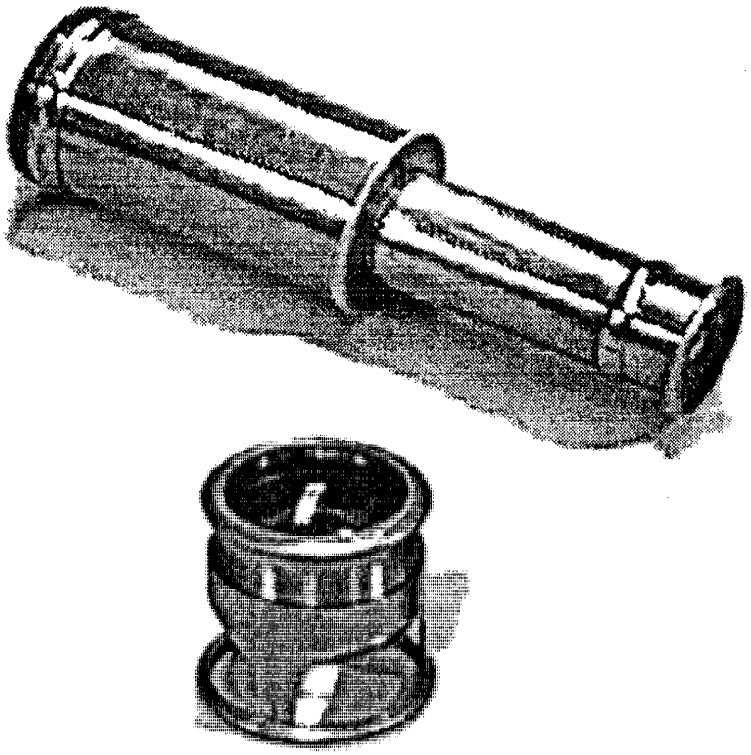


Fig. 1 Elements of Laban Heath Optical Instrument as manufactured.

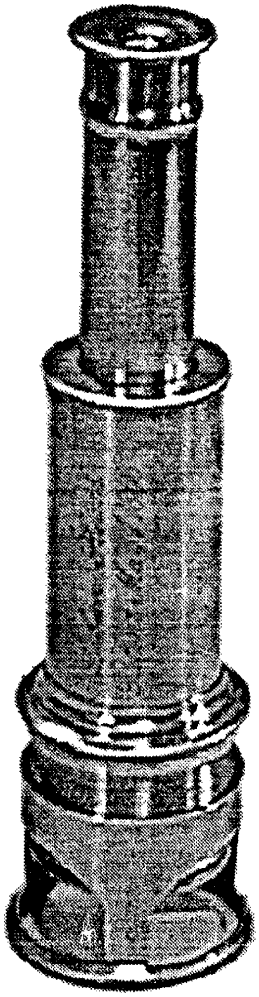


Fig. 2 Assembled Laban Heath Optical Instrument as manufactured.

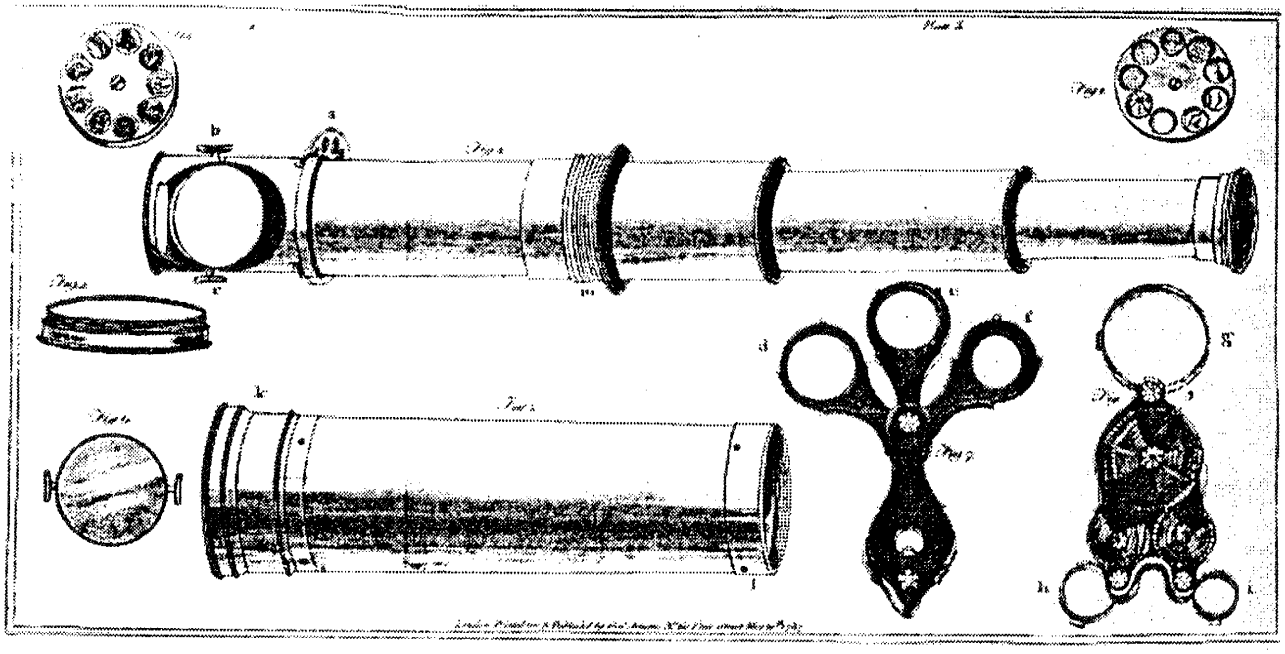


Fig. 3 Optical compendia as illustrated in 1787 by George Adams in the first edition of his *Essays on the Microscope.*

have been offered for sale. According to John Bell of Perry Hall, Md., Laban Heath also marketed, perhaps at a later date, a simpler device consisting of two lenses in a folding bright metal frame, and designated "Laban Heath's Improved Adjustable Compound Microscope." No picture is available of this instrument; it was supplied in a pasteboard box labelled "Laban Heath & Co." It is obvious that Heath was not content merely to retail other makers products, either perceiving needs not otherwise met, or simply looking to carve out a niche with unique offerings as a pure business decision. It would be of interest to know what other products might have been offered by this firm; perhaps there were other original designs. I would appreciate hearing from readers with any additional knowledge of Laban Heath, his firm, or his products. I can be reached by mail at the Department of Biological Sciences, California State University, Long Beach, CA 90840; by fax at (310) 985-8878; by phone at (714) 8470529; or by e-mail at swarter@csulb.edu.

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UNITED STATES PATENT OFFICE.

LABAN HEATH, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN OPTICAL INSTRUMENTS.

Specification forming part of Letters Patent No. **54,542**, dated May 8, 1866; antedated May 1, 1866.

To all whom it may concern:

Be it known that I, LABAN HEATH, of the city of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Optical Instrument Easily Convertible into a Microscope, a Telescope, and a Magnifying-Eyeglass; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Figure 1 is a sectional view of the instrument when adjusted to be used as a microscope. Fig. 2 is a sectional view of the same adjusted to be used as a telescope. Fig. 3 is a perspective view of that part which, being detached, serves as a magnifying-eyeglass.

Like letters refer to the same parts in all the figures.

A is that portion of the microscope containing the two large double convex lenses *a* and *a'*, and which, being detached, constitutes a magnifying-eyeglass of great power. B and B' are two ordinary telescope-tubes, one sliding within the other in the ordinary way, and *b* is a plano-convex lens or the ordinary larger lens of a telescope. C is a cap screwed onto the end of the sliding tube B', containing an achromatic lens, *c*. When these parts are all put together and arranged as shown in Fig. 1 the instrument is a microscope of great magnifying power.

To convert the instrument into a telescope, the part A, containing the two double convex lenses, is detached, and the screw-cap C', containing the concave lens *c'*, is substituted for the screw-cap C, as shown in Fig. 2. The part A being thus detached becomes a convenient magnifying-eyeglass. Said part A is attached to the annular flange *d* at the end of the tube B by means of pins and slots, so as to be easily detachable, or by other known devices for similar purposes.

The part A is provided with adjustable feet *f f f*, which may be turned up out of the way, or may be attached to a sliding band, so as to be drawn up out of the way when said part A is not in use as an eyeglass.

Having thus fully described my invention and the various modes of carrying it into effect, what I claim as my invention, and desire to secure by Letters Patent, is—

As a new article of manufacture, the convertible optical instrument herein described, constructed, arranged, and operating substantially as set forth.

LABAN HEATH.

Witnesses:
J. J. COOMBS,
JOHN COON.

Appendix I Patent text for Laban Heath's Optical Instrument

Fig: 3.

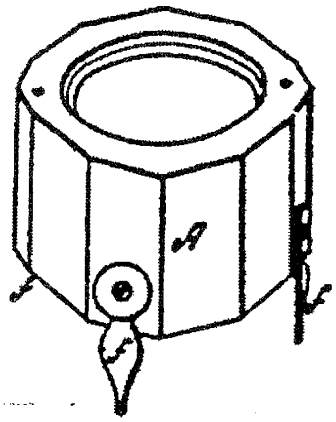


Fig: 2.

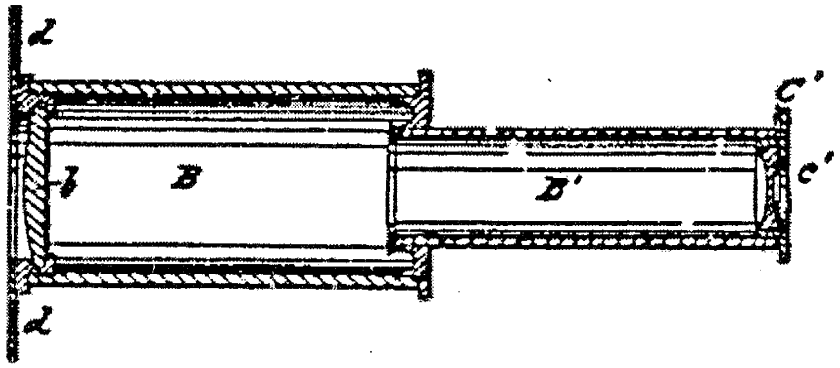
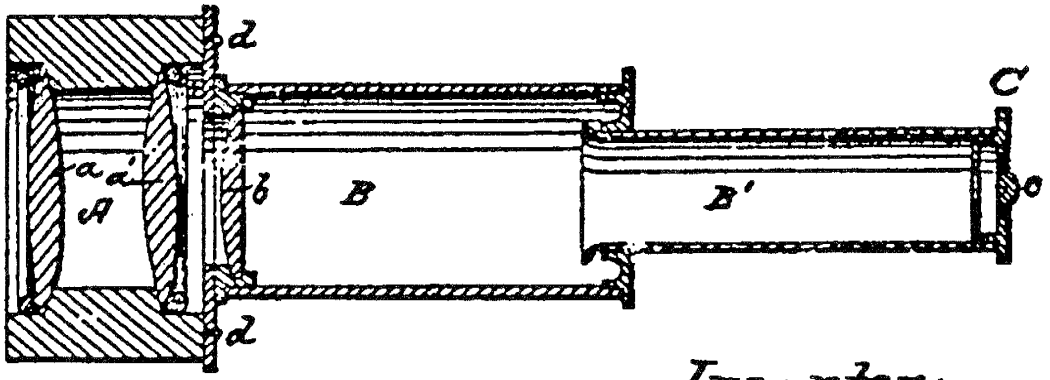


Fig: 1.



Witnesses:
John Coon.
C. L. Coombs.

Inventor:
Laban Heath
By J. F. Coombs.
his atty.

Appendix II Drawings for Laban Heath's Optical Instrument, Patent Number 54,542.

HOW MUCH IS THAT OLD MICROSCOPE WORTH?
Collecting or Investing

James D. Solliday

A few years ago I had the privilege of paying a visit to a wonderful gentleman who lived in Cambridge, England. It immediately became clear that his passion was the microscope and anything associated with microscopy. Before I had the chance to appreciate the brass and glass spread all over the den, I was swept away by the splendid boxes of perfect Enock slide mounts. By the time I lifted my head from my lap, I noticed that the wall was covered with just about every important book that was ever published on the microscope. I was intentionally ignoring the microscopes in an effort to keep from being overwhelmed. But inevitably, I was bouncing from one side of the room to the other eagerly taking in each and every instrument with the enthusiasm of a school boy. The collection was dominated primarily with impressive English Victorian instruments. Like the rest of you, my mind was spinning with questions of just where did he find such splendid pieces and how much did they cost? After hours of wonderful conversation, we finally focused our attention on the most magnificent example of Powell & Lealand's No.1 (Fig 1) that I had ever seen. The condition was like new and there was absolutely nothing missing. Both of Wenham's binocular prisms for normal and high powered objectives were present. The two accessory boxes were complete with every contrivance produced in the 19th Century. I did not dare ask how much he paid, but, in the course of our conversation, I found that all my questions were answered. He purchased the microscope just after WW II at a time when the essentials like meat and cheese were not readily available. At that time, just about everything was for sale and there were very few buyers. He said that he could not remember for sure but the price was certainly under 30 £. Was that the bargain of a lifetime or what? Perhaps.

It might be well to remember that an object is only worth what a person is willing to pay, and there are a great many factors that can influence that relationship. In 1946, the world had not yet come into a consciousness of antique collectibles. The thinking at the time was that, "if it's old, it's probably junk." One of the great tragedies of growing up was that when you went off to college, and more or less began a life on your own, your mother would go through all your junk and give it the old "heave-ho." Out went that shoe box full of marbles and those childish old baseball cards. Such was our way of thinking before the world became conscious of the value of "collectible" items. However, sometime in the early seventies all

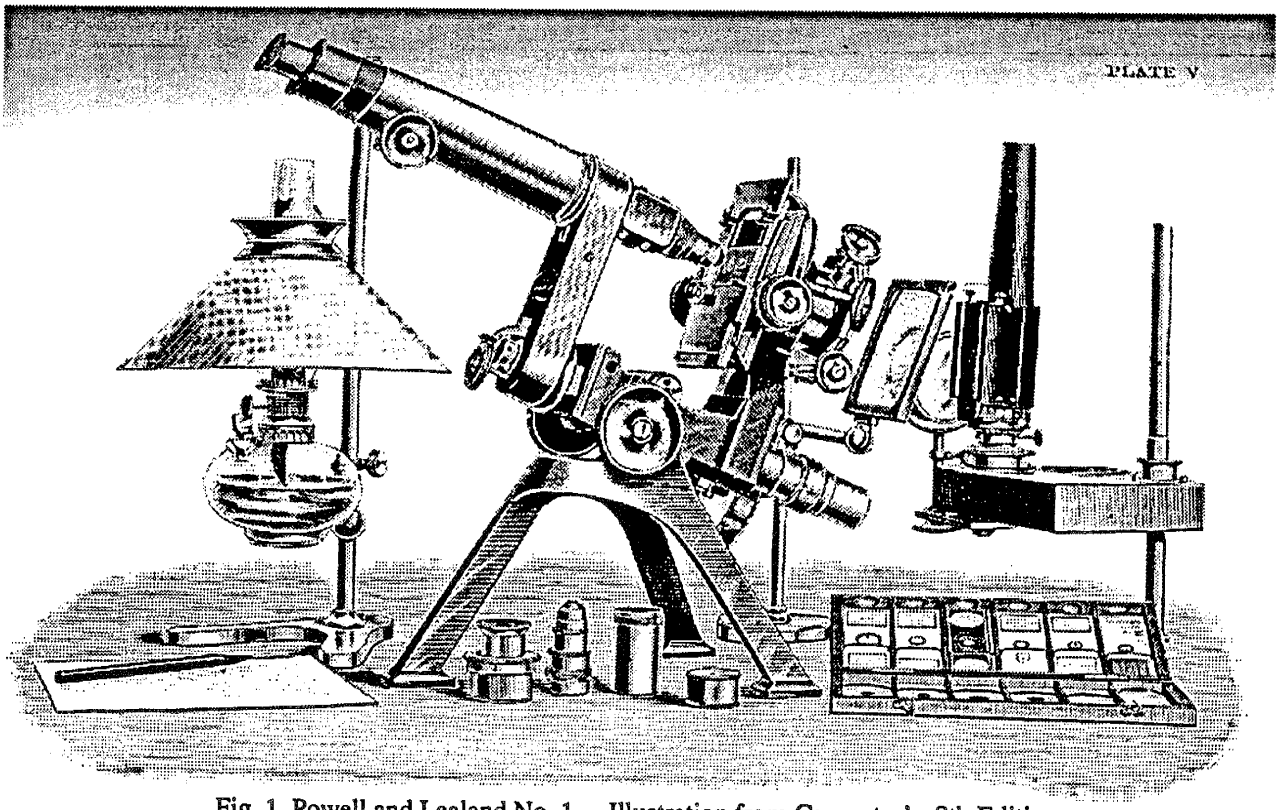


Fig. 1 Powell and Lealand No. 1 – Illustration from Carpenter's 8th Edition

that began to change. Perhaps it was the higher prices realized for works of art beginning in the late 1950's and exploding in the mid-eighties. Nowadays, people buy two or three hundred baseball cards at a time, fully expecting them to be worth big dollars in ten or twenty years. Just about anything that isn't perishable is now set aside for its potential "collecting" value. "Collectibles consciousness" is best defined as an understanding that an object has the potential to appreciate in value beyond its original cost. If you are one of those people, who last year, bought 30 Shaq rookie cards and tucked them away in a safety deposit box, then I must apologize for bursting your bubble. How much do you think they'll be worth if everyone you associate with bought 30 of the same cards? By now you may be wondering just where I am going with this and what does it have to do with microscopes. Well, the point is, our Cambridge Powell & Lealand at under 30£ would be a bargain today, but in 1946 it sold for just what it was worth. If you're the only guy in the country looking for one, the seller would then consider himself quite fortunate to find you. What does all this have to say about the value of old microscopes today? Well, that times have indeed changed and we now live in a world that has become very conscious of the value of antiques. It has been several decades since mother, or for that matter anyone, has been throwing things out to make room for the new. Old microscopes are only going to go up in their scarcity and value. Microscopes have always been rather rare when compared with other collecting categories such as tea cups and silver spoons. But as the number of collectors increases, they will also become scarce. In terms of value, it is always better for an item to be scarce than rare. Even if the supply is high, if the demand is much higher, the item can become scarce. On the other hand if the item is very rare but nobody wants it, you have something of little value.

Today I can offer three (no-brainer) bits of advice if you wish to invest in old microscopes. First, only purchase items that you are reasonably sure that you can immediately sell to someone you know. Second, invest only in items that have survived from the time when obsolete things were still thrown out (the pre-collectibles conscious age). Brass microscopes certainly fall into that category. I will save my third bit of advice for the end of this article. So, if you've decided to invest your hard-earned money in brass and glass, what principles will help justify this addiction?

The first argument in favor of your intentions is that, at present, there are no shops or guilds churning out any new (old) brass instruments. This prevents the prospect of a glut resulting in very little appreciation of the value of your investment. As mentioned above, **scarcity** is one of the three most important value components for any collectible. **Condition** and **desirability** are the other two. Just as every item has a value at which it will not sell, every collecting category has a fixed and limited number of potential buyers, whether they be collectors, decorators, investors or dealers. At one time in the not so distant past, there were very few collectors of old microscopes. However, in the last twenty years all that has changed. Those who collect for the love of the instrument now compete with decorators, speculators, dealers and professionals who just want their office to look scientific. And, lest you think I have implied this is a negative thing, we must all remember that these competing groups have added much to the value of your existing collection. However, for those of you who are thinking about beginning a collection, it may be a different matter. The potential buyers for old microscopes have increased considerably, especially in the category of those who love the instrument. This will indeed make your investment a great deal more secure. Also, unlike most other collecting categories, a microscope is not likely to be a forgery. In most cases, it costs as much to make a convincing forgery as it does to purchase an original. Most of the replicas that are out there are well known or properly marked.

Though it may sound like a contradiction, I have more good news: microscopes do not fall in the category of a "desirable." In my view, that category should be avoided as it holds hidden dangers. "Desirables" are best defined as items that have been manufactured within the past 30 or 40 years (Rinker, 1997). For the time being there may be a large number of buyers, but very often they are trend driven. Good examples would be popular figurines and sports trading cards. In my estimation, this sort of collecting is better described as speculation. True collectibles must withstand the test of time. The time from an items manufacture to its collectibles status should be considered its desirables period (Rinker, 1997). If an item should fall out of favor, it may never reach the collectibles status. Microscopes are well established as collectibles and once an object is classified as a collectible, it tends to remain at the level of collecting importance.

The law of supply and demand applies to collectibles. When a collectible is in short supply and collector demand is high, an object's value goes up. When a collectibles supply is large and collector demand is fulfilled, the item's value declines. If the supply is extremely large, an item can lose its appeal completely. What is the point of having what everyone else has? The question you will always ask is, how many examples have survived? Normally, this question is difficult to answer, but the most realistic approach is to assume a higher number than is immediately apparent. Most collectors are not usually eager to make this mental leap to reality. One also needs to keep in mind the importance of an item's condition. Even if the supply is small, an antique instrument , in most cases, should be in good condition if you intend to make the purchase. Only in certain cases, when extreme scarcity and rarity are well established, should an exception be considered. Within the category of microscope collecting, there exists plenty of diversity which provides opportunity for everyone. You can specialize in

a certain maker or in a specific time period. You could collect from the perspective of a historian, looking for examples that represent important developments in the evolution of the instrument. Or you could become known as a Continental collector or specialize in instruments with unusual features. You can collect regional examples such as American instruments. Finally, you could specialize in simple microscopes or you could limit your activities to the tiny microscopes. Deciding which items are worth collecting is all part of the fun. This leads me to my final and third bit of advice for investing in old microscopes. The best thing you can do is not invest for the sake of investing but for the joy and fun it can bring. You should buy old microscopes mainly because you like old microscopes.

In my experience, collecting and building friendships have gone hand in hand. Earlier I said, "what is the point of having what everyone else has?" I would like to add to that by saying, "what's the point in collecting if you can't share it with friends?" The dictionary defines a collector as "one that makes a collection" and that's fine for providence but a true collector is best defined by the motivation behind the act of collecting and not the act of collection itself. Remember, that old microscope is worth exactly what you paid for it.

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FISH SCALES

Preparation Staining and Mounting

Douglas T.. Richardsom Postal Microscopical Society

After many experiments, failures and disappointments, I have adopted the following methods which give reliable and reproducible results.

1. Remove from fish by means of forceps or scrape from head to tail.
1A. Alternative - see below.
2. Place scales in cold aqueous 5% potassium hydroxide solution for 1 to 3 days to remove mucus etc.
3. Transfer to water and clean with a small 'camel-hair' brush. (5% caustic will ruin a brush).
3A. Alternative - see below.
4. Stain in freshly prepared 0.1 % Aliizarin Red S iin 2.5% potassium hydroxide solution in distilled/deionized water for 15 to 30 minutes.
5. Rinse in distilled water and leave in fresh distilled water overnight to ensure complete removal of the alkali.
6. Transfer to 70% alcohol (IMS or Propanol-2) in which they can be stored indefinately.
7. Put between 1/4 microslides, bind with cotton. (scales buckle and curl up in 100% alcohols and xylene).
8. Immerse in 100% alcohol for 24 to 48 hours.
9. Transfer to fresh 100% alcohol for a further 24 to 48 hours.
10. Place in Xylene for 24 to 48 hours.
11. Transfer to fresh xylene for a similar period, longer will do no harm.
12. Separate slides under xylene.
13. Mount in Practamount or similar xylene-based mountant. (Balsam, Numount).
14. Dry in hot air oven (if available) at 50 to 60 degrees for 7 to 14 days before cleaning up and labeling.

ALTERNATIVES

1A Scales removed from fish can be stored in 70% alcohol Propanol 2 at this stage, but alcohol preserved material does not clean as easily as fresh material. Alcohol preserved material must be soaked i water before putting into potassium hydroxide solution. Do not heat the hydroxide solution as this causes excessive swelling.
3A If wanted for examination by polarised light, omit stage 4 - go straight to 5.

NOTES

Sodium hydroxide can be used instead of potassium hydroxide both for preparing the stain and cleaning the scales.
The stain is permanent.
Alizarin Red S. C.I. No. 58005. The aqueous solution, provided it is made up in distilled/deionized water, is stable. Tap water causes the stain to precipitate and should not be used. The solution in potassium hydroxide is unstable and becomes unusable after 4 to 5 hours. To make the stain; mix equal volumes of 0.2% aqueous Alizarin Red S solution and 5% aqueous potassium hydroxide solution.

OR

Dissolve a small amount (size of pin head) of the dry stain in 1ml of distilled water (It produces a yellow solution) add an equal volume of 5% potassium hydroxide solution and mix.
Examples of fish scales stained by this method are circulating in Postal Microscopical Society boxes 93/40, 93/41, 93/42, 94/1, 94/2 and 94/3.
0.2% aqueous Alizarin Red S solution is available through Northern Biological Supplies Ltd. at 3 Betts Avenue, Martlesham Heath, Ipswich, IP5 7HR. GB. Tel 01473 623995

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MINUTES OF THE MSSC MEETING OF WEDNESDAY, FEBRUARY 19, 1997

Dave Hirsch

31 members and 2 guests were treated to an exciting program complemented by delicious refreshments which add zest to the meeting. An indication of the vitality of MSSC is the refreshment table. More and more, we see an increase in the amount and variety of home baking contributed by the members with due credit to the lovely MSSC ladies who create such delicacies. Many thanks also, to PETE TETI who oversees the refreshment table.

HOLOGRAPHY. For the scientifically bent, a hologram is "a three-dimensional figure" that is made on a photographic film or plate without the use of a camera. It consists of a pattern of interference produced by a split coherent beam of light that records the phase as well as the amplitude of the information. VP GAYLORD MOSS recently presented a paper at the 12th SPIE Photonics Conference in San Jose, California. The topic of his well received paper was: "Balanced Holographic Exposures In a Single Layer"; a method of making multiple holographic elements, particularly applicable to full color holography. The paper generated much interest among holographers who will use the techniques described.

SPEAKING OF AUTOBIOGRAPHIES. Each and every MSSC member will be featured in a member profile in some future issue of The Bulletin. With over 90 members now on board, YOU might be written up any time within the next seven years or so.

THE MAIN SPEAKER. If you forget to retract the point or neglect to replace the pen cap, you have joined the club for those of us sporting ink stains on the bottoms of our shirt pockets. Such a problem is mechanically oriented and fool proof ways of avoiding this embarrassing event have yet to be devised.
By contrast, the advances in the technology of ball point pens and associated inks are to be commended. Main speaker, chemist IZZY LIEBERMAN presented a vibrant, illustrated talk on inks and writing instruments from the days of
goose quills to modern writing devices.

The ball point pen as we know it, came to light in the immediate post war years when Milton Reynolds, a huckster extraordinaire, pushed the Reynolds pen for up to 20 bucks a copy. Although this early mechanical disaster didn't raise any hackles among fountain pen makers Waterman or Parker, many years in the development of the ball point pen had to pass before it achieved public acceptance.

The principal function of a pen is to transfer ink to the writing surface. This can be accomplished successfully when the 14 desirable characteristics of ball point pens and inks given in Izzy's' detailed talk are implemented.

Izzy explained the difference between pigments and dyes, and detailed the chemical compositions and characteristics of the many materials which are used as the writing fluids for pens with fiber tips, extruded tips and roller tips.

A number of photomicrographs made by Izzy showing roller and other type of pen tips were screened. His talk concluded with the showing of a video prepared in conjunction with STEVE CRAIG, of a ball point rolling along a paper strip to show the dispersal of ink on the paper surface along with the buildup of ink residue. Samples of pen tip assemblies, and other components used in making various types of pens were available for distribution..

ANTIQUARIAN BOOK. The Rev. Kircher, mentioned in two past issues of this bulletin strikes again! This time. ALLEN deHASS acquired another Kircher book titled, "Ars Magna", published in 1646. The book is written in both Hebrew and Latin, and deals with the application of light and shadow. Several engraved illustrations were presented, including Kircher's concept of an asymmetrical double convex lens. The book covers are faced with hand tooled vellum. A pair of fasteners located adjacent to the page sides hold the covers closed.

FRAMED LITHOGRAPH. The Search and Procurement Team of STUART WARTER and KEN GREGORY scour the malls, antique stores and flea markets hither and yon, or wherever objects of compelling (scientific) interest may be found.
At one location, Stu entered the realm of Recreational Science when he bought a framed, French lithograph titled, "Spanish Steps in Rome". An interesting aspect of this picture was the title, printed backwards, and for good reason!

The picture was intended to be viewed by looking at it through a 'Zograscope'. According to L.E.Turner's book on 19th century Scientific Instruments, "The Zograscope, or 'optical diagonal machine' was made for viewing prints of landscapes, thereby endeavoring to create an illusion of seeing the landscape directly. The origins of this device are obscure, but it is thought to have first appeared in Paris early in the 18th century. To counter the reversal of the image brought about by the mirror, the prints had to be made reversed. Such reversed prints were certainly for sale in 1753, and the device continued to be popular into the 19th century." Anyone having a spare zograscope for sale may contact Stu.

A CHANGE IN PACE. PARKE MEEK brought in a silvery metal helmet topped with anodes and a complex of curled wires. We were unable to pin him down as to the function of this intriguing artifact which lacked lenses and focussing wheels.

Continued on page 54

MEMBER PROFILE

Isiah U. Lieberman

I was born in 1926 in Baltimore, Maryland. My father was also born there, in 1900, of immigrant parents. He received a degree in civil engineering in 1922 from Johns Hopkins, after which he went to Palestine, at that time a British Mandate, to work on malaria control projects. My mother was born in Rishon-le-Zion, Palestine, in 1895 then still part of the Ottoman empire. Her family, and several others from central Europe, had founded this town in 1888 as part of the "back-to-the-earth" movement. Not being too interested in this type of pioneering, she went off to the American College in Istanbul, by which time she spoke about seven languages. When World War 1 ended she came to the states and studied medicine at the University of Chicago, and parasitology at Johns Hopkins, where she worked with Dr. Hegner on bird malaria. She received her ScD there in 1922 and returned to Palestine to do further malaria research with Dr. Kligler. My parents met in Palestine and got married in 1924, then returned to Baltimore. On the way back they bought the Koristka microscope that I still own. They soon moved to South Orange, New Jersey where I grew up and was fortunate to attend Columbia High School, one of the best public schools in the East.

In 1937, at the depth of the depression , my father was offered a job in Palestine and the four- of us (I had a brother by then) moved there. By this time the British thought they owned the place so things were a bit different than in 1922. As a result of that, the job never materialized, but we lived there, in the outskirts of Jerusalem, for nearly two years. Never having been much west of the Delaware, this change to the clear air and arid landscapes of the Middle East was a fascinating experience for me. The boat trip over was likewise, including stops at such unbelievable places as Avignon and Pompeii. My favorite activity in Jerusalem was walking clear around the old city on top of the wall, an escapade that would probably be suicidal today. Another vivid memory was a boat trip across the Dead Sea to "TransJordan" to see a mountain stream gushing out of a steep canyon - a sight unknown in New Jersey. We returned to South Orange in 1934, by which time I had a sister and there was plenty of work for engineers in the new WPA program. My father surprised us all by buying one of the first De Soto Airflows, which made such a lasting impression on me that I recently had to go out and buy one. Life went on relatively uneventfully after this, until I graduated from high school in Jan. 1944 and was immediately inducted into the army. I ended up in the 69th infantry division and as they apparently thought the war would be lost if that outfit ever made it to the front, we didn't get there until Feb. 1945, thereby luckily missing D-Day and the Battle of the Bulge. We did, however, take part in three unforgettable events: taking the Siegfried Line, crossing the Rhine at Remagen, and meeting the Russians at the Elbe River. I was then forced to spend a whole year in the occupation, doing such onerous things as going to Bavaria and Switzerland to learn how to ski. If I knew then what I know now, I could have traded my cigarette rations for a fortune in old microscopes.

On returning to New Jersey in 1946 I started at Princeton and spent the next four years studying chemistry, geology and other scientific subjects. By this time my parents had bought an apple farm in central NJ, featuring a large and fabulous house whose construction had started in 1695 by Dutch settlers. (I have never had a decent apple since then). I also purchased my first car, a 1932 Packard for $175, and rebuilt the engine out in the barn. It was about 5 below zero when I finally finished, and the car had to be towed by tractor several miles before it ran on its own. Not to be outdone, my parents picked up a 1935 Packard, which though only 11 years old at the time already seemed like an antique. On graduating in 1950 I got a 1941 Cadillac and finally made it beyond the Delaware, all the way to UCLA, where I got an MS in chemistry 3 years later. The professor I worked for eventually received the Nobel Prize. I also jumped right into things one couldn't do much of in New Jersey, such as skiing, climbing, and backpacking.

My first job was working on inks at Paper-Mate, which lasted until 1958. In 1957, I married Elaine Eisenstad, an LA native since age 1, and we have one daughter, Janet, born in 1959. She graduated from UCLA Library School in 1985 and is now married and living in Seattle. We have enjoyed several trips to Europe over the years, as well as to most of the states, Canada and Mexico. On a mid70's trip to England and Scotland, we bought a bunch of antiques and started a store. That didn't last too long, and our house is full of the stuff we didn't sell.

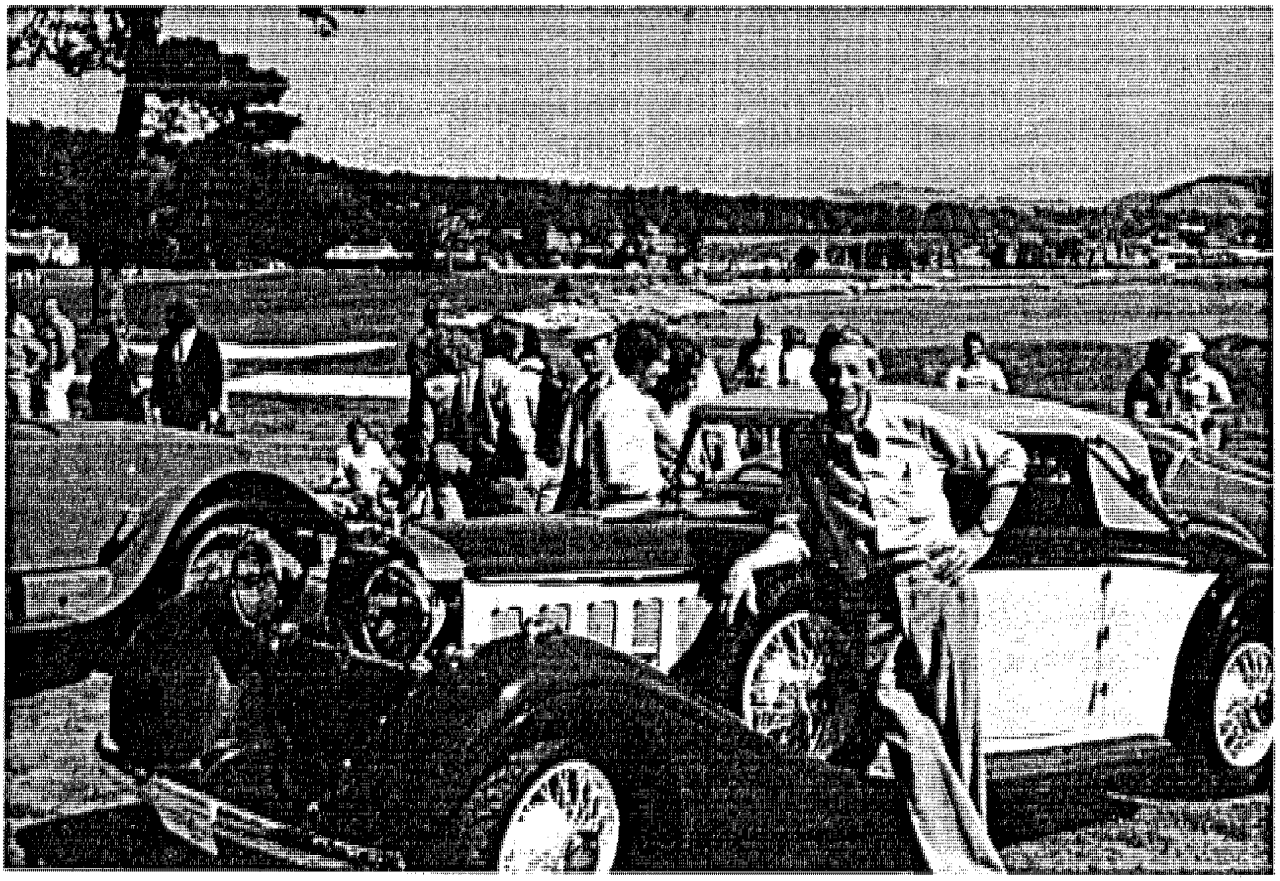
In 1969, with prices escalating, I got bitten by the old car bug again upon seeing an ad for a 1936 Hispano-Suiza for $2,000. Twelve years later it was finally restored and even made it to a show in Europe. I am now working my way down to the afore-mentioned De Soto and also hoping to eventually finish a 1916 Owen-Magnetic that was also purchased in 1969. It was apparently the first and only successful gas-electric car ever built.

After Paper-Mate I worked for two years at a division of Scripto in Monrovia, California, making further improvements in inks, and then started my own business. I acquired a partner and we manufactured inks and epoxy compounds During this time we developed the first "white board" (or "dry erase" board) and obtained our first patent, but the product still needed so much more work that we sold it to the Pilot Pen Co. of Japan who perfected it. After 1970, I gradually evolved from production to consulting, which I still do a little of, my interests having shifted somewhat from writing inks to jet-printing inks.

My neighbor, Dave Hirsch had been urging me for ages to join this society, which I finally did a short time before it moved from the museum. I only wish I had listened to him when he had first suggested it.

Isaiah Lieberman with daughter Janet

with wife Elaine



At Pebble Beach Concours with personally restored Henri Chapron bodied 1936 Hispano-Suiza

WORKSHOP of the Microscopical Society of Southern California

by: George G. Vitt, Jr.
Date: Saturday, 1 March 1997
Location: Steve Craig's Lab, 28 persons attended.

1. **Steve Craig**, our MSSC Workshop Chairman, introduced member **Herbert A. Layfield** and **Mrs.Layfield.**

2. **Herbert Layfield**, who has been a member of the Society since its inception, described the early days of the Society. He talked of Max Erb (then the Leitz rep.), Mr.Horton (of Horton & Converse), and the famous comedy actor **Harold Lloyd**, who obtained his microscopes from **Bill Sokol**. Herbert came from Vancouver, BC, and met Bill Sokol at Erb & Grey (on Figueroa Street, Los Angeles). When Herb showed his thorough knowledge of the Baker interference microscope that was exhibited there, Sokol introduced him to Mr.McBain (now of McBain Instruments Co.), and Herb got the job he was seeking - doing the records for the firm - while Bill Sokol was doing inside sales. In those early days, the Society met in the basement of the L.A. Natural History Museum. Herb did not know **Mr.Comstock** who was instrumental in giving this meeting place to the Society shortly after the end of WWII. Herbert brought with him, as a generous donation to MSSC, a number of mineral thin section microslides of paleobotanic specimens cut from Coal Balls. **Leo Milan** took charge of these slides and said that he would take photomicrographs of them. (For those who wish to catch up on their Coal Balls, please refer to G.Vitt's notes:TECH NOTE 48, Oct. 1995 and TECH NOTE 49, Nov. 1995).

3. **George Vitt** exhibited and described the fine microscope case that had been recently made for him by guest **Richard Upper**, a friend of **Gaylord Moss**, and a former member of the technical staff of Hughes Aircraft Co., Radar Group. The case was made to hold the excellent Russian Stereo Microscope Mod.MBS-10, which is now owned by a total of four MSSC members. The case is made of maple, birch and oak, with dovetail joints, felt-lined hold-downs for the microscope base (with an easy slip-fit), an essentially hermetic door with lock, and a closed drawer-compartment at the top to hold extra eyepieces, illuminator, etc. The case can also accommodate a 35mm camera mounted on the microscope phototube. The fine workmanship on the case was highly praised by all. George then passed around an alphabetized list of dyes that he has on hand and the members marked those which were useful in microscopy. This list will be amalgamated with a list of dyes that had been prepared by **Bill Hudson**, our *Curator of Chemistry*, who is the custodian of this material. George also reported that **Al Herman** has been carrying on experiments, down to the pixel level, on 35mm images scanned by various scanners. Using his computer and *Photoshop* software, his first conclusion was that all photos taken at 1/250 sec. with a tripod mounted camera were perceptibly sharper than those made hand held at the same shutter speed. (A word to the wise!)

4. **Steve Craig** read a recently received letter from **Fred Loxton**, editor of the PMS Journal, the *Balsam Post* - where Fred describes the activity of the "1/2 frame group", comprised of avid collectors and users of 1/2 frame 35mm cameras. Steve then told of his having made a master index of MSSC books, and that all were 'present and accounted for' when tallied against our inventory list that had been prepared some time ago by **Norm Blitch**, our former *Curator and Librarian*. There was a general discussion as to the disposition of these books, glassware and instruments. It was decided to get the job done now, and a group remained after the meeting to go through the books.

5. **Richard Jefts** showed a fine color photo he had taken of the *Hale-Bopp* comet with his camera, using a lens of 'normal' focal length. He stated that the comet is visible to the naked eye or through 7X binoculars, looking in a ENE direction, some 20° above the horizon. (Being an amateur astronomer, Richard also uses an 8" Cassegrain telescope.) He then showed the book *Under the Microscope*, Panorama, 1961, Columbia Records Club, which contained text, color slides of photomicrographs and 45rpm records describing them. He then circulated a 1960 Zeiss publication (presumably predating their *Information* periodical).

6. **Fred Hantsch** thanked our **Izzy Lieberman** for his fine presentation at our February meeting, on the technology and development of the ball point pen and its inks. He then circulated the "Strato" ball point pen that had been made in Europe in 1944! Fred then discussed the stereo effect one gets when observing certain types of red printing against a cool color background. He then passed around a recent map printed in such colors where the red information stood up most distinctly above the background. The stereo depth effect was greatly augmented when the map was viewed with both eyes through a large (about 6" diameter) magnifying glass. There was a general discussion concerning this visual phenomenon. **Stuart Warter**, who had brought a fine large 18th century color engraving to our Feb. meeting, said that this engraving may well have been made to display the depth dimension. The underlying principles and the manner of viewing such images will, hopefully, be resolved in the near future.

7. **Dave Hirsch**, our Treasurer, stated that MSSC now has 91 paid-up members and that the treasury is well in the black. He suggested that we consider setting

up a set of bylaws. He then exhibited a Baker binocular microscope that he had gotten in Bath, England at the "Golden Emporium" - and the fine mahogany case he had made to house it. It features top drawers, a compartment for eyepieces vertically along the left wall, the top held with brass screws whose heads are recessed and covered with grain-oriented wood plugs (instead of mortise & tenon joints), overall 'screwed & glued' construction, with brass hardware from Scheiner on Windmill Street, London.

8. **Norman Blitch** stated that MSSC has a large number of excellent prepared microslides that have all been catalogued, are available for members to borrow, and are stored in **Steve Craig's** lab. Steve said that we need a librarian for our books and slides, whereupon **Leo Milan** volunteered to take care of the slides. Norm then passed around some exquisite, carefully boxed pieces of Baltic amber, containing insects encapsulated some 20,000,000 years ago. We inspected these fascinating rarities through a hand-held Micronta Illuminated 30X microscope, a pocket model available from Radio Shack for $9.95 (Cat.No.63-850).

9. **Stuart Warter** remarked that glass-doored microscope cabinets were used by manufacturers to exhibit rare or outstanding models. The large color engraving (18th Cent.) that he had brought to the pervious meeting was apparently meant to be viewed by the Zogroscope to bring out the depth dimension. He stated that the Zogroscope and the Anamorphoscope had been mentioned as collectibles in the book *Scientific Instruments* by Anthony Turner and Harriet Wynter, the latter a London dealer, now retired. There was a general discussion on 3-D perception. Stuart then showed some microscopes: The first was a rare brass microscope by G&S Merz of Munchen, a successor to the Fraunhofer firm which originated the European drum microscope It was made in 1880, as established by its serial number. Inside the finely constructed and conceived case there is a holed bracket for holding eyepieces. On the inside of the vertically sliding front door, there is an old India ink handwritten inscription in archaic German script, quite difficult to decipher "... Microscope No. 7... from Optical Institute of Sigmund Merz in Munchen... sold December 1868 for 40 Talers...". The last such microscope sold at auction for £900. Its movable vertical limb column has a cross section of an isosceles triangle, with the apex carrying the rack of the rack/pinion coarse focus. By removing the body tube and dividing the objective, the instrument is converted into a dissecting microscope The second microscope was a fine unsigned, cased, brass Fraunhofer type drum microscope. The third microscope was a fine Beck Histological dissecting microscope in an excellent compact mahogany case. By unscrewing the body tube and substituting a simple magnifying lens, the instrument converts into a dissecting microscope.

10. **Ken Gregory** showed a Zeiss Student's microscope, c. 1921-22, with simple draw tube focus. Ken had expertly refinished its black base. He then showed a French type 2-pillar miniature microscope with swingable bullseye condenser, c. 1870. It's case Ken had cleverly made of a converted wood cigar box! Some stain and a polyurethane finish did the job. He then showed several books: *Comets*, by C.Sagan; *Comets in Art*; a Griffith Observatory book on comets; and two books (1883,1898) with illustrations and text on comets.

11. **Ed Jones** displayed a most interesting slide of over 300 *Mini Objects* that he had prepared. The mere assembling of them on the slide took some 24 hours! (Consider the time it took to collect and identify them!!) One of Ed's many specialties is the preparation of slides, each of which contains many examples of small objects such as diamonds, rubies, glitter, microfossils, types of gunpowder grains, etc, etc. This fascinating slide was viewed through a stereo microscope in Steve Craig's lab. Ed also brought several interesting books on microscopy, which he circulated, and an article *Microscopic Mass Production*, Discover, Feb. 1977. This dealt with "Techniques that may form the basis of a microscopic industrial revolution in the twenty-first century are taking shape now in a Harvard chemistry lab."

12. **Leo Milan** circulated a photo album (about 4" high and 14" wide) of some spectacular panoramic color photos he had taken on his recent trip to mainland China. All the scenes of plazas, buildings and crowds were "naturals" for Leo's panoramic format.

13. **Bill Hudson**, our *Curator of Chemistry*, passed out copies of his recently prepared list of dyes currently in the MSSC inventory. Dye names, manufacturers, and quantities were listed.

14. **Gaylord Moss** described a recent computer technique used to reconstruct the 3-D structure of biological micro specimens via multi-slice photos. A general discussion followed on the subject of 3-D techniques. **Allen de Haas** described a piezoelectric driven objective lens and **George Vitt** described the use of a tuning fork and stroboscopic illumination, with the micro specimen near the fulcrum and a screen at the tang end - the sequential images being microprojected through the microscope and 2 mirrors onto the moving screen. Gaylord discussed a method using the atomic force microscope with its vibrating probe. He then reported that Kodak is making molded glass aspheric lenses, at very low cost ($0.25 in quantities), and selling them to companies like Minolta for assembly into their zoom lenses. He then circulated a computer generated 8x10" color photo of human skin, with a resolution of 3008 x 2072 pixels.

15. **Larry Albright**, our Program Chairman, announced that **Brian Ford**, author of the book *The Simple Lens* and others, and a proponent of A. van

Leeuwenhoeck, will be guest speaker at our Nov. or Dec. meeting. He added that a Forensic Entomologist is being scheduled for April to give a presentation titled *Insect Dementia.*

16. **Allen de Haas** asked if anyone could identify the type of black finish, and the means that Zeiss used to apply it to its early microscopes. Allen especially admires its sheen, surface and durability. Who can give us the answer?

17. **Larry McDavid** recounted what he saw at the Gem and Mineral Show in Tucson, AZ, where he found excellent turn-of-the-century insect microslides prepared by NBS (England). He then described his travels in Bolivia, in the rain forest and at altitudes of up to 15,000 feet in the altiplano, to witness the total solar eclipse. This particular eclipse was extraordinary because it lasted for 6.5 minutes! Larry used a Questar reflector telescope and a 1200mm stop-motion lens. Anyone contemplating going to this isolated region of barter and trade, he advised, should bring many ball-point pens - where one of them can get you "almost anything." Larry then passed out to everyone 5 pages of sky maps and information (text & sky calendars for Feb. through April) as an aid to seeing the Hale-Bopp comet. In March the comet will be between ENE and E, 4-fingers above the horizon, and best visible at about 1.25 hours before sunrise (5am).

18. **Izzy Lieberman** literally "wowed" the whole assembly by exhibiting a pristine, gorgeous, and rare Zeiss Jena Immersion Refractometer (which can also be used for drop-size samples), cased with calibrated prisms and other accessories. Each prism allows the measurement of index over a small range of values and, by changing prisms, a wide range of index can be measured. The unit is accurate to the fifth decimal place. The particular value of index is engraved on each prism and the 100 unit graticule, viewed through the eyepiece, is calibrated to each prism using standards of known index. The tube of the unit is about 15" long. (Word has it that the unit was spotted in Seattle for Izzy by our inveterate collector, **Ken Gregory**!)

19. **Steve Craig** announced that the ball-point test video was being shown in his lab and that he was using a Unitron zoom micro objective in front of his compact video camera. He also said that a teacher friend of his is looking for a good camera lucida for use in the classroom. There were several responses.

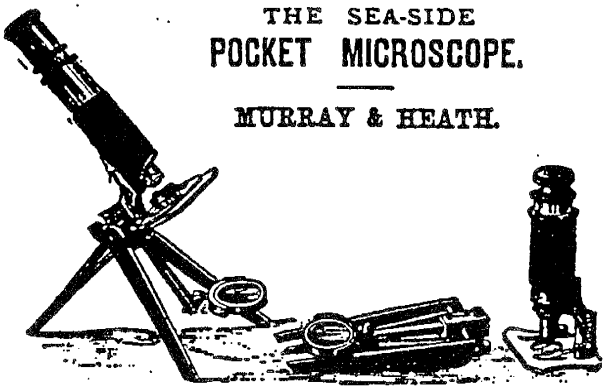
Minutes of MSSC meeting of February 19, 1997 **Continued from page 49**

When Parke donned the device and activated it, he disappeared in a flash of eerie blue light. Fear not, we are merely getting up to speed for April Fool's Day. Parke, who has an incredible collection of scientific apparatus which he rents to the movie industry, appears in a current I-Hop commercial seen on nationwide TV. Some years ago, he was the subject of a program on the Discovery Channel.

Every so often, the subject of instrument cases arises, particularly that variety of cases holding microscopes of various vintages. Cases may be considered a form of packaging, going back to antiquity. Wooden cases for scientific instruments are still being made albeit, to a diminishing extent. MSSC members collecting vintage microscopes, may obtain an instrument missing a case, or perhaps having a (wooden) case exhibiting some degree of damage.

Being a woodchopper of long standing, your Treasurer owns several microscopes housed in restored boxes, or in new boxes which duplicate the original cases, down to locks and other cabinet hardware. To illustrate the restoration of instrument cases, PRES GEORGE VITT brought in a restored microscope case made of Honduras Mahogany, along with a newly fabricated wood box for storing microscope accessories. MSSC members with instruments in restored or newly fabricated cases are welcome to show them at forthcoming meetings.

Members have been bringing microscopes and other interesting paraphernalia to both regular meetings and workshops. Objects of interest, other than microscopes may be displayed, provided they are 'intellectually stimulating' as so elegantly stated by VP Moss. Sorry, but wax lips and rubber chickens do not fill the bill.



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DESMIDS

John Clegg

Most pond hunters must, at some time, have found desmids in their nets when they examine their 'catch', for they occur in a wide variety of habitats, but especially those with acid waters such as bog pools. They are, of course, green algae and are in my opinion the most beautiful of green algae. Larger than diatoms, they stand out in examination for their bright emerald colour.

Each desmid is a separate entity, although a few are joined together in a filament. The individual desmid is flat with a constriction in the middle of the 'waist' separating the plant into two demi cells. They have some ability to move about, but generally they are attached to other vegetation among which they are found.

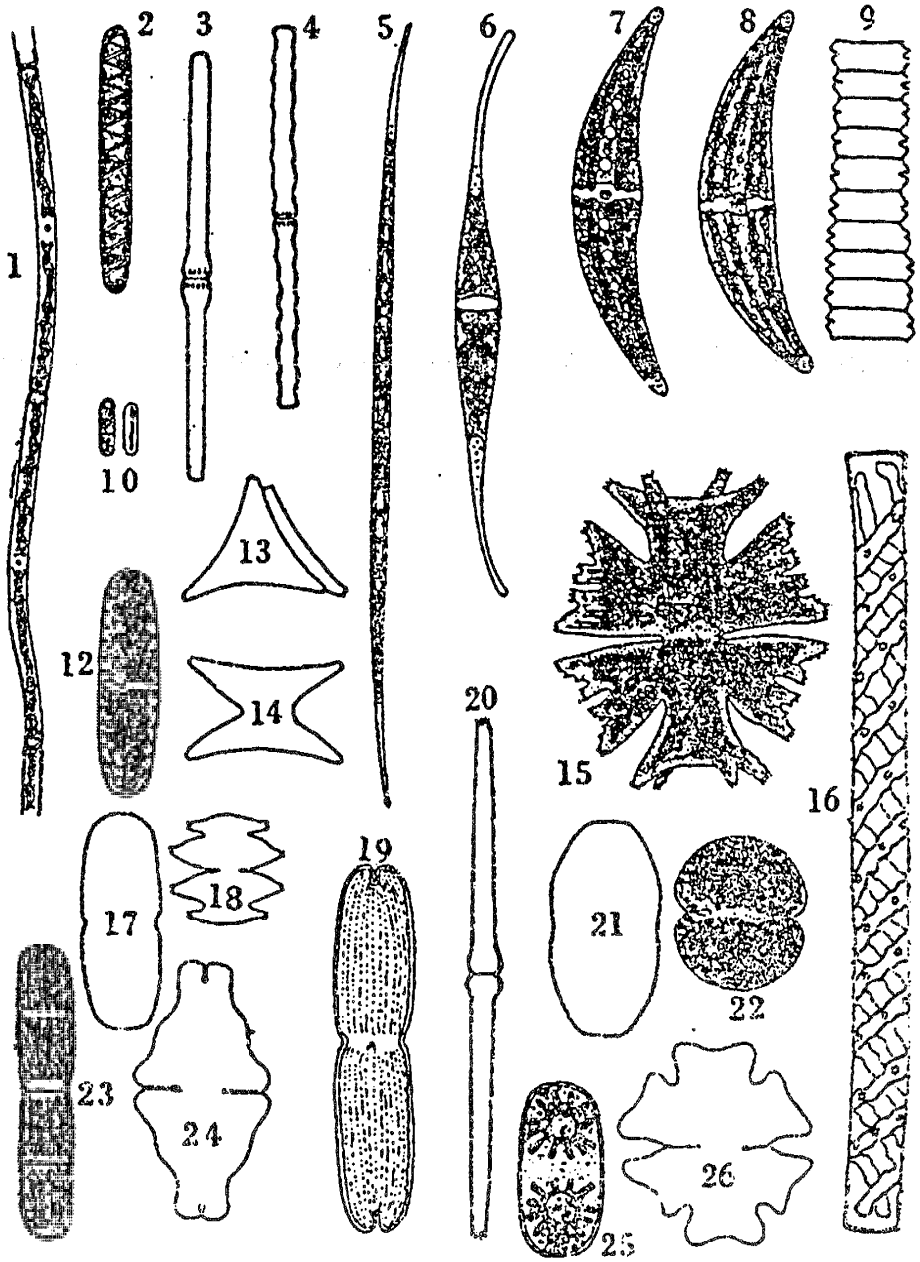
The commonest kinds are shown in the illustration, but it is well worth buying the Scientific Publication No. 42 of the Freshwater Biological Laboratory, *A Key to Desmids of the English Lake District*. Price 8£ plus 61 p postage. I have confirmed that it is still in print. They also publish '*A Check List of Desmids of the British Isles*, Occasional Publication No. 28, but this, of course, only contains the names and classification of desmids.

Reference

Guide to the Study of Fresh Water Biology, J.G. and P.R. Needham, (1935) Comstock Publishing Company, Ithica.

This article reprinted from *The Balsam Post*, Issue No. 32, July 1996

Closterium 5,6,7,8
Cosmarium 21,22
Cylindrocystis 25
Desmidium 9
Docidium 3,4
Euastrum 24,26
Genicularia 16
Gonatozygon 1
Mesotaenium 10
Micrasterias 15, 18
Netrium 12
Penium 17,23
Pleurotaerium 20
Spirotaenia 2
Staurastrum 13,14
Tetmemorus 19



A MULTIFOCUS METHOD FOR CONTROLLING DEPTH OF FIELD

Paul Haeberli - Silicon Graphics Corporation

Introduction

When a photograph is taken with a camera, the lens is focused at a particular distance. Objects nearer or farther than this focal distance will appear blurred. By changing the focus of the lens, near objects or distant objects can be made to appear in sharp focus. If you want to create an image where distant objects as well as close objects are in focus, two or more images can be merged together to make an image with increased depth of field. This is done using a simplification of a pyramid-based technique described in [Ogden 85].

The Technique

Here are two images of the same scene, one focused close and the other focused at a distance. Figs 1 and 2. We can combine the in-focus parts of both photographs using the following procedure. First each input image is blurred. Figs 3 and 4.

Fig. 1 Near focus image

Fig 2. Distant focus image

Fig. 3 Blurred near focus image

Fig. 4 Blurred distant focus image

Next, we subtract the blurred image from the original above it, and create an image that shows the magnitude of the difference. Figs 5 and 6. This image will be dark where the original image is smooth, and will be bright where the original image has edges. The strength of the edge information maps directly into the brightness of these edge images.

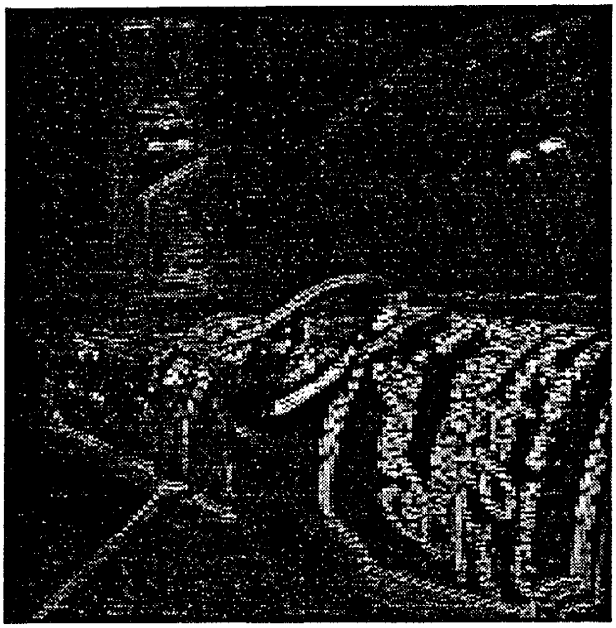


Fig. 5 Image of Fig 3 subtracted from image of Fig 1.

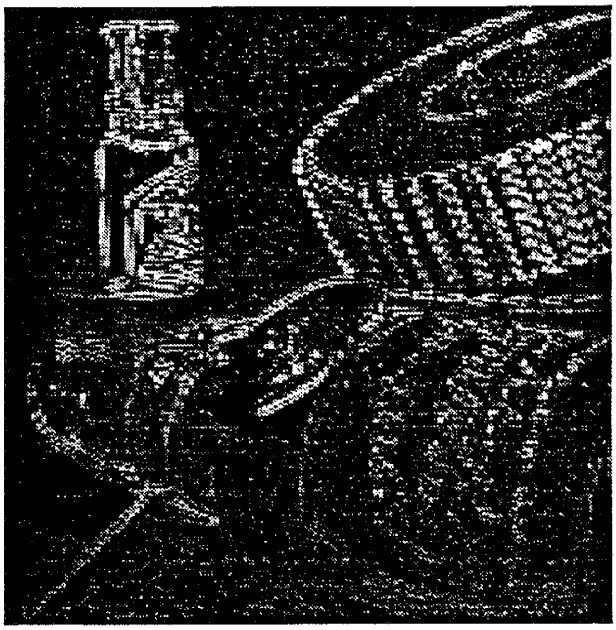


Fig. 6 Image of Fig 4 subtracted from image of Fig. 2.

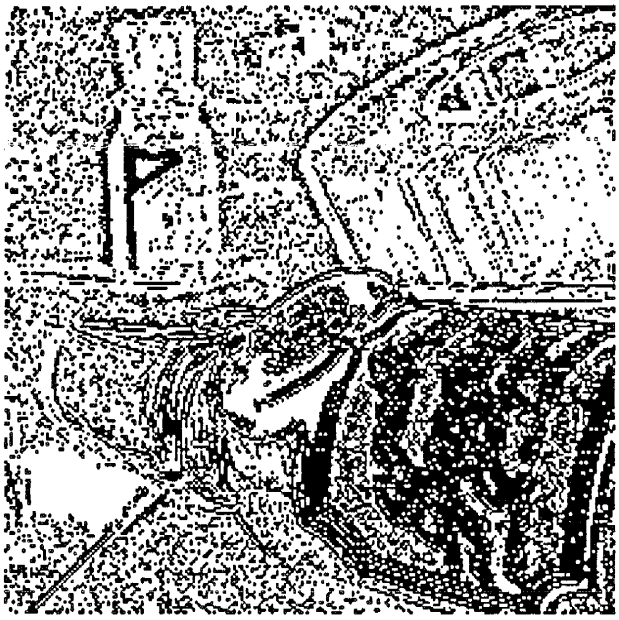


Fig. 7 Image that is black where Fig 1 has more edge information and white where Fig. 2 has more edge information.

Fig 8. Best image, created with pixels from either Fig 1 or Fig 2 depending on which has the most edge information.

Now we compare the two edge images, and make an image that is black where the left image has more edge information, and is white where the right image has more edge information. Fig.7.
Finally, this is used to create an image with the best parts of each original image. Fig. 8. Where the image in Fig 7 is black, pixels from the left image (Fig 1) are used. Where the image in Fig.7 is white, pixels from the right image (Fig. 2) are used. A simple extension of this technique can be used to combine the in-focus parts of any number of photographs.

Reference

[Ogden 85] J.M. Ogden, E.H. Adelson, J.R. Bergen, P.J. Burt, Pyramid-based Computer Graphics, RCA Engineer, Sept/Oct, 1985.

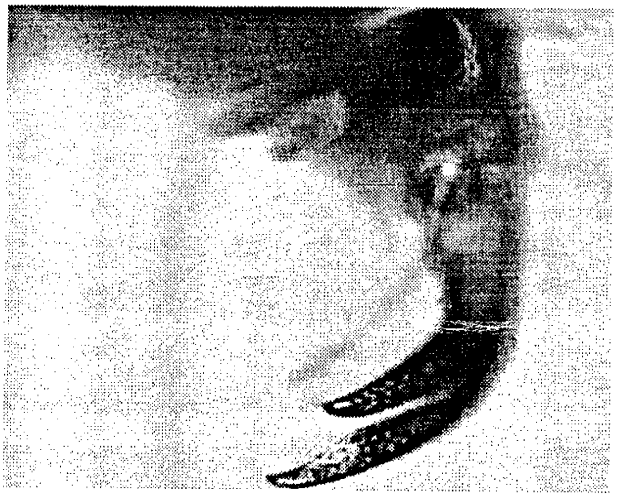
EXAMPLE OF COMPUTER ENHANCED DEPTH OF FIELD MICROSCOPY

Gaylord E. Moss

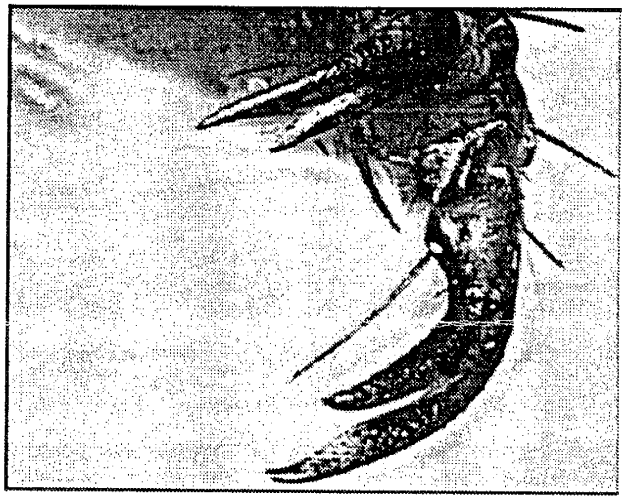
At the recent Photonics West Conference in San Jose, California, a German company showed some images that used a technique similar to those described on the previous pages by Paul Haeberli to achieve great depth of field. Volker Tympel has a line of software and hardware products that, besides using the computer and multiple images to increase depth of field, also stitch together multiple side by side images to achieve wider field width in a patchwork in which the edges match perfectly.They also extract images in very low light situations.Their exhibit at Photonics West was merely an unmanned poster board in the hall for poster sessions.Their images were impressive, especially as seen in 3-D through a stereo slide viewer that was hanging on the poster.

This technique is a good example of the continuing increase in the capability of light microscopy as it is enhanced by the development of other technologies.

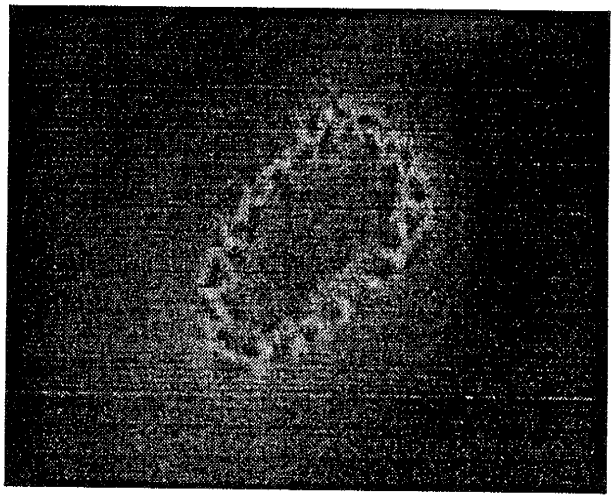
Volker Tympel Engineering Office for Medical and Technical Image Processing
Konrad- Zuse- Str. 3 D-07745 Jena Germany
Phone: +49 3641 606011 / 603170 FAX: +49 3641 215135/ 603170
VoiceBox: +49 3641 215134 email: One.Magic@t-online.de



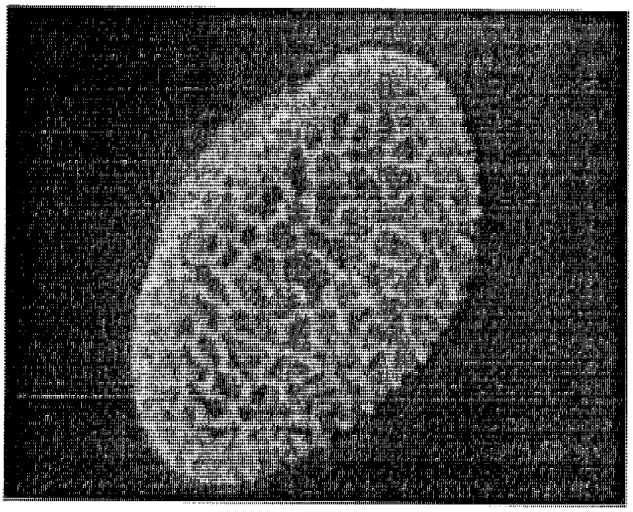
Leg of Bumblebee
Normal single image. (10X objective).
The depth of focus is too small for the leg, only a thin layer is focused.



Extended depth of focus mode, 30 images used, the whole leg is focused.



Low light applications: Single image. Pollen of a lily, fluorescence. Lens x40/1.4 Oil/



Extended depth of focus mode, 26 RGB images used. The whole pollen grain is focused.

TOTAL INTERNAL REFLECTION LENSES

Gaylord E. Moss

At first glance the molded facets on a Total-Internal-Reflection, or 'TIR' lens might make one mistake it for a Fresnel lens in which each segment merely refracts the light like a section of an ordinary refracting lens. Closer examination of the diagrams below shows that these cup-shaped lenses work on a totally different principle,accepting incident light over a full hemisphere. Fig 1 shows a simple ray diagram for one facet. Each facet is cut so that the light from the source passes through into the lens at a steep angle, making the transmission into the lens very high (A). When the light inside the lens strikes the next surface (B), it does so at a very shallow angle, however, which is beyond cutoff. Cutoff, of course, is the range of angles that is so far from the normal to the surface that Snell's law of sines gives a reflection angle with a sine greater than one, which is impossible. Under these conditions, the light is almost totally reflected at the angle of incidence, with extremely low loss. The reflected light then strikes the front of the lens (C) from inside at an angle much nearer the normal to the surface so that it passes out into the air with, this time, very low internal reflection. The TIR lens is a very clever new addition to available design configurations which is already in use in some automotive taillights, and will undoubtedly appear in many more applications. The profile is 1/4 to 1/8 the height of conventional lens or mirror systems with a claimed light collection efficiency improvement of about 30%.

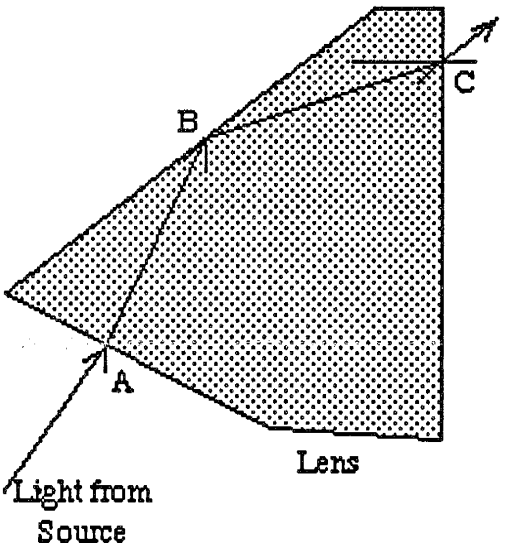
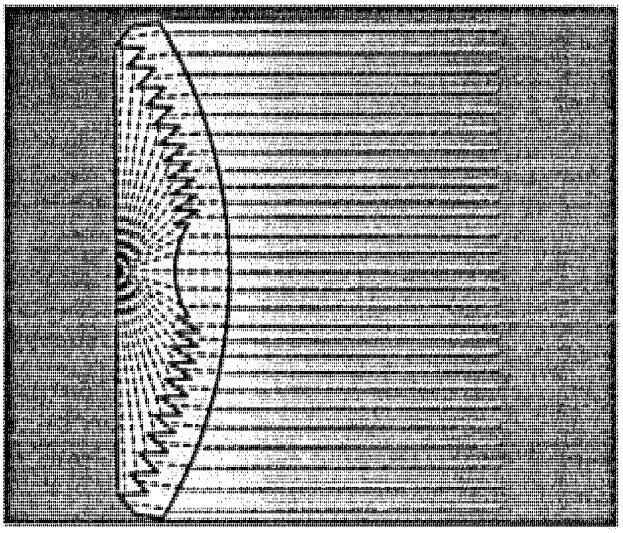
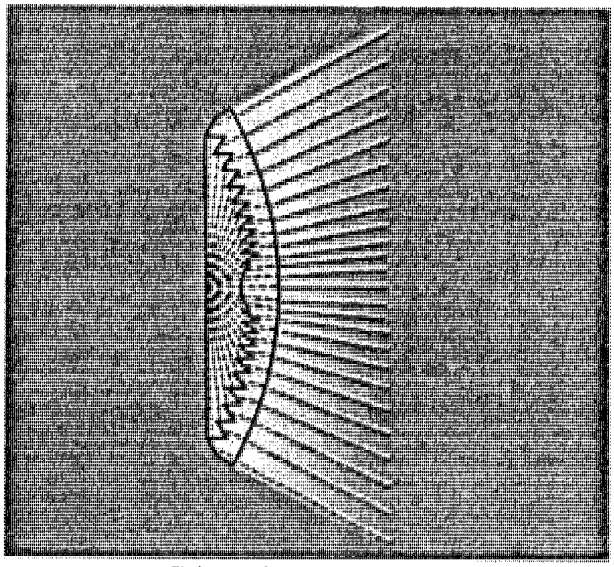


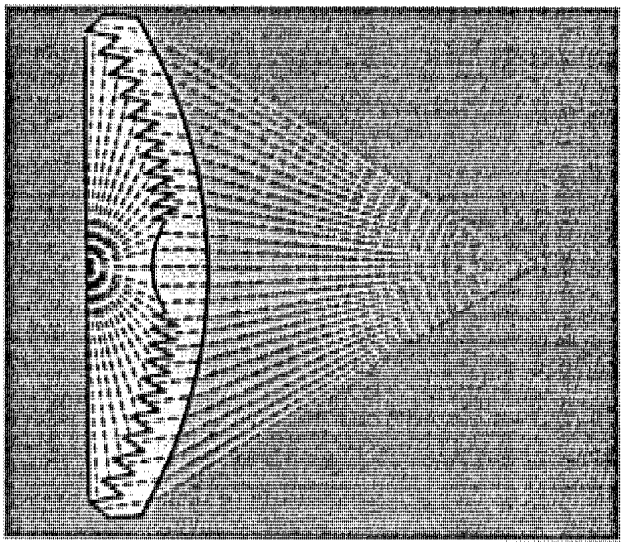
Fig. 1 Ray diagram for TIR lens



Collimating TIR Lens



Diverging TIR Lens



Focusing TIR Lens

MARCH Program

Wednesday the 19th 7:30 PM

at the Crossroads School

Our speaker for the evening is John F. Cerlanek, the founder of SignaScan, a company specializing in using microscopic analysis in the detection of handwriting and document forgeries. In a serendipitous follow-on to Izzy Lieberman's talk last month on inks and writing implements, some of the analysis involves the striation analysis of ink writing, with the effects of the ball or point on the ink path on the paper analagous to ballistic analysis of the striations on a bullet. Some of the effects that Izzy mentioned such as the accumulation of dust or scratches on a point can provide definitive identification on the writing, as can the particular holding of a writing implement.

Mr. Cerlanek's company has five patents covering mechanisms for document analysis. He has performed case work and provided expert opinions on over 1900 questioned document cases. In 1991, one of his products won the Grand Prize at the Pasadena Invention Convention.

SignaScan produces video and photographic exhibits for court presentation. Videotapes are prepared using patented microscopic, computer enhanced imaging with graphic overlays. Mr. Cerlanek's company is actively developing new mechanisms and techniques to further advance the fields of questioned document analysis and forensic photography.

It promises to be a most interesting evening with the usual comaraderie and microscopic exchanges.

Editor's Notes

Several members have asked for a membership list with names and addresses to help in communicating with other members. Accordingly, we plan to include such a list with the next issue. We have, of course, addresses and, for most members phone numbers. For a few, we also have e-mail addresses which is the fastest and cheapest form of communication. If anyone has an e-mail address that you would like included, please send it to the Bulletin by April 4.

IMPORTANT **If there is anyone who does not want their name, address or phone included in the listing in the next bulletin, please let me know by the above date. If I do not receive any instructions to the contrary, I will assume assent to the publishing of name, address and phone number in the membership list of the forthcoming April Bulletin.**

Some members have also suggested that we publish a list of "experts" as a Society resource to other members. Those who can attend regular meetings have the advantage of being able to seek people out and ask questions in person. However, such a resource list should be helpful to regular members in between meetings as questions arise, as well as to corresponding members. Therefore, we plan to publish a list of members who are knowledgeable in various fields associated with microscopy, and who are willing to answer questions by mail or phone from other members. The following is a list of some suggested subject areas for the expert resource group. I welcome additions to these categories, as well as, and most importantly, volunteers who will be willing to have their names in the various categories. We have a remarkable range of talent and experience among the members. The expert group should enrich the microscopy experience for both those providing as well as seeking answers.

Please do not feel timid about serving on the resource list for fear that you are not 'expert' enough. If you know something about a subject, you will probably know more than someone else who is asking a question. The hope is that we will have several people listed in most categories, so that the questioner can glean information from several 'experts' and then form his own conclusions. This sharing and critical evaluation of information is one of the delights of both the regular and workshop meetings. I hope that it can be extended to more members by mail and telephone.

Some Suggested Subject Areas:

Antique microscopes identification and history
Books and literature
Modern microscopes, microscope selection.
Forensic studies
Woodworking, microscope boxes
Metal machining and tools
Diatoms
Photomicrography, Camera techniques
Histology
Botany
Slide making
Internet communications
Computer - MacIntosh, IBM Dos, Windows
Microscope techniques, illumination, adjustment.
Restoration, brass, wood, finishes.
Chemistry
Video/cinema micrography
Metallography

Some of these topics were selected because I can think of one or more members who have particular knowledge in these areas. I hope that in the next couple of weeks there will be more topics suggested and that we will have volunteers for all of them.

The last month's Society events have been extremely exciting with a highlight being Izzy Lieberman's intensely interesting and superbly organized presentation on the history of inks and writing implements. The quality of his talk points up the sort of talent that we have in the group and explains why each MSSC event is such a joy to attend and share with the other members.

Gaylord E. Moss