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THE MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA

Volume 2 Number 7 July 1997

ADAMS' LUCERNAL MICROSCOPE

As Described in The Universal Magazine of 1788

Stuart L. Warter

The Universal Magazine
OF
Knowledge and Pleasure.
CONTAINING

Letters	Biography	Philology	Chemistry
Debates	History	Mathematics	Medicine
Essays	Geography	Astronomy	Mechanics
Poetry	Voyages	Husbandry	Navigation
Music	Travels	Gardening	Architecture

AND OTHER
Arts and Sciences;
Which may render it
Instructive and Entertaining,
TO
GENTRY, MERCHANTS, FARMERS, and TRADESMEN:
To which occasionally will be added
An Impartial Account of Books in several Languages,
And of the State of Learning in Europe;
ALSO
Of the STAGE, New OPERAS, PLAYS, and ORATORIOS.
VOL. LXXXII.

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ADAMS' LUCERNAL MICROSCOPE

As Described in The Universal Magazine of 1788

Stuart L. Warter

The Universal Magazine of knowledge and pleasure published in London in the Eighteenth Century was typical of a number of publications which brought to the public news of a variety of subjects in a time when communications otherwise were largely confined to word of mouth. In the issue for October of 1788, there appeared what today would be known as a product review of George Adams' "improved" lucernal microscope (a type of projection microscope) which was presented in Adams' "Essays on the Microscope" published the year before, in 1787. The magazine article was accompanied by a print from what was billed as a new copper plate engraving.

In actuality, neither the article nor the engraving had much original in them, both being largely copied from Adams' original. The copper plate, while a new engraving, was in fact a duplication of Adams' plate (a common practice at the time). Eliminating the tin lantern originally depicted by Adams at the right side as his figure 3, and appropriately renumbering the remaining figures in the new plate. Much of the text, while expressing a few opinions, is largely either a paraphrasal or direct copy of Adams' text. Originality notwithstanding, such articles provided a valuable service in disseminating knowledge of advances in technology that otherwise might have gone unnoticed. They also serve to explain in part why certain products became well enough known to have earned a place in history, while others, at least as good, if not better, but overlooked or ignored by editors and authors, were consigned to oblivion.

The following is a reproduction of what may have been the first review of Adams' lucernal microscope to be published outside of a scientific journal.

MSSC Journal
Volume 2 Number 7 July 1997

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President	George G. Vitt Jr.
Vice President	Gaylord E. Moss
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Program	Larry Albright
Workshop	Steve Craig

Publication Correspondence To
Editor — Gaylord E. Moss
P.O. Box 9130
Marina del Rey, CA 90295
Tel/FAX (310) 827-3983
E-Mail mosss@worldnet.att.net

Other Correspondence To
President — George G. Vitt, Jr.
2127 Canyon Drive
Los Angeles, CA 90068
Tel/FAX (213) 464-6503

Dues and Membership Applications To
Treasurer — David L. Hirsch
11815 Indianapolis Street
Los Angeles, CA 90066-2046
Tel (310) 397-8357

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A DESCRIPTION *of Mr.* ADAMS*'s Improved and Univerſal* LUCERNAL MICROSCOPE; *illuſtrated by an accurate Repreſentation of it, engraved on a Quarto Copper Plate.*

THIS microſcope was originally thought of, and in part executed, by the father of Mr. George Adams, of Fleet-ſtreet, Mathematical Inſtrument-maker to his Majeſty, and Author of 'Eſſays on the Microſcope;' by whom, however, it has been ſo improved and altered, both in conſtruction and form, as to be altogether a different inſtrument. It has met with the greateſt approbation from the moſt experienced microſcopic obſervers.

As the far greater part of the objects which ſurround us are opake, and very few are ſufficiently tranſparent to be examined by the common microſcopes, an inſtrument that could be readily applied to the examination of opake objects, has always been a deſideratum. Even in the examination of tranſparent objects, many of the fine and more curious portions are loſt, and drowned as it were in the light which muſt be tranſmitted through them; while different parts of the ſame object appear only as dark lines or ſpots, becauſe they are ſo opake, as not to permit any light to paſs through them. Theſe difficulties, as well as many more, are obviated in the lucernal microſcope; by which, opake objects, of various ſizes, may be ſeen with eaſe and diſtinctneſs; the beautiful colours with which moſt of them are adorned, are rendered more brilliant, without changing in the leaſt the real tint of the colour. The concave and convex parts of an object retain alſo their proper form.

The facility with which all opake objects are applied to this inſtrument, is another conſiderable advantage, and almoſt peculiar to itſelf; as the texture and configuration of the more tender parts are often hurt by previous preparation, every object may be examined by this inſtrument, firſt, as opake, and afterwards, if the texture will admit of it, as tranſparent.

The lucernal microſcope does not in the leaſt fatigue the eye; the object appears like nature itſelf, giving eaſe to the ſight, and pleaſure to the mind: there is alſo, in the uſe of this inſtrument, no occaſion to ſhut that eye which is not directed to the object.

A further advantage peculiar to this microſcope is, that by it the outlines of every object may be taken, even by thoſe who are not accuſtomed to draw; while thoſe who can draw well, will receive great aſſiſtance, and execute their work with more accuracy, and in leſs time than they would otherwiſe have been able to perform it in. Moſt of the deſigns for Mr. Adams's 'Eſſays on the Microſcope,' were taken with this inſtrument; and, we think, the accuracy with which they are executed, will be deemed a ſufficient teſtimony in its favour. In this point of view, it will be found of great uſe to the anatomiſt, the botaniſt, the entomologiſt, &c. as it will enable them not only to inveſtigate the object of their reſearches, but to convey to others accurate delineations of the ſubject they wiſh to deſcribe.

By the addition of a tin lanthorn to this apparatus, tranſparent objects may be thrown on a ſcreen, and exhibited

hibited at one view to a large company, as by the ſolar microſcope.

Tranſparent objects may be examined with this inſtrument in three or four different modes; from a blaze of light almoſt too great for the eye to bear, to that which is perfectly eaſy to it.

Fig. 1, repreſents the lucernal microſcope, mounted to view opake objects; A B C D E is a large mahogany pyramidical box, which forms the body of the microſcope; it is ſupported firmly on the braſs pillar F G, by means of the ſocket H, and the curved piece I K.

L M N is a guide for the eye, in order to direct it in the axis of the lenſes; it conſiſts of two braſs tubes, one ſliding within the other, and a vertical flat piece, at the top of which is the hole for the eye. The outer tube is ſeen at M N, the vertical piece is repreſented at L M. The inner tube may be pulled out, or puſhed in, to adjuſt it to the focus of the glaſſes. The vertical piece may be raiſed or depreſſed, that the hole, through which the object is to be viewed, may coincide with the center of the field of view; it is fixed by a milled ſcrew at M, which could not be ſhewn in this figure.

At N is a dove-tailed piece of braſs, made to receive the dove-tail at the end of the tubes M N, by which it is affixed to the wooden box A B C D E. The tubes M N may be removed from this box occaſionally, for the convenience of packing it up in a leſs compaſs.

O P a ſmall tube which carries the magnifiers.

O one of the magnifiers; it is ſcrewed into the end of a tube, which ſlides within the tube P; the tube P may be unſcrewed occaſionally from the wooden body.

Q R S T V X a long ſquare bar, which paſſes through the ſockets Y Z, and carries the ſtage or frame that holds the objects; this bar may be moved backward or forward, in order to adjuſt it to the focus, by means of the pinion which is at *a*.

b c is a handle furniſhed with an univerſal joint, for more conveniently turning the pinion. When the handle is removed, the nut, fig. 2, may be uſed in it's ſtead.

d e is a braſs bar, to ſupport the curved piece K I, and keep the body A B firm and ſteady.

f g h i is the ſtage for opake objects; it fits upon the bar Q R S T by means of the ſocket *h i*, and is brought nearer to, or removed further from, the magnifying lens, by turning the pinion *a*: the objects are placed in the front ſide of the ſtage, (which cannot be ſeen in this figure) between four ſmall braſs plates; the edges of two of theſe are ſeen at *k l*. The two upper pieces of braſs are moveable; they are fixed to a plate, which is acted on by a ſpiral ſpring, that preſſes them down, and confines the ſlider with the objects; this plate, and the two upper pieces of braſs, are lifted up by the ſmall nut *m*.

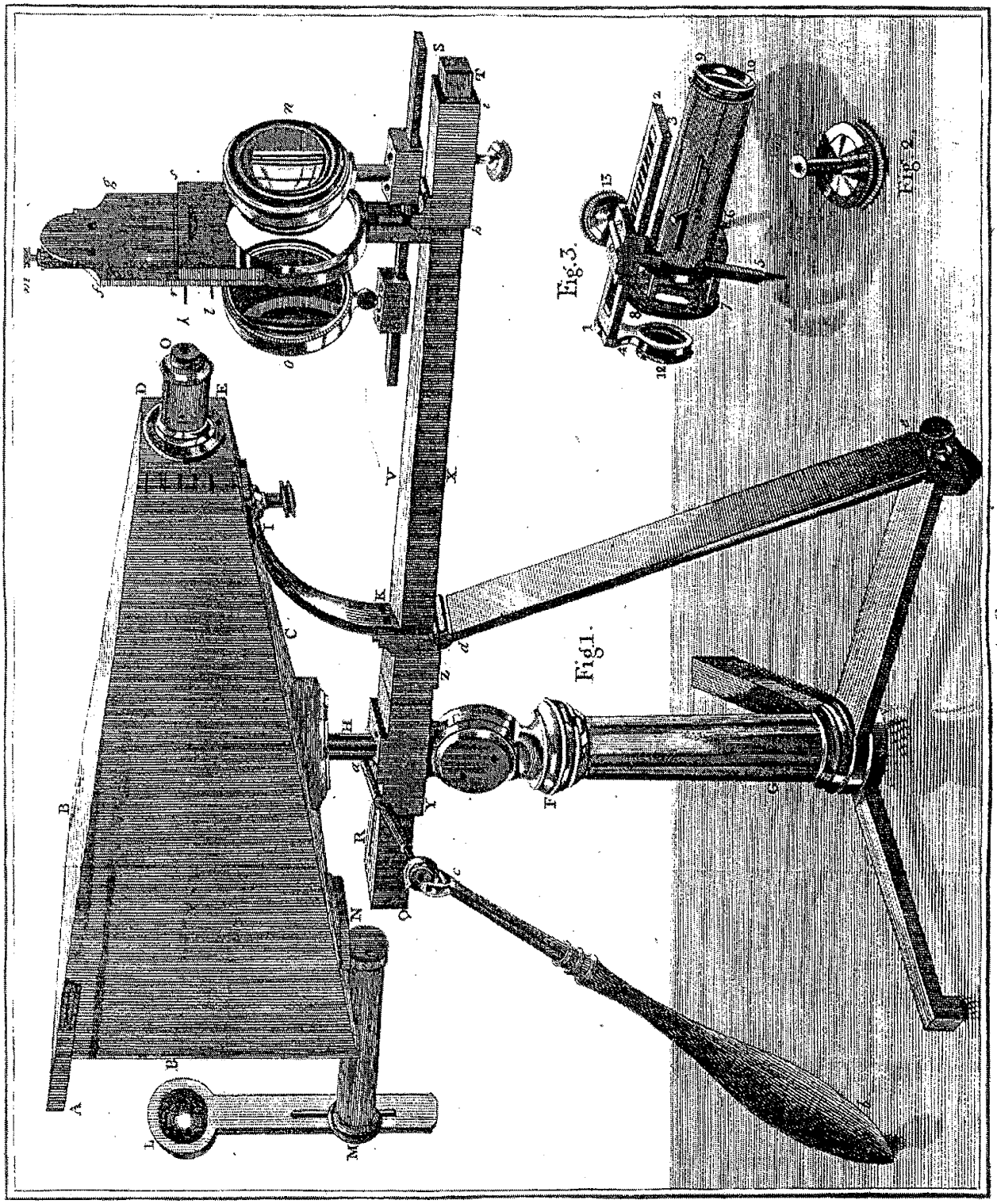
At the lower part of the ſtage, there is a ſemicircular lump of glaſs *n*, which is deſigned to receive the light from one of Argand's lamps, placed before it, and to collect and throw the light on the concave mirror O, from whence it is to be reflected on the object.

The upper part, *f g r s*, of the opake ſtage takes out, that the ſtage for tranſparent objects may be inſerted in its place.

Fig. 3, repreſents the ſtage for tranſparent objects; the two legs, 5 and 6, fit into the top of the under part *r s h i* of the ſtage for opake objects; 7 and 8, is the part which confines or holds the ſliders, and through which they are to be moved; 9 and 10 a braſs tube, which contains the lenſes for condenſing the light, and throwing it upon the object; there is a ſecond tube within that marked 9 and 10, which may be placed at different diſtances from the object by the pin 11.

When this ſtage is uſed as a ſingle microſcope, without any reference to the lucernal, the magnifiers, or ob-

ject



ject lenſes, are to be ſcrewed into the hole 12, and to be adjuſted to a proper focus by the nut 13.

N. B. At the end A B of the wooden body, there is a ſlider, which is repreſented as partly drawn out at A; when quite taken out, three grooves will be perceived, one of which contains a board that forms the end of the box, the next contains a frame with a greyed glaſs, the third, or that farthest from the end A B, two large convex lenſes.

THE STUDY OF DIATOMS

S.H. Meakin

The possessor of a microscope who treats its use as a spare time hobby usually acquires a number of varied slides prepared and sold by the opticians, and generally these slides are used as one uses a picture book. In time he becomes satiated with viewing his slides, and this is the stage at which these notes may prove useful.

To make the hobby continuously interesting, the owner of a microscope needs to have new interests, and one of the most prolific is the minute life, animal and vegetable to be found in water-marine, brackish and fresh. Animals in the live state, are of course, the most interesting, but one cannot make permanent slides of the animals alive, and when dead these subjects soon retreat to the "Picture-book" state. The vegetable inhabitants of water, -algae, desmids , and diatoms are perhaps the easiest objects to handle.

The study of Diatoms is one of the most exciting and far reaching hobbies one can adopt, for one never gets to the end. Diatoms are always easy to procure, as almost every clean pond, ditch , swamp, marsh, river, as well as the sea, contains unbelievable quantities and varieties of these tiny plants. The cost of obtaining unlimited quantities is nil and the collecting of them lends interest to any excursion.

Requirements for collecting

All that is needed to collect diatoms are a few corked tubes 2 1/2 ins. long, about 3/4 in. diameter, an old tablespoon, and a walking stick, some means of fixing the spoon to the end of the stick being required. A pocket field microscope which is easy to construct is a great advantage, but not absolutely necessary. One of the eyepieces and objectives belonging to the microscope can be used for this pocket microscope and the body to contain them can easily be made, as the sketch and description on the opposite page shows.

Examination in the field prevents rubbish from being gathered and brought home, but with a little experience one soon finds out what is likely to be good even if the field microscope is not used. So it is by no means necessary to go to the expense of a field microscope, if one is prepared to take a sporting chance of the contents of some tubes not being as good as might otherwise be the case. There will always be plenty of diatoms of some kind, as soon as the necessary knowledge of what to look for is acquired. Generally speaking any brownish-green, or yellowish-green patches on stoned, mud, roots of trees, and on stems and leaves of water plants will prove to be rich in diatoms.

Having arrived home, take a 3 inch x 1 inch micro slip, and with a fountain pen filler or forceps take up a spot of the brownish material and place it on the slip with one drop of water. Just loosely lay on this drop a cover glass and inspect under the microscope. If the gathering happens to be of Naviculas or Pleurosigmas it will be difficult to convince the novice that he is looking at plants and not animals. The whole field of view will be alive with moving diatoms, pushing and jostling each other all over the place.

Now the microscopist is up against his first diatom problem, which is: by what means do these plants move about so vigorously? If he solves this problem, he can call himself a genius. The next problem will probably be: how is it that there are so many thousands of these tiny plants and by what means do they grow and multiply so enormously? That is another very difficult and controversial subject. In fact there are so many unsolved problems connected with these minute plants that he will have enough interests in the hobby to last a lifetime.

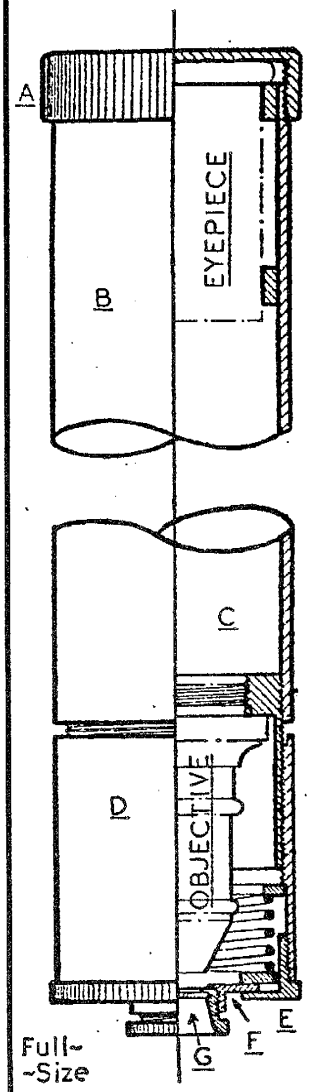
What to do with the collected material had better be left till later, as the budding diatomist will be so busy watching the antics of his little plants that he will refuse to leave his microscope for the time being.

Advertisement from *The American Journal of Microscopy* Sept 1876 Courtesy of Richard M. Jefts

The Field Microscope

To make the microscope illustrated, get a piece of light brass tube six inches long, the diameter of which will accommodate the eyepiece. If slightly too large in diameter, the tube can be bushed to suit, as shown, but the proper diameter tube can easily be purchased from the opticians who manufacture microscopes. Cut off 1 1/4 ins. from one end and in the long piece fit a brass bush screwed internally with thread to fit objective and externally with a fine thread which screws into the end of the long piece of tube. Now screw with same fine thread the interior of the short piece of tube throughout its whole length, so that it turns easily, but is a good fit on the thread on the brass bush. This is used for focussing, but only about one revolution is ever required to correctly focus, once the selected objective has been focussed.

Near the other end of this short tube, screw a ring to act as stop for the spring, and at the end fit a brass cap which carries the small sliding fitting which acts as the microscope slide, and on which a tiny speck of the material to be examined is placed. The sliding motion is necessary to enable the spot of material to be examined in various portions as required. After years of use, this field microscope has proved entirely satisfactory, and does everything the hobby requires. Of course, it is just as adaptable and useful for all microscopical field work. A X10 eyepiece and 1/2 inch objective are very suitable for diatoms and would be just as useful for algae or desmids. Perhaps for animal water life a lower power objective would prove more suitable.



A. Light brass cap screwed on the outside of the body tube to protect the eyepiece.

B. Body tube 120 millimeters long, but if preferred it may be made 160 millimeters to suit the tube length for which objectives are made. It is preferable to have this tube 1 1/16 internal diameter so that the flange of the objective will go inside the bush C.

C. Brass bush with internal thread to fit objectives and external thread 40 per inch. This bush is screwed permanently into the end of the Body Tube.

D. A piece of tube about 35 millimeters long of same diameter as the body tube. The exact length must be made to suit the objective which is used. This tune is screwed with internal thread to fit the bush C. This thread is then bored out for a length of 1/2 inch, to form a seat for the spring washer. It is best to solder the spring to this washer. A new thread is then cut for a length os 1/4 inch to receive cap E.

E. This cap is bored out as large as possible internal diameter. Externally it has thread to fit tube D and is screwed firmly therein, thus compressing spring and causing pressure on cup F. Bore the end of the cap out to 5/8 inch diameter.

F. Cup with internal thread and recessed to take a 3/8 inch diameter cover glass, which is cemented in with gold size. This cup slides about in the space between cap E and the spring washer.

G. Small cap which screws easily into the cup F. It has a glass disc bezelled securely in the end. This cap is removed and the specimen placed in the centre of the glass disc. It is then screwed into cup F. It is really a small Compressor.

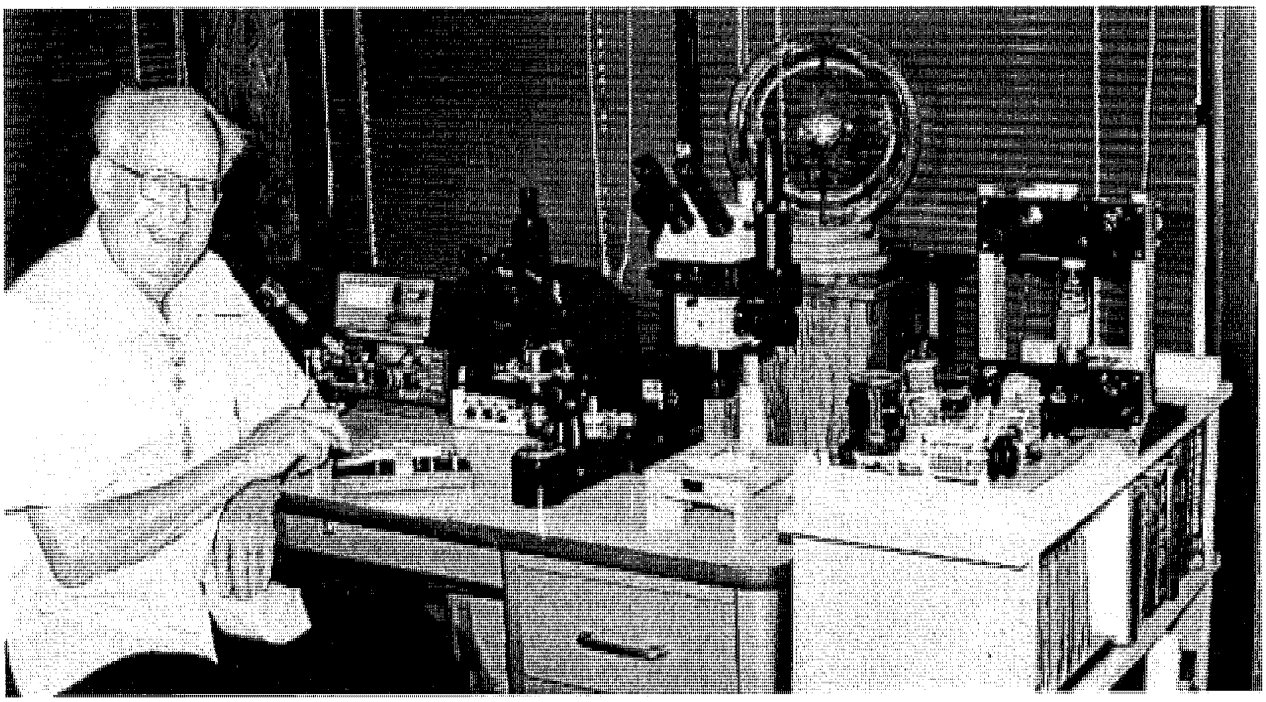
If the body tube is procured 1 1/16 inch internal diameter it will be necessary to provide two ring bushes tightly forced into the body tube. The internal diameter of these bushes will be made to accommodate a standard eyepiece. If the body tube is procured the correct size to fit the eyepiece, it becomes necessary to reduce the flange on the objective so that it will go into the bush C.

The microscope is held pointing to the sky when viewing objects, plenty of illumination for the 1.2 inch objective is then obtained.

This article is excerpted from that originally published in THE MICROSCOPE Vol. III, 1939 London as:
Meakin, S.H. 1939. The Study of Diatoms. Provided courtesy of George G. Vitt, Jr.

MEMBER PROFILE

Gary Legel



Gary Legel with Microscopes, Ham Radio Set, and favorite key.

My home town is Milwaukee, Wisconsin, where I was born in 1916. My father emigrated from Vienna, Austria, and my mother was an American of German descent. Graduating from high school in the middle of the depression, I soon learned the value of a dollar and the possession of a job. I peddled early morning (5 AM) newspapers, caddied at a golf course, and played piano at local bistros three nights a week. During summers I played clarinet with (don't laugh, he was a great gentleman and conductor) Oscar Dunker and his concert band, at open-air band concerts. At Allen-Bradley Company I was pianist with a Lawrence Welk type orchestra sponsored by the company.

While working as an electrical assembler at Allen Bradley, I pursued an Electrical Engineering education at night by attending courses at the University of Wisconsin and at the Milwaukee Institute of Technology where I graduated with a degree in Electrical Engineering. This took a total of seven years of night school. During that period I progressed from electrical assembler to electrical tester, to designer of electrical test equipment, and finally to product designer of electric motor control apparatus. My stay at Allen Bradley was for fourteen years. During that period, I met and married Margaret, we were together for fifty-three years. She went to her well deserved rest in peace in 1993. We had two girls, Karen and Marjorie, who now live with me.

In 1950, my family and I moved to Los Angeles, I was tired of all that snow shoveling and cold weather. There I began working at Hughes Aircraft Company as a board designer of electro-mechanical devices for the Falcon missile. I took courses at UCLA, including review of mathematics through calculus and Engineering Application of Electronics. As a result, I became an electronics circuit designer and Member of the Technical Staff. Then became unit engineer on the Field Handling Console for the Falcon Missile. Included were responsibilities for the Power Distribution Panel, High and Low Voltage Power Supplies, the Pulse and Rep-Rate Generators, the 400-Cycle Power Supply and design of the circuit for a Radar Target Acceleration Simulator. Several of my articles were published in Electronic Design Magazine. Over the years a dozen or so other articles have been published in various trade magazines, journals, etc.

Looking for new opportunities, my family and I moved to Tucson, Arizona, still with Hughes Aircraft. Company. There I was Liaison Engineer between Hughes Culver City Design and Hughes Manufacturing in Tucson. Quite a bit of travel was involved to Hughes vendors all over the United States. We enjoyed five years in Tucson and then moved to Fullerton, California, to join Hughes there. I spent seventeen years there in a number of capacities. Responsible for instrumentation for environmental tests, wrote procedures, supervised

tests, and wrote reports on qualification tests of Hughes semiconductor devices and commercial devices. Planned and justified expenditures for instrumentation for the Environmental Lab. Was responsible for Electromagnetic Interference Control including assistance to project designers, supervising and reporting electromagnetic test results and making suggestions to improve performance.

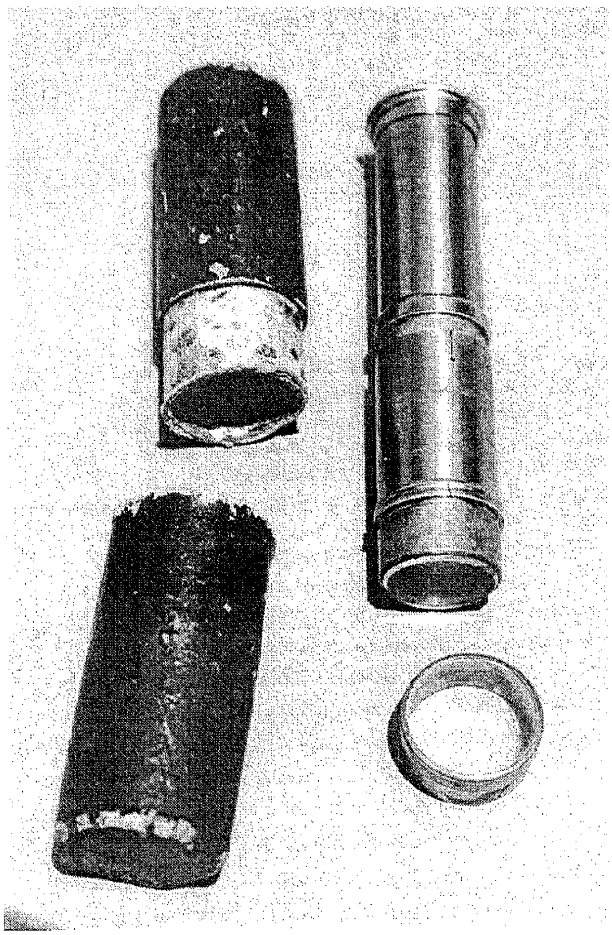
In 1960 I became interested in teaching (a long-time desire) and took a 40-hour course in Fundamentals of Teaching at UCLA.This resulted in obtaining a California Teaching Credential. I accepted a teaching position instructing classes in Instrumentation For Electronics two evenings a week at Fullerton College. I did this for three years and enjoyed every minute of it. Work, and other pressures made it to my best interest to give this up. In retrospect, I sort of wish I had become a high school Physics instructor. Ha! Don't we all have moments like that.

During the last years at Hughes, I applied for and was awarded a State of California Professional Engineers License. Also, at one time I was a member of the IRE, IEEE, and ARRL. I retired from Hughes Aircraft Company after twenty-seven years of service.

My hobbies include photography, music (no rock and roll though) just symphony, classical, jazz with special interest in piano (how about that Vladimir Horowitz and Fats Waller?), and organ. I played the organ in a couple of small churches, but that's all done now (I'm 81 years old).Traveling and fishing are also great interests of mine.

After retiring, I gained a new interest, *TeslaMania*, resulting in the building of fifteen Tesla Coils over fifteen years, and giving twenty-four demonstrations to schools, churches, science clubs, physics classes, amateur radio clubs, etc. These Tesla coils were of all sizes. I showed a 5 foot model at the MSSC one evening that used about 2 KVA to put out 3 foot sparks. The largest which I built stood 12 feet high and used a 200 pound transformer at 5 KVA to generate 900,000 volt sparks which made a 10 foot arc. In particular, I desired to instill in young people the desire to pursue scientific careers. Of course, I wanted to show off too! I quit that endeavor recently.

Three years ago Larry Albright introduced me to microscopy and I embraced this *new* hobby with great enthusiasm. Along with enjoying looking at things through a microscope, I appreciate the comradeship of our Society, and marvel at and enjoy the wide range of scientific knowledge and experience of the members. To sum up, I've enjoyed life and am continuing to do so.



POCKET MICROSCOPE

Leon Stabinsky

Passing through London while returning from a recent cruise through Scandanavia I acquired a pocket microscope in a shop on Portobello Road. When I showed it at the July MSSC workshop, Gaylord Moss remarked that it was very similar to one described by S.H. Meakin in a 1939 article in *The Microscope* and asked if I would include a photo and description of my microscope for comparison with Meakin's in the July *MSSC Journal.*

Accordingly, a photograph of the pocket microscope is at the left along with the 7/8 inch dia. x 4 inch long thin-leather covered cardboard case. In use, the clear base is pointed at the sky for illumination. There are three stacked button objectives to vary the magnification. The inscription to the right, which is embossed on the bottom of the case, shows that it was made by Wm. Edward Newton (1818-1879) and Frederick Newton (1824-1909). They were established at 3 Fleet Street from 1852 to 1856, dating the manufacture. The cased instrument can be carried comfortably in the pocket and with the changeable objective powers is versatile enough for the examination of many sorts of objects in the field.

W.E. & F. NEWTON
OPTICIANS
GLOBE MANUFACTURERS
TO HER MAJESTY
3 FLEET ST.
LONDON

WORKSHOP of the Microscopical Society of Southern California

by: **George G. Vitt, Jr.**
Date: **Saturday, 7 June 1997**
Location: **Steve Craig's Lab**, 32 persons attended.

This has been another record-breaking attendance of the MSSC Workshop, exceeding even that of the previous month. The Workshop is becoming so popular that we must devise some means of discouraging attendance! Any ideas?

1. **Richard Jefts** displayed a beautifully prepared large blue placard with 13 circular color print photomicrographs of microslides that had been prepared by our late members, **William Sokol** (11) and **Ed Lowe** (2). This he had done in appreciation to Bill Sokol and Ed Lowe. The magnification on his 35mm film was 32X, using his Leitz Ortholux, a Wild objective and a Minolta setup. Richard used Kodak Gold 400 ASA film, crossed polars, with exposures of 1/125 to 1/500s. **Jim Solliday** added that Lowe, with Max Erb and Smith, were founding members of our Society, and that Bill Sokol had gotten his first photomicrographic setup from Lowe.

2. **Norm Blitch** displayed the rare book, *Fibrilia, a Practical and Economical Substitute for Cotton*, Anon., Boston, 1861. It dealt with methods of "cottonizing" flax, hemp, jute, china grass, and other fibers, so that they may be spun or woven on cotton or woollen machines. The book contains microscopical studies of the fibers, with 10 plates copied from nature at a magnification of 500X. All of these types of fibers had been considered as possible substitutes for cotton fiber, which became unavailable at the outbreak of the American Civil War. Flax seemed to have been the favorite candidate.

3. **Stuart Warter** displayed a cased brass mid-19th century English Martin type brass Drum monocular compound microscope, maker unknown, and without serial number. It is the type of instrument that was popular and widely sold in England 1820-60. The 10" high microscope came with the following accessories: 6 objectives, livebox, fluid tray, hand magnifier, brass mica box, glass stage disk, B/W ivory stage disk, arm for stage bullseye (missing), 6 bone sliders. Stuart had expertly restored the upper rim of the lower part of the fitted Honduras mahogany box. Also displayed was a French made drum microscope, of Fraunhofer (German) pattern, marked "Gorham & Co." (Rhode Island), c.1856. A slide in it is dated 1861. The stage moves in parallel motion by a substage knob. This microscope. shows the transition of a Drum-to-Continental design due to its rear-positioned main tube support (a bar). It comes in a compact fitted case with button lenses which consist of achromatic pairs that can be added or subtracted from one another to achieve various powers.

4. **Dave Hirsch** stated that he had for sale a number of items in electronic lab equipment (square wave generator, oscilloscope, etc.) at $25/item. He then displayed and described a superb Nachet Grand Model microscope with double pillar legs, complete with many accessories, objectives and eyepieces - all fitted into a fine mahogany case with inset brass fittings. The binocular eye-tubes and their optics produce a "pseudo-stereo" effect where the depth dimension is opposite to that normally perceived with the eyes, e.g., the less the parallax, the closer the item is perceived to be. The interpupillary adjustment is by rack-and-pinion; the substage iris and condenser are lever actuated. The microscope. has a complement of nicol prisms for polarized light observation.

5. **Leo Milan** described his trip to a PSA meeting in San Pedro CA. He displayed the book *Insect Magic*, by Kjell Sanoved, photographer of the Smithsonian Institution, 1988. The closeup color photos were spectacular! Leo then passed around a bound album of some recent color photomicrographs that he had taken of diatoms, some of which are quite rare.

6. **Jim Solliday** displayed an English, cased, compound drum microscope signed *Jacob Franks (J.F.1841)* of 114 Deansgate, Manchester. This is a Martin type drum microscope mounted on a pillar with a leaded base. The stand can be inclined while in use, for more convenient viewing. It is fitted with an English 1/4" achromatic objective of very high quality, unusual for a drum, and a Huygens eyepiece to match the objective. Jim gave a brief history of the development of the drum microscope. These were difficult to use, since they could not be inclined; their bi-convex optics, in the pre-achromat days, had much chromatic and spherical aberration, but were OK at low power. The microscope, a bullseye and many objectives were packed in a compact mahogany box. **George Vitt** raised the question as to when and how brass tubing began to be manufactured. Jim and Stuart stated that brass non-seamless tubing was first manufactured c.1751 with the invention of the rolling mill, and seamless tubing came later. **Stuart Warter** stated that the Drum was all that was available for students' use at a reasonable price. He added that, to reduce the chromatic aberration of the drum optics, Brewster wrote of using color filters ("Tinted glass") with these non-achromatic objectives which would give better performance because of the limited spectral band.

7. **Ed Jones** described his method of sorting and storing his micro-specimens. Ed uses 1" square pieces of 3-M Post-It note paper on which the specimens are arranged and held - the squares are then slipped inside a very small, transparent plastic zip-bag! Thus, the many small pieces are kept in place, protected, and easily visible through the transparent plastic. Ed also showed a book *Exploring With the Microscope*, by Werner Nachtigall, available through Edmund Scientific Co. **Carol Jones**, Ed's charming wife, found this book in the Childrens' Section of Dutton's Book Store in Burbank, CA.

8. **Jim Clark** described his new Rivett Mod. 1020S toolmaker's lathe, weighing in at 5,000 lbs., and acquired since the previous workshop!

9. **Ken Gregory** described his trip to Washington DC, where he visited various museums and the Walter Reed Army Hospital where there was an exhibition "Evolution of the Microscope" with 100+ microscopes. on exhibit. This was undoubtedly part of the Billings collection. There was also a medical instrument exhibit.

10. **Bill Hudson** passed out copies of his latest list of MSSC chemical reagents of which he is the custodian. The 3-page list contains **101 chemicals**. Bill is to be congratulated for doing such a thorough job! He also showed the book *Journeys Through the Microscope* which had many SEM photos.

11. **Ernie Meadows** absolutely outdid himself and astounded us all with his newly constructed microtome of his original design. Using the very precise micrometer head (from our previous, now defunct, Cambridge SEM), a very sharp straight razor in an ingenious and safe mounting arrangement, and an extremely sturdy base and support parts of solid rosewood, Ernie had fashioned a true work of art! On the very first try, his grandson cut sections 6 microns thick! This microtome has to be seen to be appreciated. Not only is it a precision instrument which is safe to use, but it is truly a most aesthetic art object - Shibui in the true sense. We urge Ernie to prepare a paper, describing his masterwork, for publication in our Journal.

12. **Larry Albright** read a letter from Col.L.R. Davidson who is circulating postage stamps, from various nations, which illustrate the microscope! Stamps of interest can be purchased, and the rest sent on to others.

13. **Gaylord Moss** congratulated the 11 contributors to the June issue of the Journal of the MSSC. He also reported that he had recently acquired a new laser printer with 600 dpi capability. This he will use to produce illustrations for the Journal which will be of higher quality and which will result in a publication saving of $35/month. That's $420/year!

14. **John de Haas** brought many exquisite mineral micro-mounts which he carefully set up under several of his stereo microscopes which he had brought to Steve Craig's lab. At the end of the workshop all attendees had the opportunity to examine John's fine collection.

15. **Tom McCormick** deserves an enormous amount of credit for all the effort he had expended on the transportation, set-up, and trouble shooting of the new SEM which is now **fully operational** at the Crossroads School! Not only did he underwrite the transportation of this instrument but, with undiminished enthusiasm, he spent untold hours in the critical phases of trouble-shooting and alignment. Tom may have missed his lunch and supper, but he certainly didn't miss his calling! **Ron Morris** was the major figure in the obtaining of the SEM, as described fully in his article in this issue of the Journal. With Tom, both Ron and Steve Craig spent a great deal of time and energy throughout the historic move of the SEM to its new home.

16. **Barry Sobel** exhibited and described his accomplishments in the field of microscope repair and restoration, using his newly acquired (from **Jim Clark**) miniature Sherline lathe. He exhibited a miniature, cased simple microscope from the George III collection, probably made by Wes Jones c.1800. It features an oval ebony base, a square pillar, and a sliding stage beneath 3 simple lenses which can be used individually or together. Barry had fashioned the ebony base and several metal parts. He also displayed a superbly restored Compass Microscope. in pristine condition. Then Barry showed and described a French Solar Microscope, c.1840, which he had obtained from Christie's, and for which he had made a new eyepiece on the Sherline lathe. This microscope is signed "Alexandre Lebrun Opticien, Paris". It features a spring stage, internally racked rack & pinion focus, rack & pinion adjustment of the condenser, and a geared adjustment of the mirror in 2 directions. The instrument is in its original case, with an unusual fish-plate (to observe the circulation of blood) and a glass live box. Barry described how such a microscope is installed, the desirability of using a heliostat, and the projection of the image on a wall some 20-ft. distant.

17. **Alan de Haas** stated that the MSSC should become a non-profit organization, giving many reasons for so doing. This step will be taken in the very near future, and shall be put up for a membership vote at the June meeting.

18. **Peter Fischer** brought a Unitron toolmaker's microscope for sale. The unit, which is in excellent condition, features turret mounted objectives, a 10x eyepiece and micrometer driven X-Y stage with 0.0001" resolution, for which Unitron has been justly famous for many years. Please note that Peter's new phone number is: 310-375-7604; e-mail: gfischer@uscchccm1.snads.philips.nl.

19. **Larry McDavid** described his attending the Ham Radio Convention in Dayton, Ohio. He then described a helium arc monochromatic light source (c.1960) which he uses with optical flats for interferometry.

20. **George Vitt** displayed and described the use of a Meade Maksutov type catadioptric telescope, focal length= 1000mm;f/11;aperture= 3.5". The instrument can be used with a camera for celestial and terrestrial observation, or as a spotting scope, at either 40x or 80x. He then circulated the FARGO (Vacaville, CA) catalog of camera repair tools, lubricants, and instruments. George then passed out copies of the latest membership list showing phone numbers, FAX numbers and e-mail addresses of the membership.

Even though this was quite a full program, the show & tell portion of the workshop was over at 11:30am! This gave us all time to see John de Haas's mineral micro-mounts and to discuss the myriad things that

had accumulated over the month. There was a large assortment of interesting and useful items for sale - books, glassware, instruments, optics, etc! Finally about 15 persons adjourned to Coco's for more conversation and sustenance.

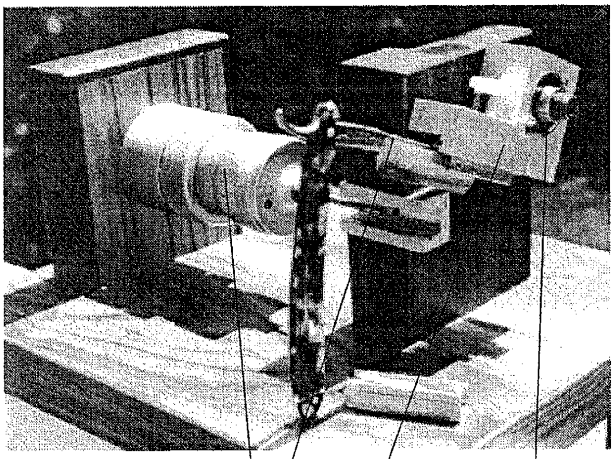
We all thank **Steve and Millie Craig** for their boundless hospitality in providing the setting and refreshments for our workshop!

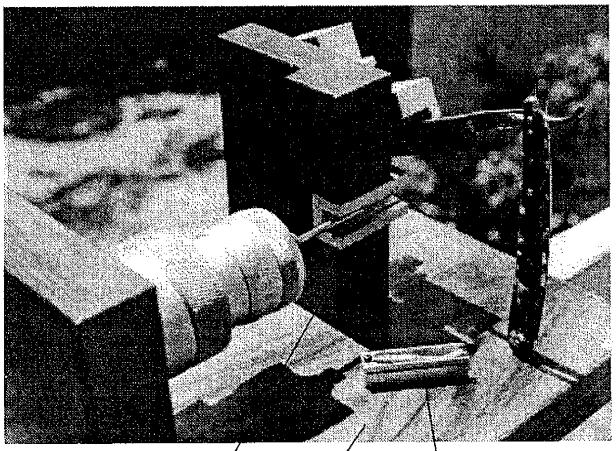
ERRATA: Inexplicably, **Richard Jeft's** contribution had been left out of the minutes of the 3 May 1997 Workshop. My original notes have been retrieved, where Richard's input had been duly recorded, but had somehow been skipped in the computer transcription. For a complete record, here is the information missing from the previous Journal:

Richard Jefts showed two color photos he had taken of the Hale-Bopp comet. He then showed the article "Seeing Through Coal With Your Microscope", by Morton C. Welling, *Popular Science Monthly*, March 1938. This article describes the preparation of thin sections from Coal Balls for the microscopic study of fossilized plants dating to the Paleozoic and Mesozoic Ages (*). He then showed Vol.4 No.2 of the magazine *Microscopy Today* (a free monthly publication) which had the following information: a) The group, *The Society for Amateur Scientists*, based at San Diego State University, and their efforts to "empower everyday people to make real contributions to science". The group publishes a monthly Journal at a subscription cost of $35/year. Richard's thought was 'can amateur microscopists make a contribution?'; b) a three page excerpt from the new book, *Judgement Day for the Turin Shroud*, by Dr. Walter McCrone ($30), with text and eight photomicrographs in color, and his general conclusions as to the authenticity of the shroud.

(*) For information on coal balls, see G. Vitt's **Paleobotany, Coal Balls and Replicas, Part 1**, TECH NOTE 48, Oct. 1995; and **Paleobotany, Coal Balls and Replicas- Part 2**, TECH NOTE 49, Nov. 1995.

ERNIE MEADOWS' MICROTOME





The photos show the rosewood based microtome that Ernie Meadows displayed at the June workshop as described by George Vitt on page 131. As George says, it must be seen to be fully appreciated. Aside from its aesthetic beauty, the design is both elegant and functional with clever design features not obvious at first glance. The pivot is a precision double ball bearing preloaded to eliminate any play. The sliding carriage for the specimen has a spring detent to prevent the brass case from extending into the blade path. Notice also that the pivot point is offset so that the blade cuts with a slicing motion, drawing across the sample rather than just chopping straight down. The micrometer head which is calibrated in microns was bored out to take the moving shaft from the head end as shown; the opposite from its original construction. The guard slips over the straight razor to protect it when it is not in use.

Ernie's Grandson has been successfully cutting, for study, 6 micron sections of insects, leaves and other materials.

GOODS, GEAR AND GADGETS

Richard M. Jefts

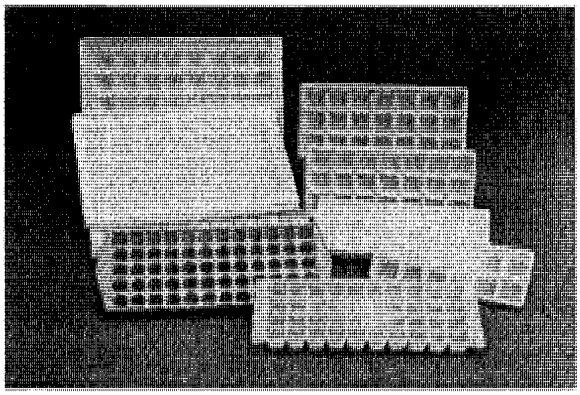


Fig. 1 Nine plastic ice cube trays with 12 to 60 wells

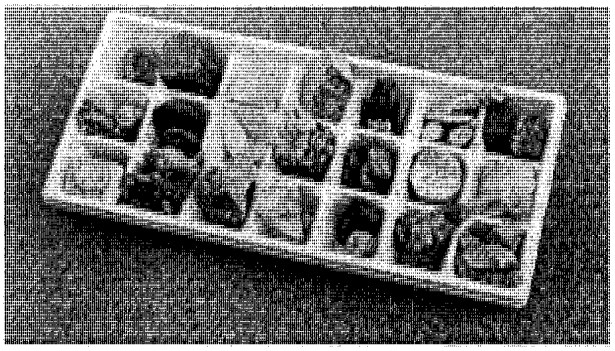


Fig. 2 Rock and mineral specimens.

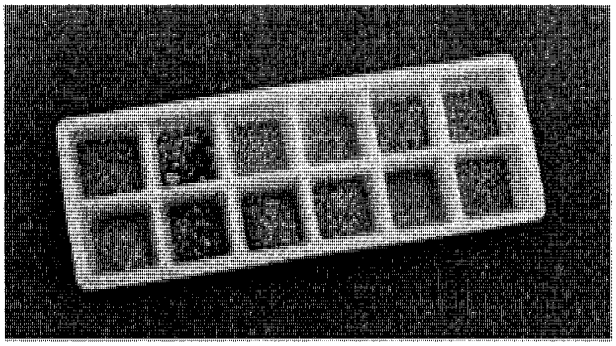


Fig. 3 Beach sands from the California coast.

The offering this time takes no material conversion, we simply adopt the item to a use for which it was not originally intended. Fig. 1 shows nine plastic ice cube trays, of which five are of a different size or having a different number of compartments. The sizes range from 7 1/2" x 11" with 40 compartments to 2 3/4" x 7 1/2" with 12 ice cube wells. One, only 4" x 10 3/4" has 60 deep wells. For the microscopist, such trays can be very useful to segregate, save or store a host of small items in the lab or at the workbench, either on a temporary or more permanent basis. A short while back, a single tray with temporary Scotch Tape labels, easily held 28 different types of gunpowder (preparatory to having their picture taken) and another project with similar sized material, took only one tray, holding close to 40 different fruit, vegetable and flower seeds. Fig. 2 shows one current use where-in are stored smaller rock and mineral specimens, many of which will be reduced in size to fit a 1" x 3" microscope slide, while Fig. 3 shows a tray with 12 different beach sands taken from selected sites along the southern California coast. Along similar lines, (and temporarily set aside in an ever growing stack) are a number of trays with from very small to microscopic size marine and fresh water shells awaiting hopeful identification or at least further study. Other uses for such trays will come readily to mind when your particular need arises. It might be mentioned that all the trays accumulated and used over the years were picked up in various Thrift Shops at something like 25 to 50 cents each, so as the saying goes, the price is right. More important, however, is that many of these now more or less obsolete size trays can be found by rummaging around and they can perform a very useful service. If cast from the same mold, they can be nested and neatly stacked. Being of plastic, they can take quite a beating, they are washable, are easily and inexpensively replaced and sometimes even colorful. (The trays in fig. 1 are in two shades of white plus a yellow and a blue.) And although it may seem like cheating, there is really no law that says that you cannot take these trays, freeze water and even make ice cubes with them. Just remember to dump out the (fill in your choice of specimens) before you do.

MINUTES OF MSSC MEETING OF JUNE 18, 1997

David L. Hirsch

The June 18, 1997 meeting of the Microscopical Society of Southern California came to order at 1915 hours, with about 35 members and guests in attendance. President GEORGE VITT presented the evening's agenda. Meanwhile, PETETETI prepared the refreshment table for the onslaught of attendees hankerin' for a good cup of java and pickin's from the sweet table which was well stocked by Ernie Meadows.

ED JONES gave a well organized and comprehensive talk on Forensic Microscopy, the part it plays in solving crimes, and in the apprehension and conviction of perpetrators. His talk was accompanied by slides showing high profile criminal cases of the past, including Sacco and Vanzetti, the Lindbergh baby kidnaping, the Hillside Strangler case and others. Ed showed the various types of microscopes used in forensic investigation and concluded his talk with an in-depth look at the identification of various fibers, along with examples of cases where the examination of fibers was instrumental in solving cases.

FREEBIES. At regular meetings and workshops, various items are offered gratis to members in attendance. At tonight's meeting, KEN GREGORY donated a quantity of assorted chemical glassware. DON BATTLE distributed copies of Calumet photographic catalogs and buying guides.

SHOW AND TELL. By far, the largest Show and Tell instrument ever presented to the membership was the Cambridge Scanning Electron Microscope which RON MORRIS was instrumental (not a pun!) in acquiring and installing in the science laboratory of Crossroads School. Ron showed the SEM to MSSC members and described its function. TOM McCORMICK worked with Ron on the installation of the SEM. Tom submitted a print of butterfly scales made with the SEM at a magnification of 458X. An interesting aside of the print, was a butterfly scale, partly suspended by electrostatic forces. MSSC members are invited to use the SEM by appointment. Call JOE WISE at Crossroads school, (310)829-7391.

JIM SOLLIDAY showed a newly acquired Bausch and Lomb dissecting microscope, complete with carrying case. The 1909 brass stand was in pristine condition, featuring a horseshoe base supporting a pillar with rack and pinion. An articulated arm atop the pillar supports the lens ring. The mirror, on a swivel arm, is plane on one side and concave on the other. These microscopes come in a variety of forms and members are invited to bring in other types for display.

TOM PORTER showed an unusual precision balance, circa 1930. The German made, vernier dial equipped balance, has a capacity of 50 milligrams using a system of levers and a damping cylinder. The mechanism is encased in a protective enclosure. The body of the balance is a machined aluminum casting. The object being weighed is retained in a pan located on the right hand side and external to the mechanism. Tom seeks additional information on the balance.

ALAN DeHASS showed the 'mother' of all mechanical stages; an integrating stage made by Leitz. This complex and massive unit, made of nickel plated brass, comes in a leatherette covered wood case. The stage consists of three sets of micrometer barrels arranged facing each other, and assembled to the specimen holding portion. The stage is described as of a 'planimeter type', capable of measuring the surface area (footprint) of three separate specimens at one time. Alan will prepare an article on the stage for publication in a coming issue of the MSSC Journal.

DON BATTLE showed an interesting photographic device consisting of a Nikon single lens reflex camera integrated into a Magny 45 Polaroid attachment. A system of mirrors and prisms conducts the image from the focal plane, thence to the back of the camera, to the forward facing Polaroid film holder.

GUESTS. MYRON LIND, M.D. and his wife, ANITA, came in from Sherman Oaks to attend the meeting. Dr. Lind displayed a box of prepared slides from mid-nineteenth century England. GAYLORD MOSS introduced his guest, SUSAN TAUCK, who is visiting from Marengo, Illinois, which is located about 60 miles northeast of Chicago.

VP GAYLORD MOSS displayed an album of color photos taken at the March 1, 1997 workshop. Several of the photos were of the Show and Tell table loaded with an array of vintage microscopes. All members are encouraged to bring cameras and camcorders to the meetings and workshops to record the goings-on. RICHARD JEFTS showed a neatly formatted photo montage of crystalline substance photomicrographs. The prepared microscope slides used in the making the photomicrographs for the montage were from the collections of the late BILL SOKOL, and ED LOWE.

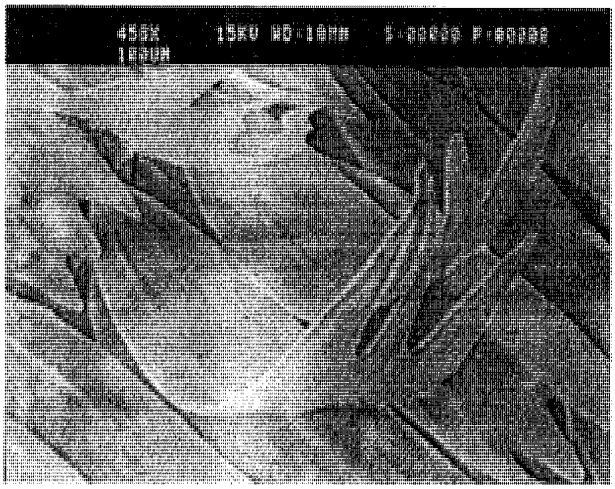
On behalf of the members of MSSC, we thank ALAN DeHASS for his generous donation of a Hewlett Packard IICX scanner to replace the one currently in use for producing the photographs and illustrations which enhance and enrich our Journal. We thank VP GAYLORD MOSS for the magnificent job he is doing in the publication of a First Rate journal. All members are urged in supporting Gaylord by keeping him well supplied with microscopically significant articles for publication.

SOCIETY BUSINESS. A maximum of one page of the MSSC Journal will be available for paid advertisements Members can still put in free ads to sell or trade their own personal items or to ask for items they want. For further information, contact GAYLORD MOSS. Editor, at (310)827-3983.

NOW HEAR THIS! Once again, it is annual membership renewal time. Dues for the forthcoming year are determined at the end of the prior fiscal year. The dues structure, for the 1997-1998 fiscal year, as voted on and approved by the membership are: $50. for regular members and $40. for corresponding members. Dues are payable one year at a time. Spousal dues have been eliminated. Current members are urged to renew their MSSC dues before the end of August. After 31 August, 1997, in-arrears members will be dropped from the roster, and their Journal delivery will stop.

THE CROSSROADS SCANNING ELECTRON MICROSCOPE STATUS AND PLANS

Tom McCormick



The photograph at left shows a moth scale scan taken recently at Crossroads School with the Cambridge SEM procured by members of the MSSC. The uncoated scales were lifted up by the electric field giving somewhat the effect of grain waving in the wind.

Considerable work has been done to fix intermittent connections to increase the reliability of the SEM electronics. A main power supply has been replaced by Ron Morris and many cables are being remade by Ron and connectors replaced. It is a big job requiring many man hours.

There are some exciting prospects for the use of the microscope. General Telephone has fitted Crossroads with a T3 fiber optic connection which has an enormous data carrying capacity; equivalent to that of the usual Internet service provider. The eventual plan is to use this data capacity to make the microscope available to other high schools and to graduate students at UCLA who cannot get time on the University SEMs. The remote user would send a sample to Crossroads and then communicate with the SEM operator to run the sample. The scanned pictures could be posted to the school web site or sent immediately by e-mail to the user who could then request a modified scan.

By this means, the SEM at Crossroads could become a research and study tool for students all over the world. Success would be a worthy payoff for the hard and continuing work of several members of the Microscopical Society of Southern California and a start toward fulfilling our original "charter" of promoting public and scholastic interest in microscopy.

RUSSIAN MBS-9 & MBS-10 STEREOSCOPIC MICROSCOPES

by Roy Winsby - Editor and Hon. Secretary
Manchester Microscopical and Natural History Society

Much interest arose during the last year in the offer by Lakeland Microscopes of the MBS-10 stereoscopic microscope at the bargain price of £199 including carriage. Many of our readers availed themselves of this offer and got themselves the bargain of the year because the list price of the MBS-10 is around £481. There are no more available at £199 but Lakeland Microscopes have managed to obtain a further supply though they have had to pay more and the price is now £215 - still a bargain for a stereomicroscope like this.The MBS-10 was only introduced a few years ago. I paid £386 in 1986 for the previous model, the MBS-9, and have been pleased with it.With my home-made turntable attached to show samples of foraminifera sand I have demonstrated it at many exhibitions.The optics are good, giving an erect image in either transmitted or reflected light and I like it, but when I heard that the new model MBS10 had some refinements including improved optics and was being offered at such a low price I was naturally interested in finding out more about it.

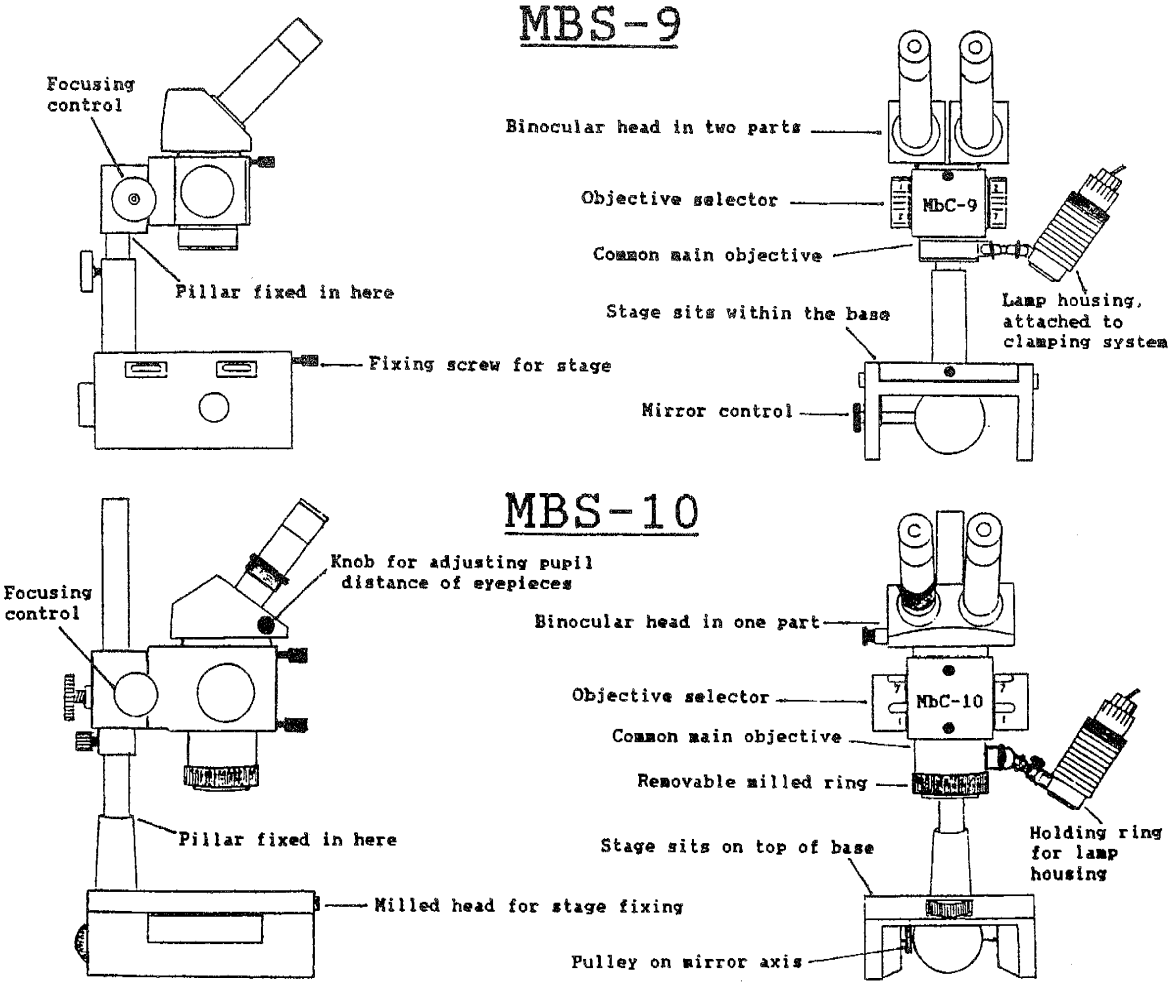
The MBS-9 has 4 sets of paired eyepieces, but with so many as this and the five objective powers there is a large amount of duplication of the various total magnifications. Three sets of eyepieces, x6, x8, x14, are supplied with the MBS-10 when purchased at its full price of £481. The x6 eyepieces are not supplied when it is bought at the cheap price but they are not really necessary.The supplied eyecups do not have a deep enough lower rim and are easily knocked off the eyepieces. However, this can easily be remedied. On the metal rim which fits over the eyepiece there are two tabs. Hold the eyecup firmly and with the thumb press in the two tabs very slightly. This will make for a much firmer fit when applied to the eyepieces.

A little confusion is caused by the "MbC" on the microscopes and in the instruction manuals, because both microscopes have been marketed in the UK as "MBS". It would appear that the Russian C = the English S.

The eyelens of the x6 eyepieces supplied with the MBS-9 are 10 mm diameter, all other eyelenses of both microscopes having a 14mm widefield eyelens. The lower lens of the x8 eyepieces are 20 mm diameter on the MBS-9 and 23 mm on the MBS-10, which means that the latter give a larger field of view than the MBS-9 x8 eyepieces. The MBS-10 is reported to have a flatter field of view, though I have never noticed my field of view not being flat, but then how important is a flat field with a stereomicroscope? If you are looking at something entirely flat then you might notice a little curvature, but when looking at things which are not flat and for which stereomicroscopes are ideally suited such as studying forams, insects, etc. You are not likely to notice any curvature, both microscopes are par central and par focal with all eyepieces and objectives. The MBS-10 is provided with dioptric adjustment on one eyepiece tube, the MBS-9 is not. Whilst this is no doubt an advantage, at these levels of magnifications I would not have thought its omission too much of a detriment, and it has never bothered me with my MBS-9. However, more expensive stereomicroscopes such as those made by Zeiss Oberkochen have dioptric adjustment on both eyepieces and this often raises the question of why should this be necessary. I understand it is more necessary with zoom stereo microscopes.

The actual magnification values are, for the eyepieces, x5.85, x8.16, x12.5 and x14.3; for the objectives,

	MBS-9	MBS-10
Paired eyepieces supplied	x6, x8, x12 1/2, x14	x6, x8, x14
(Special offer version)		x8, x14
Objectives on revolving drum	x0.6, x1, x2, x4, x7	x0.6, x1, x2, x4, x7
Widefield eyepieces	Yes, except the x6	Yes
x8 single micrometer eyepiece	Yes	Yes
Cross line scale graticule	Yes	Yes
1 mm ruled squares graticule	Yes	Yes
Inclined binocular head reversible	Yes	No
Left eyepiece has dioptric adjustment	No	Yes
Removable green filter	No	Yes
Magnifications	x3.3 to 100	x3.3 to 100
(Without the x6 eyepieces)		x4.6 to 100
Working distance, stage to underneath of objective	64mm	95mm



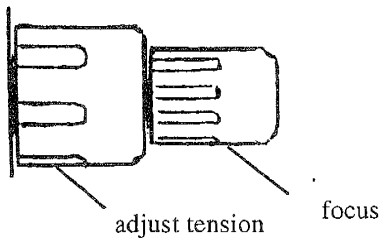
x0.57, x1.01, x2, x4, and x7.05, whereas they are stated in their nearest round figure equivalents on the eyepieces and the objective magnification changers, and which is how I will refer to them, By means of the supplied x8 eyepiece with the changeable scale or grid, accurate linear or area measurements can be obtained. This eyepiece has its own dioptric adjustment to obtain sharp focus of the scale or grid before focusing on the specimen. Both manuals give a conversion table showing the measurement value of the specimen corresponding to one division of the grid or scale at the different magnifications.

Mr. Robert Baldwin of Northampton kindly drew me sketches and measurements of the MBS-10 and has helped me in the compilation of this article. Ia grateful for his kind help. We both drew our respective stereomicroscopes, so far as we were able, to the same scale.

In both models the head unit with the magnification changer on the revolving drum is mounted on the vertical column, adjustable for height, and focusing is by rack and pinion. Only a coarse focusing control is fitted, which I find is satisfactory with all the magnifications. The focus controls on both sides of the MBS-9 are slim, but on the MBS-10 they are really wide.

These differences in the focus control do not show on the front views of the above drawings because the focus controls are at the back of the head unit. On the MBS-10 the right hand control is in two parts, the larger part nearest the head unit tightens the tension, the smaller outside control being used for focusing. See sketch below.

The focusing knobs are awkwardly placed at the back of the MBS-10. I find it an advantage that I can turn the binocular head round to face the rear on my MBS-9, which means that I can then have the focusing controls directly in front of me. The MBS-9 does not have a separate knob to adjust the focusing tension. Page 8 of the MBS-9 manual states, in regard to the objective magnification changer, "ATTENTION", it should not be rotated the handles in the opposite directions", which statement is repeated in regard to the focusing controls. Not knowing about the method of tensioning on the MBS-9, ownersof the MBS-10 may



Right hand focusing knob

well wonder what this instruction means. Certainly it does not mean that you cannot turn the controls to and fro. What it does mean is that you must not grip one control firmlyand try to rotate the other. The translated manual is badly written and in parts is misleading.

Incident (top) lighting is by means of a lamp unit consisting of a lamp housingwith a bulb in a retractable holder, the whole unit mountedby an adjustable clamping system on the body of the microscope. Illumination is by an 8v 20w bulb controlled by a mains transformer with rheostat. For safety reasons, a British transformer is usually supplied. On the MBS-10 a removable green filter is supplied which screws into the bottom of the lamp housing, but if only one colour filter is being supplied it is a pity it is not a daylight blue filter. The MBS-9 is not supplied with a colour filter but it does have a non-removable frosted glass in the bottom of the lamp housing. I do not like a green filter, which colours the specimen green, but of course it can be unscrewed.A frosted glass is not supplied for the MBS-10.

The adjustable clamping system fixing the lamp assembly to the head unit on the MBS-9 is made up of separate cast metal links with thumb screws tightening on to semi ball and socket type joints - actually hollow and dimple.The two halves of the sockets tighten on to dimples on the inner connecting pieces. See sketch below left

.

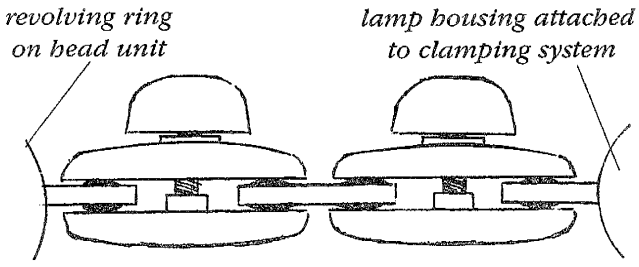
The clamping system on the MBS-10 is meant to be an improvement but is in fact much worse, (see below right) it being made up of jointed thin bright steel pieces clamping on to a 12 mm steel ball. It is not possible to tighten the two screws sufficiently to grip the steel ball, with the result that the system is wobbly. This is compounded by the fact that the lamp housing instead of being fixed to the clamping system as on the MBS-9, simply drops into a holding ring and the fit is too loose. I have heard many disparaging remarks regarding this clamping system on the MBS-10, including that it is weird, that it is a stupid arrangement, and that some people have abandoned it and use a separate lamp.The holding ring for the lamp housing is screw tapped for holding the lamp housing but no screw is supplied.

As I use my MBS-9 mostly for the low power observation of sand and marine debris I removed my lamp assembly as I can obtain ample top illumination from my desk top table lamp fitted with a 40w bulb. 40w bulbs cost around 40p each, whilst the 8v 20w microscope lamp bulbs cost around £2.40 each, though both microscopes are generously supplied with two extra bulbs.

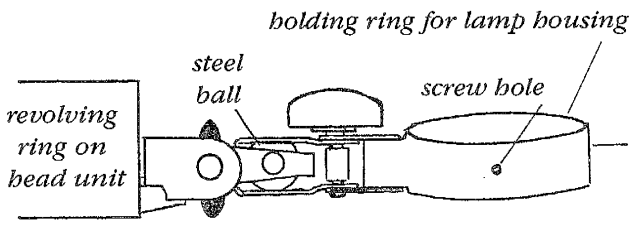
Another aspect in which the MBS-10 manual causes confusion is in regard to illumination. On page 9 it says to ensure uniform illumination of the object the microscope design provides an adjustment shift of the lamp with respect to the condenser.The condenser is the large domed lens in the lower part of the lamp housing which is exposed when the green filter is removed.The bulb is in a holder in the top end of the lamp housing and this holder can be moved slightly forward or backward to obtain uniform illumination. Also, as the manual says, the illumination can be adjusted by changing the lamp voltage via the rheostat on the transformer box.

The column on the MBS-10 is an extraordinary length, though this provides some advantages; the optics have been recomputed to allow a greater working distance, and the top of the column can be used to lift the microscope. It is not easy to grasp the short length of the column of the MBS-9, which makes the instrument not easy to pick up. An advantage of the greater working distance is that it allows better alignment of the lamp assembly to illuminate the specimen on the stage.The height to the top of the column, when the microscope is attached to the base, is 455mm nearly 18".This permits the examination of a specimen up to 165mm (6 1/2") high.When examining a specimen of this size, the eyepieces are at a nice height for standing up! The highest specimen on which the MBS9 can be focused is 82mm (3 1/4")

The flat rectangular base which forms the stage has an 85mm diameter aperture over which fits the 100mm diameter clear glass plate or reversible black/white metal plate, both of which are supplied.The stage fits on to a cast iron base unit with a 60mm diameter aperture above an adjustable 70mm diameter piano mirror/opal reflector. For transmitted light with the MBS-10 the lamp housing can be lifted out of the holding ring from its upper incident light position and inserted into the rear of the base unit so that illumination is obtained via the mirror. Unfortunately another wobbly fit. It is slightly better if you remove the green filter because then the lamp assembly can go in a little further, but still wobbly. You cannot do this with the MBS-9 as the lamp housing is fixed to the



Top view of MBS-9 clamping system



Side view of MBS-10 clamping system

ring round the condenser. What you can do on both microscope! is to retract the bulb holder from the lamp housing and insert it into the base unit, where you will find it is a nice firm fit, and in this position the bulb utilizes the metal dome shaped reflector in the base. The MBS-10 manual explains this in the first paragraph on page 9 where it refers to using a lamp with the lamp holder without condenser.

On the MBS-9 the mirror control is a shaft extending through the side of the base and fitted with a control knob for swivellinq the mirror. On the MBS-10 the shaft holding the mirror has a pulley driven by a small belt from another pulley at the back of the base, this back pulley being adjusted by a milled wheel protruding through the back. I have had varying reports about the level of the transmitted illumination. Some say they find it satisfactory even for the higher magnifications whilst others say it is only suitable for use with the lower magnifications. Mr.Baldwin recommends a piece of black opaque paper, large enough to cover the stage opening, with an appropriate size hole just big enough for the subject. Placed under the specimen it cuts out excess illumination and improves the contrast.The hole in the sample he sent me was 18 mm diameter.

In Quekett Journal "Microscopy", Vol.35, Part 7, Jan-June 1987, pp 526-7, Mr.H.S.Henderson explains some interesting modifications he made to his MBS-9. He removed the lamp housing and adjustable arm from the objective lens outlet and relocated the lamp housing through the side of the base so that it was closer to the mirror. For top lighting he attached the Russian OI-19 high intensity lamp to a steel rod rising up from the side of the base. After removing the upper lamp assembly he made use of the revolving collar round the objective lens outlet by fixing to it a piece of polarizing material, the analyser, on a hinge so that it could be swung up into position when required. The collar can be rotated for crossing the polars. Mr.Henderson explains that he inserted a second piece of polarizing material, the polarizer, mounted on a pivoted bracket beneath the stage.

I use my MBS-9 mainly for examining sand and marine debris looking for forams and other objects where top lighting is required. If I want transmitted light I find that my biological microscope with a low power objective is more efficient and do not therefore use the heavy base unit, which has the disadvantage of raising the height of the microscope. At the general working distance with the object in focus, heights to the eyepieces from the table or bench are approximately as follows:

	MBS-9	MBS-10
With base unit fitted	375-380 mm	435-440 mm
Without base unit	305-310 mm	375-380 mm

I qualify my comment about using a stereomicroscope with transmitted light. For the examination of such things as the venation in insect wings at low power it may well be suitable.

On the MBS-9 the binocular head is in two parts, one part for each eyepiece tube, adjustment for inter-pupillary distance being accomplished by gripping a part in each hand to move them.This is one thing I do not like about the MBS-9 because the movement is rather stiff. I was pleased to see that this difficulty has been overcome in the MBS-10 which has a one piece binocular head, the eyepiece tubes swivelling in their sockets controlled by a side knob, which is a vast improvement. It is because of the method used in the MBS-9 that the manual for the MBS-10 says "ATTENTION: It is absolutely prohibited to change the inter-pupillary distance by moving the eyepiece tubes towards and apart by hand."

This side knob adjustment for the inter-pupillary distance is a worm drive which means it has an element of play, I.e., its action is not instantaneous, you have to turn it a bit before it begins to move the eyepieces. This play of course happens on many worm drives, as users of the CTS-12 mechanical stage will know.

The stage of the MBS-9 is clamped within the raised sides of the base unit, whereas the MBS-10 fastens on top. Both models are supplied with long sloping arm rests which hook on to the sides of the respective base units, but these rests need the luxury of ample open table space and I doubt if many people use them for general use.The MBS-9 manual describes them as elbow rests but this is a equally a misnomer as they are really hand rests since they are to support the hands to keep them steady when dissecting. On the comparative drawings of the two microscopes you will notice the different arm rest seats on the side of the respective bases. On the base for both microscopes there are two seats and the arm rests can be fitted in either of two positions, in the case of the MBS-10 one position being more forward than the other. On the MBS-9, however, the choice of seat depends on which way the binocular head is facing. For the examination of large flat objects the microscope stage, removed from the base unit and without the glass or black/white metal plate in position, can be sited directly on to the surface of the object to be examined.

Both instruments have five different objective magnifications marked on an indexed revolving drum as shown on the sketch.The lenses inside the drum are not the actual objectives but a twin Galileo system to vary the power of the large fixed x2 common main objective.This is apparent by the fact that x2, which is marked twice on the control for the revolving drum, can be used either end since it i" two straight through open apertures, the actual x2 being provided by the common main objective. In the case of the other powers, inversion reduces the magnification as regards the x0.6 - x7 and the xl - x4.

The common main objective is in a much deeper housing on the MBS-10 with a removable milled ring to keep the lamp holding ring in place. Because the MBS-9 can be used in either the forwards or the backwards positions the objective numberings on the

SATURDAY WORKSHOPS AT STEVE CRAIG'S LAB.

The monthly Saturday workshops have become very popular with more than 30 members now attending each one. Last Saturday, three ladies were present.The format has developed informally. As members arrive, instruments brought to show or discuss are placed on a table in the middle of a circle of chairs under a shady tree. Although the workshop officially starts at 9 AM, members start arriving an hour or more earlier to greet each other, look at things brought to sell or to give away and to start on the coffee, tea and great spread of fruit, cakes and cookies arranged by Millie Craig.
At 9 AM everyone sits down and each person in turn shows and discusses what he has brought or whatever other interesting piece of knowledge he would like to share. Microscopes and other instruments are discussed roundly with everyone learning from the interchange.

At 10:30 there is usually a 15 minute break.The aim is to finish the show-and -tell by 12:00 but it often ends later. This round table is sometimes followed by a microscopic exhibit, hands -on demonstration or video presentation which has been set up inside the lab.After that, a group of 10 to 14 gathers at Coco' restaurant to have lunch and continue the discussions.

The workshop is a unique example of how a wonderful monthly event has just evolved without any formal structure and with no management except for Steve's ringing a cow bell or tooting a horn to call to order at 9 AM. Our president, George Vitt adds tremendously to the enjoyment and value of the event by doing the nearly impossible job of recording the details of the proceedings.

Each workshop seems to get better than the one before. The Smith and Beck special event organized by Barry Sobel on July 5th was truly inspiring as is shown by the photograph on the opposite page below.

RUSSIAN MBS-9 AND MBS-10 STEREO MICROSCOPES - Continued from page 139

rim of the control read backwards on one side of the microscope and forwards on the other, a red dot lining up the objective setting being on the left of the control knob on one side of the microscope and to the right on the other.The MBS-10, however, can only be used with the binocular head in the forwards position because if reversed the tall column would be in the way of the nose.The objective powers marked on the rim of each control therefore read the same way, and there are white indicating pointers to the front of the control on each side of the binocular head.

I take my glasses off to look through the eyepieces but then I cannot read the objective markings on the rim of the control. I can feel the clicks as I turn the drum but I do not like having to put my glasses on to see which magnification I am using, so I put three small rectangles of coloured paper on the control, starting on the rim against the number and turning 1/2" down the side, pink paper for the x4, yellow paper for the x2 and blue paper for the x7. Though I cannot read the numbers without my glasses I can make out the colours.

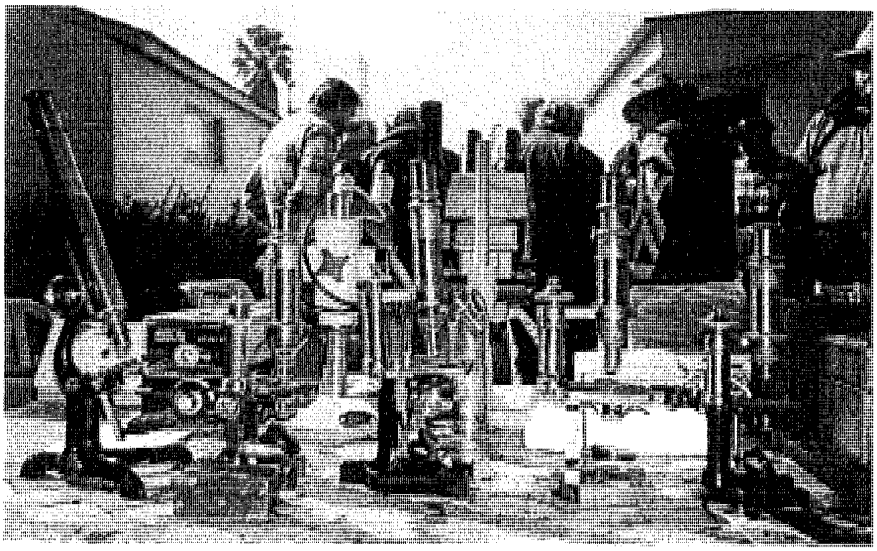
On the MBS-9 the rear part of the head unit is fixed to the top of the column and the column slides up and down in the lower tube housing, being secured at the required height by a locking screw. The column therefore has a limited restricted depth of travel to the bottom of the tube housing. On the MBS-10, however, the column is fixed and the head unit slides up and down the column, being fixed with a locking screw.A moveable safety supporting ring prevents the head unit crashing down on to the specimen.The MBS-9 does not need this safety feature since the column is unable to go lower than the bottom of the tube housing.

My MBS-9 came in a massive heavy top opening wood box painted light grey, longer in its length and breadth than in its height. As well as the microscope, the base unit, rheostat transformer control, polystyrene box holding the eyepieces, and the two arm rests, all fitted in the box but the binocular head and the base unit still had to be removed to fit in the microscope, and the problem was where to keep the extra large box. It may be considered reprehensible to dispose of a microscope box, but I gave it away as a tool box. The MBS-10 when supplied at its bargain price is despatched in a disposable packing carton.

To sum up - the MBS-10 is a nice instrument, finished in light grey. If you already have a MBS-9 you are not missing much by not changing. You have more eyepieces and a better clamping assembly for the lamp in its upper position, and you have a box, but then you will have paid a lot more for it. The MBS-10, having the range of magnifications on a revolving drum with optics the quality of those supplied, is a real good buy at its current offer price of £215 in spite of the idiosyncrasies of its lamp clamping unit and its pidgin English manual.

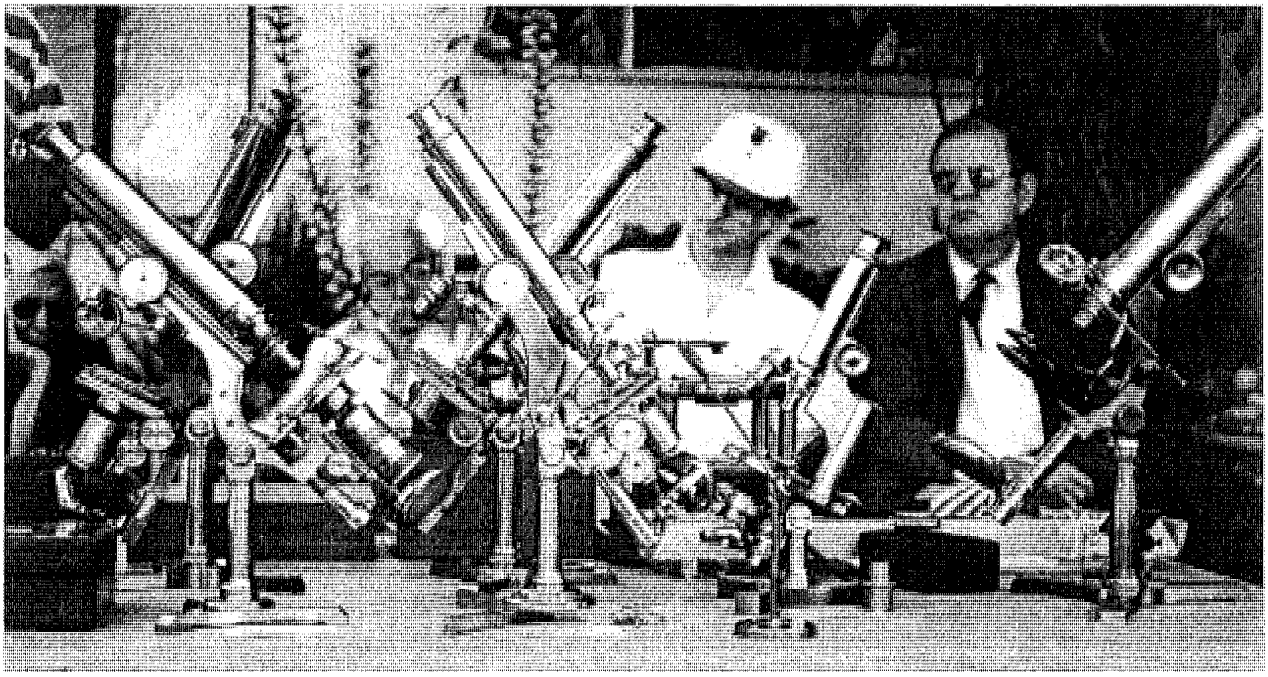
This article is reprinted from the January 1994 Issue No. 27 of *Micro Miscellanea*, the Newsletter of the Manchester and Natural History Society with the kind permission of the author: R. Winsby, Editor and Hon. Secretary.

WORKSHOP PHOTOGRAPHS



1 March 1997 workshop at Steve Craig's showing the array of microscopes ready for discussion during the show and tell.The crowd is perusing the swap and freebie table before the start of official festivities.

1 March 1997 Left to Right: Don Battle, Jim Clark, Bill Hudson, Norm Blitch, Leo Milan and Jim Solliday.
Early morning in Southern California; sun up but it is still cool. The coats came off later.



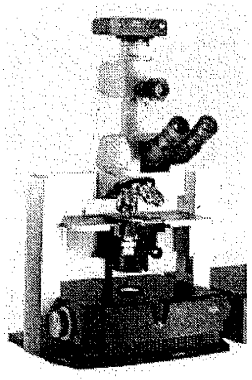
5 July 1997 - Smith and Beck workshop. A sampling of the incredible array of Smith and Beck instruments that were shown and discussed. Left to right: Isiah Lieberman, Pete Teti, Barry Sobel and Frank Barta.

July Meeting Features

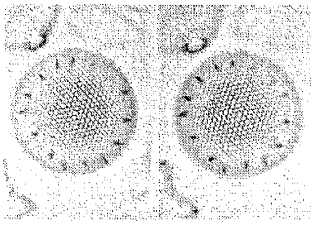
A High Definition Real Time 3-D Microscope

by Gary Greenberg ofThe Edge Corp.

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



R400 Real-Time
3-D Microscope



3-D Pair photomicrograph
of diatom.
100x oil objective

Wednesday's presentation will be most interesting and instructive as Gary Greenberg demonstrates and explains the Edge RD-400 3-D microscope which obtains higher resolution by the use of four oblique illuminating beams which allow the objective to collect additional higher-order wavelets along all axes, resulting in higher resolution throughout the image plane. There are many other unique technical and mechanical features in the microscope, the explanation of which is sure to add to everyone's knowledge of microscopy.

The microscope generates left-right stereo pairs which can either be viewed in separate eyepieces, or projected on a screen and viewed with magenta/green filter eyeglasses.

Another advantage of the multiple oblique illumination system is an increased depth of field which makes the 3-D image more useful.

Everyone will have a chance to look at the microscope and see the increased imaging capability first hand.

Editor's Notes

What a week this has been! Last Friday on the 4th of July we all watched a spacecraft from Earth zoom into the Martian atmosphere and bounce to a landing on the surface, open petals like some giant seed pod and disgorge a remote controlled vehicle to explore the surface of Mars.

Then the very next day, 34 members of the MSSC gathered at Steve Craig's in front of a stunning array of brass microscopes (page 141) that were made in England by Smith and Beck in the reign of Queen Victoria. In the presence of the overwhelming elegance and beauty of these instruments, it is easy to forget that these were the high technology of little more than 100 years ago. The jubilation that we witnessed at JPL as the Mars probe landed successfully must have been witnessed by some of these instruments as Victorian era researchers used these lovely crafted objects to explore down inside our world instead of out from it. The brass and glass of then may be silicon, titanium and polymers today, but the drive for knowledge is the same. The human passion, energy and intelligence that put a probe on Mars is clearly visible in the microscopes that we had the privilege to see and touch last Saturday.

Tom McCormick (see page 135) neatly linked our microscopical past with the technologies of the present and future when he explained how our Crossroads scanning electron microscope will be connected by the Internet for the use of students at other schools and potentially anywhere in the world.

Once again, I would like to thank our friends in English microscopical societies for allowing us to republish some of their writings. This time we are again indebted to Roy Winsby of the Manchester Society for his article on the MBS-10 scopes that 7 of our members now own. Other kind contributions come frequently from the Postal Microscopical Society and our friends there. Also in this issue is our first supporting advertisement which comes from Bill Krause at Savona Books. Savona has an excellent catalog with many unusual items. Also, several members have met the Krause's on trips to England and have remarked on their kind hospitality.

Gaylord E. Moss