Bulletin of

THE MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA

Volume 1 Number 1 September 1996

RICHARD ADIE

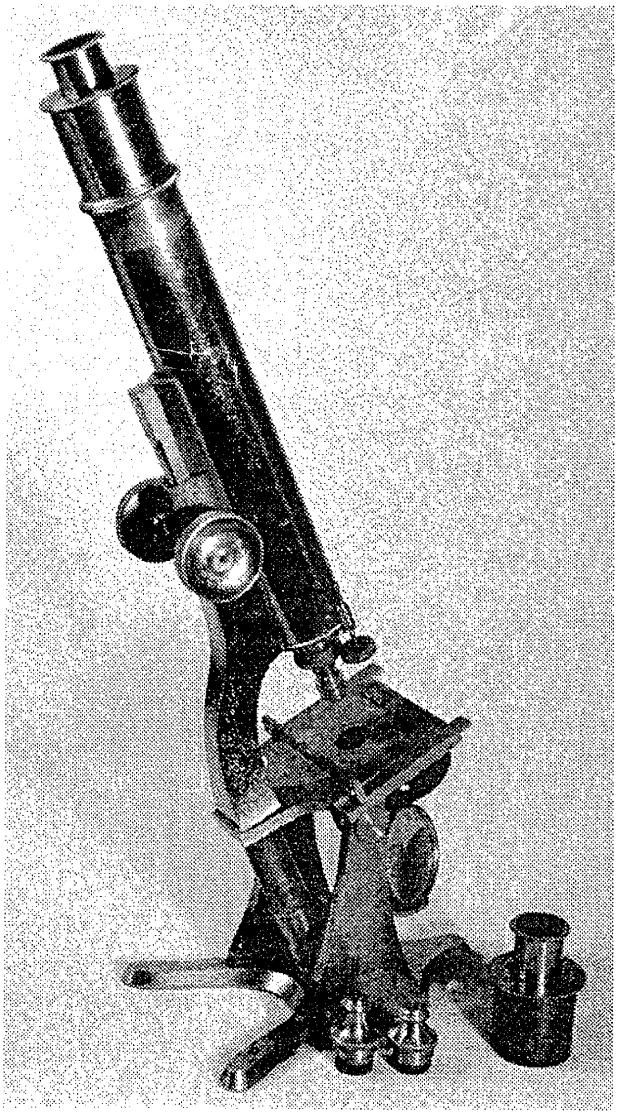

Fig. 1. Adie Achromatic Microscope
Circa 1842-1846

INSTRUMENT MAKER from LIVERPOOL AND EDINBURGH

By James D. Solliday

Microscopes associated with the name of Adie are rare items indeed. I recently had the opportunity to study one such instrument having the signature of **R. Adie of Liverpool**. It may be helpful at this time to provide a brief description in order to establish the type of microscope under discussion. Nineteenth century microscopes are often referred to as Continental, Bar-limb or Lister limb type instruments. The present subject is immediately recognized as a monocular Lister limb type microscope. By virtue of its signature, location and design, the date of production has been estimated at circa 1842-1846.

This instrument signed by Richard Adie is a good example of an early achromatic microscope (fig.1). All three objectives are of the stacked button type and are accompanied by a pair of eyepieces. What immediately catches your attention, and is probably the most important feature, is the arrangement used for fine adjustment. The mechanism is a very slender screw mounted in such a way that it remains in contact with the side of the body. A very short lever extends through a slot and acts against a sprung nosepiece (fig.2). The screw directly drives the lever at a ratio associated with the pitch of the thread. I suppose the idea of keeping the screw attached to the side of the tube was to maintain stability. How-

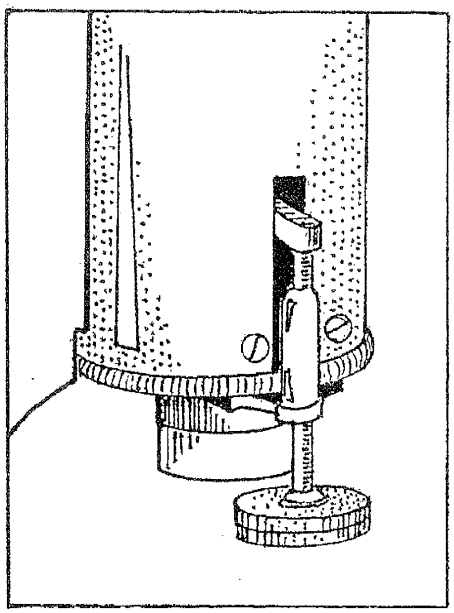

Fig. 2. Adie Fine Adjustment Mechanism

ever, the lever is so short that the thread pitch needs to be quite fine. This same unique type of fine adjustment can be seen on the microscopes of James White of Glasgow . The instrument is supported by a very unique claw foot that is set in the reverse position, much like the Smith & Beck student microscopes of the 1850's and 1860's. The slide holder, or in this case a ledge, is dove-tailed into the stage itself. The mirror is of the early type having a concave reflecting surface on one side and a flat chalk surface on the other. The chalk surface was intended to be used with direct sun light. This feature helps establish the instrument as an earlier type and indicates that it was never intended to be used with a substage condenser

I know of no other example of a surviving microscope signed by Richard Adie. This single instrument illustrates the excellent workmanship and functional design produced by this rare instrument maker. The Adie legacy, although primarily associated with Edinburgh (Scotland), is well represented by the work of Mr. Richard Adie. Although, not signed by Richard, a similar microscope has been found with the signature of "Adie & Son of Edinburgh". It is possible that it was manufactured by Richard and sent to the Edinburgh shop to be sold. It is also conceivable that this design was made in the Edinburgh shop and sent to Liverpool for distribution. However, the Edinburgh shop is better known for its surveying instruments, theodolites and large thermometers. In a recent dealers catalogue, I

MSSC BULLETIN

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Microscopical Society of Southern California

President	George G. Vitt Jr.
Vice President	Gaylord E. Moss
Treasurer	David Hirsch
Secretary	Ronald Morris
Program	Larry Albright
Workshop	Steve Craig

Publication Correspondence to:
Editor Gaylord E. Moss
PO Box 9130
Marina Del Rey, CA 90295
Tel/FAX 310-827-3983
e-mail moss@netcom.com

Other Correspondence to:
President George G. Vitt Jr.
2127 Canyon Drive
Los Angeles, CA 90068
Tel/FAX 213-464-6503

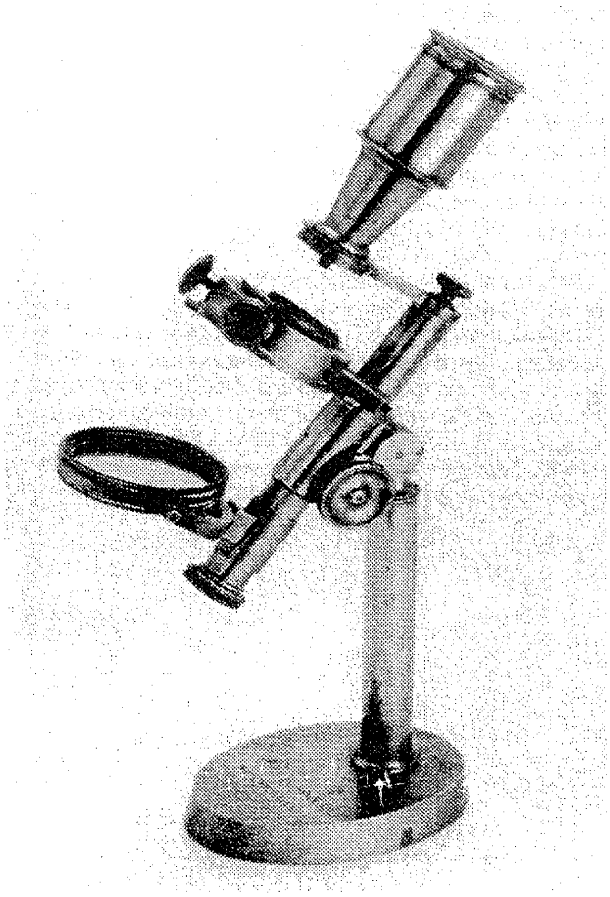


Fig. 3. Early Pre-Achromatic Microscope signed "Adie & Son of Edinburgh"

found an example of an earlier microscope of the pre-achromatic type signed by Adie & Son (fig.3). The most distinctive features of this instrument are its oval base, Cary type conical body tube and mechanical screws that act on the stage. Examples of this same model can be found in the Wellcome Museum (London), and in the Royal Scottish Museum.

Richard Adie was the third son of the famous instrument maker Alexander Adie of Edinburgh. After the death of his father and brother John, Richard acquired the Edinburgh business while continuing to operate the shop in Liverpool. Richard Adie was born in 1810 and died in 1881.

The industrial activities associated with the name of Adie represent the most creative and important of Scottish family businesses. We should begin with Mr. John Miller (1746-1815) who for a period worked in London in the workshop of George Adams. Miller reappeared in Edinburgh in 1769 and described himself, "from this place (Edinburgh) and bred by Adams in Fleet Street." In 1772 Miller's sister married John Adie and bore him two sons, the second being Alexander J. Adie born in January of 1775. Both of Alexander's parents died early and subsequently he was adopted by his uncle, John Miller. They stayed together until the death of Miller in 1815. Adie's apprenticeship lasted until 1796 but he continued to work as his uncle's assistant until 1803. The partnership of Miller & Adie began in 1803 and was located at 86 South Bridge, Edinburgh. By 1804 they moved to 94/96 Nicolson St. and by 1810 had moved to 15 Nicolson St. The business remained there until 1822 when Alexander Adie dropped Miller's name.

In 1815, C.R. Goring , then a medical student, commissioned Alexander Adie to execute a microscope similar to the design of Professor John Robison. While the intention was to eliminate chromatic aberration, Goring was quite unhappy with the results. He attributed the defects to Adie and referred to him as.."a bungler." He then turned to Charles Tulley of Islington to do the work . But in fairness, Goring had by this time improved his optical theory giving Tulley a better chance for success. This episode discouraged Adie's involvement with the microscope until the early 1820's. It was in 1824 that David Brewster commissioned Adie to grind two garnet lenses, which were judged to be better than any solid lens of the time. In the Royal Museum of Scotland there is a very large instrument having a substage polarizer dated at between 1823-29, making it easily the earliest such compound polarizing microscope. It was constructed by Alexander Adie for the Royal Society of Edinburgh and proposed by Brewster to be added to the Physical Cabinet of Scientific Instruments. Few microscopes made by Adie are available today, but the few examples that do remain justify his reputation as an important instrument maker.

In 1804 Alexander Adie married Marion Ritchie and had four sons and seven daughters. Adie was elected a Fellow of the Royal Society of Edinburgh on January 25, 1819. In 1822 when Alexander dropped his uncle's name and began trading under his own name, he was still located at 15 Nicolson St. In June 1828 he moved to more fashionable premises in the New Town at 58 Princes St, there the business remained until 1843. Sometime in 1835 John Adie was brought into partnership with his father Alexander and the business became known as Adie & Son. This name remained until 1880. John was the first son (1805-1857) while the second son was

named Alexander James Adie (1808-1879). The third son, Richard Adie (1810-1881), was baptized with the name Ritchie in honor of his mother. The youngest son, Patrick (1821-1886) was also an instrument maker practicing in London (1844). It may have been Patrick who arranged to have microscopes made by James Smith sent to Adie & Son of Edinburgh for resale. They also bought separate optics and other components with which they assembled complete instruments.

Richard Adie was awarded three medals by the Royal Scottish Society of Arts, the first in 1836 the second in 1844 and the third in 1860. It seems he was well established in Liverpool from around 1835 until the death of his father in 1858. Richard Adie, who inherited his father's firm, divided his time between the Edinburgh shop and his Liverpool business. He made the statement in 1870, "my time nearly equally divided between the two places." His Liverpool business was a success from its beginning in 1835. Far more than his father, or any of his brothers, Richard Adie was an experimental scientist. His 27 published papers, as well as his unpublished research, attest to the variety of his interests and the vigor of his investigative mind. His first paper delivered before the Society of Arts in Edinburgh in 1836 earned him the award of the Silver Medal. Richard Adie gained a reputation as an authority in physical science and this no doubt helped sustain his business.

Richard Adie died of apoplexy at Bonnyrigg near Edinburgh on January 25, 1881, at the age of 70. Only a few months after Richard's death, or perhaps even before his death, Thomas Wedderburn (listed as a master optician) assumed control of the firm . He changed the name to Adie & Wedderburn under which it lasted until 1913. He also moved from Princes St. to 37 Hanover St. for the period 1883-1902. In 1903 the firm was located at 52 George St. Edinburgh. Wedderburn died of typhoid in 1886 at the age of 49.

If by chance you should come across an old microscope signed with the name of Adie, you would not be mistaken if you considered it quite rare and a prime example of Scottish scientific instrument making. Much of the above information came from *Brass & Glass* by T.N. Clarke, et al., 1989, National Museums of Scotland.

RECENT CRITICAL EVENTS IN THE MICROSCOPICAL SOCIETY

This has been a hectic and confusing two months in our society. In 1978 Mr. Melle, the president of the Los Angeles Microscopical Society was involved in the incorporation of the society. Some important implications were not understood by the members and officers of the society.

In July, 1996, new bylaws were presented to the membership which found them unacceptable. As a result of the rejection of these bylaws, Mr Melle has essentially removed himself from the microscope group and will continue the LAMS Corporation as he sees fit.

The membership will continue their society under the new name of the "Microscopical Society of Southern California." There has been a grand increased enthusiastic participation in all of our events as we see that the society, that we all enjoy so much, will be better than ever.

During the meeting of 21 August, new officers were elected as described in the minutes on page 9.

Our new meeting place is the Crossroads School located at 1714- 21st Street in Santa Monica California. The monthly meetings will be, as before, at 7 PM on the third Wednesday of each month. The bulletin will be sent before each meeting. The workshops will still be at Steve Craig's lab on the first Saturday of each month at 9 AM.

At the September meeting, we selected the name of the society by popular vote. At the next meeting we will choose a logo for the society as a whole, and a name and logo for the bulletin.

These choices should make for a lively discussion and voting session, judging from the immediate flow of creative ideas at the last meeting. Bring any suggestions that you have for either name or logos. And remember the old adage , "a picture is worth a thousand words." Any sort of rough sketch would help to showcase your ideas.

MINUTES FOR THE MEETING OF 21 AUGUST 1996
David L. Hirsch - Treasurer

IT'S ALIVE! IT'S ALIVE! Prior to this evening's historic and well attended meeting, all members were mailed a letter titled: "The Last Objective". The last sentence of this letter read: "LAMS is no more". Perish the thought!
Our Microscopical society is VERY MUCH ALIVE and striving for much bigger and better things. We urge you to hang in there with your fellow 'microphiles', while we 'rearrange the furniture'. The best is yet to come! ,SIC TRANSIT. One event of the evening was the dramatic declamation by former President GIL MELLE', who cited the highlights of his accomplishments and service to LAMS, along with suggestions on how the Society can be even more meaningful in its operation in the future. The Society extends a fond farewell and its' heartfelt thanks for the many years of faithful service to LAMS by this fine man of many talents.

THE PEOPLE'S CHOICE. Many, many moons have passed since we held an election. After the ballots were counted, the new slate of officers includes: GEORGE G. VITT, Jr, President; GAYLORD MOSS, Vice President, DAVE HIRSCH, Treasurer, and RON MORRIS, Secretary. Congratulations to these stalwarts, and we wish them smooth sailing in the days to come.

A TESTAMENT OF FAITH. Sometimes, in the course of it's existence, a Society may encounter rough seas. I wish that all members of our Society who were not able to attend this meeting, could feel the same sense of pride that I felt at what transpired during the meeting.

After reviewing the financial statement which is being prepared for release, and considering the expenses that might be incurred due to the soon to be resolved restructuring, your Treasurer noted a potential shortfall in our Treasury balance, which would result in a deficit. Even as I spoke, wallets were flipped open and within minutes, more than $150.00 was volunteered by the members present to help relieve the deficit! I'm not the kind of guy who gets misty eyed over things, but I came close, after seeing such a generous and spontaneous outpouring, not only of cash, but just as important, of the sincere resolve of the membership to preserve our Society, along with the magnificent display of fellowship shown by all. Thanks, guys.

WATCH YOUR MAILBOX. Shortly, all Members of Record will be sent information detailing the restructuring and enhancement of our Microscopical Society.

SHOW AND TELL. The dramatic oratory which highlighted the opening of the meeting, was modified by something which brought us back on track, reminding us that the name of the game is still Microscopes and Microscopy. KEN GREGORY travels far and wide in his quest for microscopes and recently came upon four fine stands produced at the turn of the century. Most noteworthy of the wood cased stands was an near pristine FUESS metallurgical microscope. We look forward to a coming workshop when Ken can describe the microscope in detail.

A CHANGE OF VENUE. Our new meeting place is the Music Room of the Crossroads School, located at 1714 21st Street, Santa Monica, California. The large hall is acoustically designed, and includes a harpsichord and a grand piano (for musically inclined microscopists?). We have a close relationship with the school, which serves gifted middle school students. Recently, LAMS donated a Cambridge Scanning Electronic Microscope to the school. Our members, such as STEVE CRAIG and TOM McCORMICK are assisting in the setup of the SEM.

Several science students and their instructor from Crossroads School served as speakers at a recent Microscopical Society meeting. In a very well organized presentation, they described their progress in the construction of an electron microscope. Plans are being considered for including microscopically oriented Crossroads School students in our future activities.

RIDDLE. How many microscopists does it take to install an objective in a microscope?
Answer: 3; One to hold the objective, another to screw the microscope into the objective, and a third, to read the instructions. (Dave, stick to writing upthe minutes!)

PRODIGAL SONS (AND DAUGHTER). Recently, I had the pleasure of speaking with an old friend, and a former LAMS member, JOHN DeHAAS. John is

Continued on page 8

WORKSHOP of the Microscopical Society of Southern California

notes by George G. Vitt, Jr, President: Date 7 September 1996
Location: Steve Craig's Lab, 28 persons attended

This was The Most Memorable Workshop to date not only because there were more people in attendance than at ANY previous workshop, but also because of the excellent, interesting and instructive program and the refreshing new spirit of Renaissance that pervaded the group and every individual. The enthusiasm and optimist was universal and instantly apparent.

The workshop began promptly at 0900 and was divided into four parts: 1. Round-table comments and Show & Tell; 2. Demonstration of the separation, cleaning, segregation and mounting of microfossils; 3. Video microscopy demonstration; 4. Items offered for sale.

Comments and Show & Tell:

1. **Steve Craig,** our Workshop Chairman, welcomed Donna Crandall and John de Haas, both of whom had not attended for quite some time. There was a rousing round of applause. Steve reported that both he and Tom McCormick (who is familiar with vacuum systems) had worked on the SEM at the Crossroads School, where we now hold our monthly meetings. Steve said that Mr. Joseph Wise, one of the professors at the School, welcomes our group with open arms and would like to see our activities integrated with those of the school, assuring us that we will have a meeting place in one of the large classrooms. Of great benefit will be the School's stock of scientific equipment and their fine library to which we will have access. Our books, which had heretofore been 'sitting around', will now have a special place in this library, and available to us at any time. From all indications, we will have an exciting future in our synergistic relationship with the Crossroads School where our meetings will be held as usual Students from the School will participate and will, undoubtedly, join our group.

2. **John de Haas.**, a former member who has not been in attendance for several years, attended this workshop. He volunteered to give a Workshop on microtechnique, microtomy, and staining (for which he has all the necessary dyes). As freebies, John generously brought many plastic pipettes and boxed glass microslides. John brought a Zeiss refractometer and gave a demonstration of its use in determining the refractive index of mounting media. He also displayed several excellent oil paintings of his (European landscapes and a fine owl) -a talent that had remained dormant for some years and which he has revived recently.

3. **Gary Legel** had a variety of photographic equipment for sale.

4. **Leo Milan** displayed a rare orchid that he had collected in Mexico, a species that grows only near waterfalls, and which he had finally learned how to grow. Leo videotaped the Workshop with his camcorder.

5. **Donna Crandall,** out superlative artist of natural history subjects, has been working with the UCLA Media Department which, she reports, is now all-electronic with images available off the network.

6. **Larry Albright** showed a rough draft he had composed of a possible newsletter format. which would contain want ads, buy and sell, and other features which should be especially useful to corresponding members.

7. **Gaylord Moss,** our new Editor, reported that he had put together several articles that had been submitted by members. This he did with his Power PC, scanner, laser printer, and the *Pagemaker* program. He displayed a sample page of Jim Solliday's article on Adie, the Scottish instrument maker, photos being scanned in at 600 dpi. He proposed a monthly *'Member Spotlight'* feature, which would give a brief biography and interests of a particular member. Gaylord urges everyone to contact him with their ideas for presentations, papers, etc. He proposes that the membership list include a code for each member that will identify his particular interests. The bulletins will have sequentially numbered pages for easy access to articles through reference to the annual index. The pages will be pre-

punched for binding. He reported also that we are in the process of establishing a WEB page on the Internet, and an e-mail address. In conclusion, Gaylord said that all this, in addition to the synergy with the young science students at the Crossroads School, offers us some very exciting prospects!

8. Ed Jones brought all the material and equipment needed for the presentation he put on with Jim Solliday on the preparation of microfossils - the subject of this Workshop's hands-on program. Ed had collected the Eocene period microfossils (which were in their sand-like matrix). He had prepared especially for the workshop a large number of carefully labeled plastic 35mm film containers filled with microfossils that he had collected at Rincon Hill, Ventura County, CA, and at Kalapaki on the island of Kauai. The Rincon samples are from the Lower Pleistocene period (about 1,000,000 years old). There were more than enough canisters for each attendee. For preparing a thin-film transparent adhesive for mounting the microfossils on microslides, Ed brought powdered *Ghatti Gum*, which is equivalent to *Gum Tragacanth*, but which dissolves much more quickly. This gum he had also pre-packaged in 35mm film canisters. For his demonstration, Ed brought a set of small, circular, nesting micro-sieves for separating the microfossils according to specific ranges of size. He also displayed two excellent books: *Introduction to Microfossils* by D.H. Jones, Harper Bros., and *Foraminifera* by J.A. Cushman, Harvard Univ. Press.

9. **Jim Clark** who came to the workshop all the way from near San Diego, brought two
modern biological microscopes. for sale and displayed the book *Closeup Photograph)'* by Lefkowitz - a fine book recommended for its complete coverage of this wide-ranging subject.

10. **Ken Gregory** brought, as freebies, 4"x6" glass plates with 'ovals', which are used for blood typing.

11. Jim Solliday, in addition to being a co-lecturer with Ed Jones on the microfossil preparation presentation, had prepared especially for this Workshop, a 5-page manual *Mounting of Fossil Material from Rincon Hill Ventura County; Calif. - Also Material from Kalapaki, Kauai.* In this excellent and very useful manual, the first page was devoted to instructions for Cleaning, Separation, and Mounting. The other four pages contained precisely 100 excellent black-and-white illustrations of *Foraminifera, Coelenterata, Porifera, Bryozoa, and Brachiopoda.* This manual is to be used for identification of specimens. It will be duplicated and distributed to the membership, in the very near future, as part of our Bulletin.

12. **Stuart Warter** exhibited several excellent books and showed a most remarkable sample of *Foraminifera,* of the Oligocene period, the likes of which no one present had ever seen! Each 'critter' was the size of a 50-cent piece, having grown to this size in a tight spiral pattern! Stuart had coflected this sample of many *LEPIDOCYCLINA MANTELLI,* which covered the surface of a 12" square piece of limestone, at Marianna Limestone, St. Stephen's Quarry, Alabama. In addition. Stuart displayed a beautifully designed and constructed, cased, brass folding microscope. by *Reichert, Vienna.* We hope to have a write-up on this excellent piecein a forthcoming publication.

13. **Terry James brought his 6-year** old grandson **Cameron James** to the Workshop. It is Terry's purpose to instill an interest in microscopy in this bright youngster.

14. **Dave Hirsch** commented that this is the LARGEST WORKSHOP that we have ever had. He reported that publication of the bulletin for the previous 12 months had been in excess of $2K, and that we can save some 70% by our proposed new way of publishing.

15. **Frank Barta** circulated a most useful catalog of *A&A Jewelry Supply Co.,* 6th Street & Broadway, L.A. This large catalog contains every conceivable tool and material of utility to both jewelers and microscopists. It is much more extensive than that published by Bourget Bros. of Santa Monica, CA.

16. **Ron Morris** brought for sale a cased, mint Olympus PM-6 photomicrographic camera. Ron is to be highly commended on the effort he had expended in bringing his superb (and massive) *Wild Stereo Zoom Microscope.* with video camera and large color monitor, along with hundreds of pristine (unscratched) samples of silicon integrated circuit microchips of various kinds for inspection at the Workshop and as freebies which he distributed to those present. For this viewing, Ron had arranged his *Wild* for incident illumination.

17. **Richard Jefts** showed and described his method of preparing grid labels on which to mount opaque microsamples. He did this with beautifully prepared large display board showing a variety of label formats (black-on-white or white-on-black) and mounted specimen types (15 types of gunpowder, etc.). Richard said that excellent opaque specimen slides might be available from Mr.Darnton; a British member of the Postal Microscopical Society (PMS).

18. **Jim Solliday and Stuart Warter** displayed a special slide holder for opaque specimens. The device completely encloses the specimens between two glass slides (with a card stock apertured separator), the sandwich sliding into a channel made of thin aluminum sheet. Ed Jones stated that this item is no longer manufactured because of the severe downturn in oil exploration effort in the USA, a major consumer of these items, where an analysis of foraminifera content in core samples points the way to oil deposits. Jim stated that we might have a workshop on diatom mounting.

19. IMPORTANT NOTE: Jim also said that the planned visit of **KLAUS KEMP from England** is definitely ON and that everything is ON TRACK for the 3rd Wednesday of November, 7pm, at the Crossroads School, Santa Monica, CA. Klaus is acknowledged as the greatest living microslide mounter of arranged diatoms and butterfly wing scales - his slides being true works of art which are highly collectable.

19. **Steve Craig** said that he has a video of KLAUS KEMP's work which belongs to Paul Ottenheimer. **Tom McCormick** volunteered to make a digital master from which copies can be made for those members desiring the tape.

We wish to thank Millie Craig, Steve's charming wife, for furnishing the tasty goodies and an endless supply of coffee and tea! After the workshop, fourteen microscopists adjourned to Coco's for lunch and conversation.

MINUTES OF MEETING OF 21 AUGUST 1996 - CONTINUED

planning to return to our Society, perhaps at the forthcoming Workshop. In the past, this highly accomplished scientist and microscopist, had set up and conducted an excellent workshop program which related to the theory and practice of Microtechnique. Included in the program was the preparation of slides, the use of the microtome, restoration of scientific instrument surface finishes and other pertinent subjects.

SAM ZARCOFF AND WIFE, TRUDY; the Vice President and Treasurer respectively, prior to 1985, were informed of the LAMS 'changing of the guard'. We hope to see them at forthcoming meetings.

BREAKTHROUGH. You can't help but notice how this newsletter has undergone a makeover. From the masthead to the period at the end of the last page, a staff of microscopically oriented people will be dedicated to the publishing of a bigger and better newsletter. Again, I hope to see more articles on our favorite subject sent in by members, extending from up yonder in the 'North Forty' to members residing east of the Mississippi. It wouldn't hurt to hear from you microscopical afacionados from across the Atlantic and Pacific oceans, either! Look for the many new features which will be gracing the pages of your favorite newsletter.

ONLINE. I like the idea of being able to talk with people all over the globe;
people who are microscopists and collectors by affinity and inclination. Enter the Internet! Via this powerful means of communication, we are able to communicate with fellow microscopical enthusiasts from Tel Aviv to Timbuktoo!
The day is long gone when microscopists where exemplified by a bunch of guys with beards, stove pipe hats and frock coats, peering into their Powell and Lealands and Pillischers perched on a round table. Vice President GAYLORD MOSS, LARRY ALBRIGHT and other computer wise Lamsians will be doing their part to help us become computer friendly.

In closing, a helpful hint: The plastic containers from 35mm film cartridges make excellent lens covers for microscope oculars. (remove the caps, first).

DLH

Microscopical Society of Southern California Workshop

Conducted by Edwin L. Jones, Jr. and James D. Solliday
7 September 1996

Demonstration of Cleaning and Mounting of Fossil Material from Rincon Hill, Ventura County, Calif.
Also, material from Kalapaki, Kauai.

Material was collected from Rincon Hill, located near the border of Ventura and Santa Barbara Counties. The location lies 15 miles north of the intersection of Interstate 101 and State Routs 33 (to Ojai) on the north edge of Ventura. Collections were from a road cut on the north side of the off-ramp to State Route 150 (to Ojai and lake Casitas). The fossils on Rincon Hill are found in the Santa Barbara formation, which is Lower Pleistocene, and about 1,000,000 years old. There are some 40 different species of snails and about 15 species of pelecypods, including such varieties as scallops, oysters, mussels and clams. Also found are corals, bryozoans, algae, worm tubes and foraminifera.

Cleaning Methods for Loose Marine Fossil Material

1. Dry sieve at 120 mesh
2. Mix in water using a bucket (mash the chunks)
3. Pour through 35 mesh sieve (keep both samples)
4. Sieve through 120 mesh sieve (lower into water just under the surface and break up the remaining chunks)
5. Spread into thin layer on paper and air dry in the sun

Other cleaning methods:

1. Boil foraminifera in Kerosene (beware of fire hazard)
2. Decant
3. Boil in water
4. Repeat the above steps. Alter 2nd boil in Kerosene, forams will float on the surface. Place in water and they should remain on the surface as the Kerosene should be trapped inside the forams.

A heavy solution can be used in the separation of forams (Varsal).. Varsal is used for cleaning and separation and was developed by the Exxon Company.

Mounting Methods

1. Prepare the exhibition slide (cover with label having numbered squares).
2. Separate the specimen material by preparing a storage slide.
3. Apply tiny amount of adhesive to exhibition slide. (Elmer's Glue, gum tragacanth, Ghatti gum).
4. Place storage slide having specimens together with the exhibition slide.
5. Use brush for very small specimens, use tweezers for larger specimens and place in position on the glue points on exhibition slide.

Equipment needed

Stereo microscope and illumination
Sieves, bucket
Slides and slide labels, mounting adhesive
Needle-nose tweezers, 00 brush, black board (for a background)

SAND, BALLOONS AND THE MICROSCOPE

Leo J. Milan

During my recent trip to Alaska, with the Caltech Alumni Group, there were numerous lectures about interesting subject matter. One talk by Jay Stuart, MS48AE, told how the microscope helped to analyze an attack by Japan on the United States.

Two and a half years after Colonel James Doolittle bombed Japan, the Japanese retaliated by sending unmanned balloons carrying fire bombs and high explosives into the mainland of the United States. Technical Major Teiji Takada of the Ninth Army was assigned the task of sending the balloons. This was not a simple matter. Each balloon had to travel five thousand miles, rising in the sunlight and falling in the darkness as the balloon expanded and contracted. Means had to be provided to keep the balloon at the correct altitude. A strong current of winter air, not yet called the jet stream, had been recently discovered by Japan at about thirty thousand feet. It was calculated that a balloon would reach the United States in three days. With an altimeter and a battery operated igniter, explosive releases jettisoned ballast if the balloon dropped below thirty thousand feet. Above thirty eight thousand feet, a valve released hydrogen to keep the balloon from overexpanding due to sunlight heating.

When over the United States, a gunpowder discharge released the bomb load and destroyed the balloon envelope which was made of several laminations of," Washi," a paper made from the mulberry tree. The laminations were glued with flour paste made from devils-tongue, a Japanese potato. Remarkably, the washi paper had less hydrogen leakage than the rubberized silk that was first used. Ten thousand balloons were ordered. To carry the required gear, the balloon had to lift 1000 pounds at sea level..

Balloons were found from California to Alaska, and as far East as Michigan, 10 miles from the center of Detroit. The findings were not publicized , however, so as not to indicate their success in reaching the United States. The U.S. army found some of the sand-filled ballast units which were programmed in pairs for release from the opposite sides of the balloon. One day Colonel Sidman Poole came in to the Military Geology Unit in Washington with a couple of bags of sand. Very hush-hush, he wanted to know where the sand came from. It seemed inconceivable that the balloons had come all the way from Japan.

One close look at the sand eliminated North America. Also, chemically and petrologically, it was not the sand of the mid-Pacific. The geologists with their polarizing, dark field and other microscopes, studied the evidence. Ken Lottman, a micro-paleontologist and a specialist in diatoms was nominally in charge.

Ken Lehman found Pliocene age diatoms identical to those in an 1889 paper by French paleontologists, Jacques Brun and Joannes Tempere who worked in the area around Sendai on the Honshu coast. Julia Gardner, a paleontologist, saw many small mollusks in the sand. Since Gardner found no coral, which does not grow in cold water, she eliminated the Southern third of Japan .

Clarence Ross, a mineralogist, found no granite in the sand. This eliminated all the beaches of Japan north of the thirty-fifth parallel where streams reached inland to granite bedrock. There was considerable igneous rock in the sand, some 50% of it hypersthene. Ross searched the literature for a location with so high a hypersthene content.

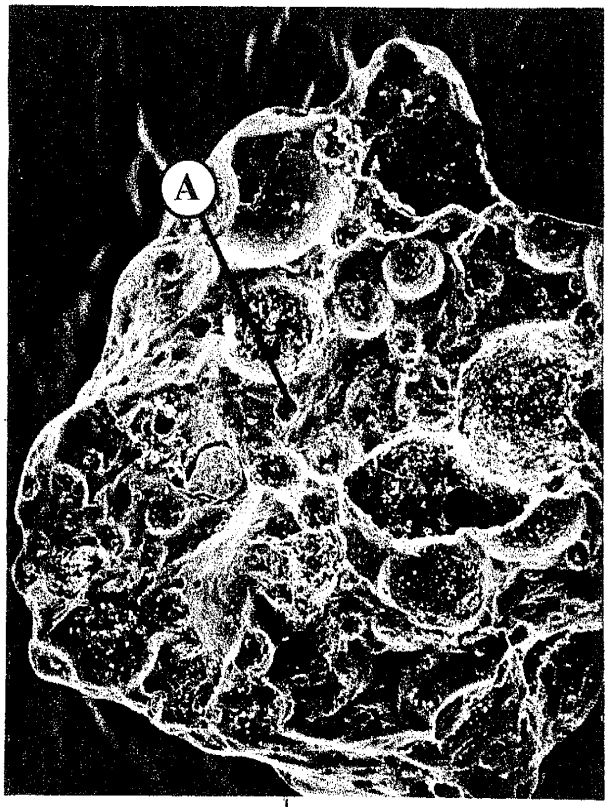
Kathryn Lehman, who had been a specialist in forams for Texaco, found quite a few forams that had been described north of Tokyo on the East coast of Japan, and which occur nowhere else in the world. The search was narrowed down to two locations that were roughly two hundred miles apart.

Because of the coral line, the geologists slightly favored the northerly site on the great beach of Shiogama, close to Sendai. The other site was the ninety-nine league beach at Ichinomiya. Later, it was found that there were actually three balloon launching sites. The nearest to Tokyo was Ichinomiya The two others at Nakoso and Otsu were scarcely ten miles apart and about a hundred miles up the coast from Ichinomiya.

Reference: Balloons of War: The New Yorker, January 29,1996

VOLCANIC SAND from HAWAII

photographed by James D. Clark Jr.



Sand Grain - Approx 1.2 mm Dia
Hitachi Scanning Electron Microscope
Model S-104a 85X

James Clark of our Society made these two photographs in 1987 at the Electron Microscopy Laboratory in the Biology Department at the University of California in San Diego. (UCSD). Todd Price, the director of the lab, was working with a biologist from the Hawaiian Islands at the time. The sand specimen no longer exists, however it is remembered as being somewhat pumice-like in character.

It is extremely fortunate that Jim Clark brought out these remarkable pictures to coincide with Leo Milan's discussion of the microscopic analysis of sand ballast in Japanese WW II incendiary balloons. These photos demonstrate in such a dramatic way the complex objects that are not only mixed with the sand, but that are inside the sand grains themselves. Looking at the life forms that Jim shows crammed into the tiny crevice in one grain of sand is truly awe inspiring.

Sand Grain - Detail of Hole " A"
from photo at left
Hitachi Scanning Electron Microscope
Model S-104a 1500X

Sand from Sendai, Nakoso and Otsu

It would be fascinating to look at some of the sand described in Leo Milan's paper on the facing page. Through personal contacts in Japan, I will try to get some sand from these Japanese beaches to distribute to interested members for their own studies. If successful, I will post a notice of availability in our new feature, **Material Exchange.** Ed.

LABELS UNLIMITED

Richard M. Jefts

In an effort to encourage and aid the aspiring article writer, our (then) V.P., Mr. George Vitt, Jr., recently put together a delightful and witty list of 23 Do's and Don'ts entitled "How To Write Good", among which are such gems as "Avoid Alliteration. Always", "Be More Or Less Specific" and Prepositions Are Not Words To End Sentences With." I could very possibly be breaking another one of the rules if the expression "Necessity Is The Mother Of Invention" is a cliche ("Avoid Cliches Like The Plague. They're Old Hat"), or a colloquialism (Go Around The Barn At High Noon To Avoid Colloquialisms", but if the expression is an adage, proverb or just an old saying, it might be fairly safe to use as an appropriate opening. For Instance:

Old friends (and expressions) are best and the perennial favorite "Necessity Is The Mother Of Invention" is as valid today as it has ever been in the past.

The necessity that spurred the invention, or actually, the method outlined here, was the means to mount a variety of small size specimens in an orderly manner, on a standard 1"x3" microscope slide, using a paper label with a grid-like design of numbered squares. Such labels, commercially made, exist and have been seen on perhaps older prepared slides.

Having cast about, however, and having been unsuccessful in readily locating labels of any such design, a method came to mind where-by the individual slide maker can prepare small, 1"x2" paper labels, with grid-like numbered squares and varying in size to custom fit the particular specimens to be mounted.

It might be noted that there are two possible, although more minor, drawbacks to this finished product: first is that the slide, with it's mounted samples, is uncovered and is prone to collect dirt and dust. Second is that there is some fragility to the mounted material, exposed as it is to general handling. However, if the slides are kept covered when not in use and handled with the requisite care, these all on one slide, multi-micromounts, can make an interesting addition to the amateur microscopists slide cabinet.

The first step was the preparation of a master form, only slightly smaller than twice the size of the finished label. On a sheet of black paper, or cardboard, using white drawing ink and a steel nibbed pen, a 48mm x 98mm rectangle was drawn, making the borders a generous 1mm thick. Horizontal and vertical lines where then added, resulting in 32 uniform squares, each approximately 6mm in width and height. For the generation of the numbers, a small paper pocket calendar was taken and a month with numbers from 1 to 31 was chosen. Each number, approximately 2mm in height, was then cut from the page using a straight edge and a sharp scalpel-type blade. The cut was made with care so as to trim close to the numbers themselves. This gave a series of 3mm white squares, each with a 2mm tall, centered black number. Each number, in sequence, was then pasted in the lower right hand corner of its appropriate square. There being no month with 32 days, a 3 and a 2 were cut, trimmed and mounted side by side.

The black and white master rectangular grid was now taken
and reduced 50% on a photo-copy machine. The now reduced size label was trimmed closely, leaving a neat, white border. The label itself was now complete. It remained only to affix the label to the right side of the microscope slide, leaving the left side available for the more standard 1"x1" size slide label. This latter will carry all pertinent data, among which is a number or designation for that particular slide that will refer it to a correspondingly numbered master list that, in turn, identifies the specimens mounted in each numbered square.

Fig. 1, in flow diagram form, shows a portion of a display card illustrating the label-making procedure, prepared for a recent workshop. At the top are four different masters. Reading from top to bottom are grids with 32, 18, 15 and 10 numbered squares, while below that are four of the untrimmed grids that have been reduced 50%.

Each of the four grids is shown next, now neatly trimmed, resulting in four finished labels, ready to be affixed to a standard microscope slide. At the bottom of Fig. 1, four finished labeled and mounted slides are illustrated. These are, from left to right: A 10 square grid with small rock and mineral specimens; A 15 square grid with larger marine and freshwater shells; An 18 square grid with flower, fruit

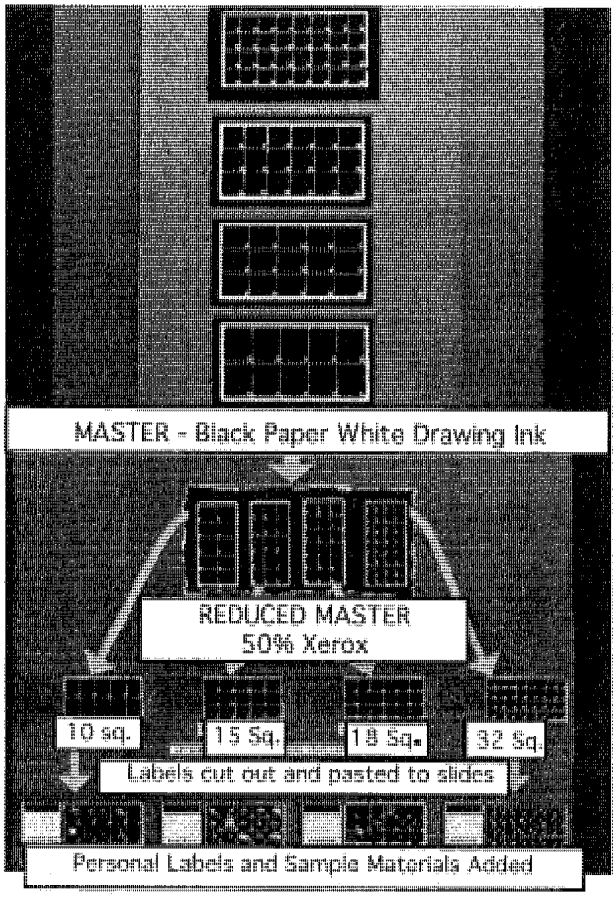


Fig. 1. Flow Diagram Showing the Label Making Procedure

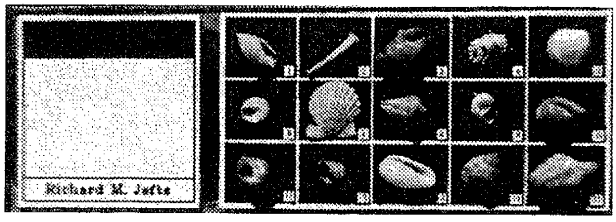


Fig.2. Finished Slide, 15 Squares

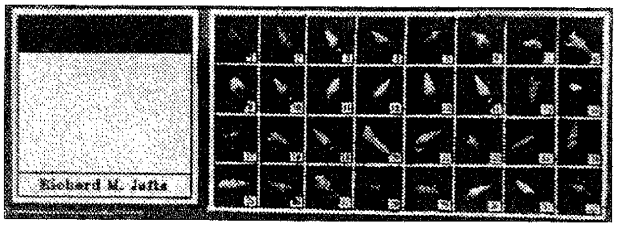


Fig. 3 Finished Slide, 32 Squares

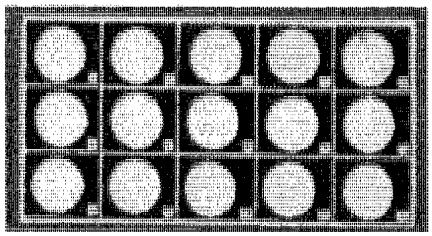


Fig. 4 Grid with white background

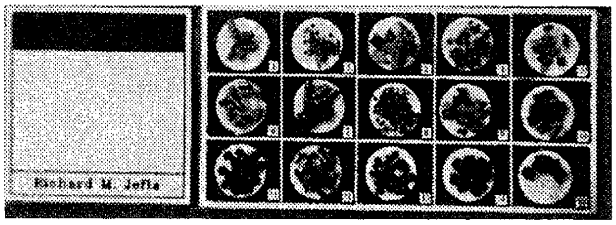


Fig. 5 Finished Slide with White Background

and vegetable seeds, and a 32 square grid slide with mounted specimens of very small marine and freshwater shells.

Fig. 2 shows the 15 square grid finished slide in greater detail, while **Fig. 3** shows the 32 square labeled slide in similar close up format and comparable greater detail.

It would, of course, be as easy to make a black lined grid with white background squares, appropriate, perhaps, for mounting darker colored specimens. Another way to achieve this effect, is to take the black background grid, as prepared here, and paste into each square, white, paper-punched circles. Figure 4 shows the label and Fig. 5 shows the finished slide for this variation in which 15 different types of dark grained gunpowder contrast nicely with the white disc background.

The method outlined here is simple, the cost is nominal and the end product practical. Give it a try.

LUBRICATION OF INSTRUMENTS: Part I

Tech Note Number 58

George G. Vitt Jr.

Introduction: One of the most important, but often woefully neglected, aspects in the proper functioning and maintenance of philosophical instruments such as microscopes, is lubrication. In well designed instruments and with proper maintenance, there is little to wear out and very little reason why the instrument should not last for an indefinitely long span of time. I have always supported the idea that microscopes, no matter their age, should be fully functional. In order to maintain such instruments in top working order, not to mention preserving them in this state for the use of future generations (we are all custodians), it is incumbent on the present owners to pay particular attention to their proper lubrication - in addition to all the other possibly necessary aspects of restoration such as re-finishing, re-fitting, alignment, and calibration.

The designers and builders of many of these instruments took great pains to insure the close fitting of parts, and the smooth, easy, precise and backlash-free operation of: focus controls, body tube movement, "diopter adjustment" of eyepieces where movement must be smooth but with no subsequent creep, movement of dovetail slides (some with spring-loaded steel ball detents), stage movements (X-Y and rotational), iris diaphragms, micrometer screws, rotating cells, Bertrand lens slides, phase contrast turrets, shafts in their journal bearings, hinges, worm gears, tapered axis spindle of theodolites/transits, vernier adjustments on sextants, spring loaded detents, bearings and escapements in timepieces, etc., etc. Various types of moving parts, depending on the load they carry and the velocity of movement, require specific types of lubricants. There is no 'universal lubricant'.

With such a slippery subject, where does one begin to write, and what areas does one cover, especially when the writer himself is in the process of learning! So, please bear with me. To date, the writer has worked on various instruments (microscopes and other types) made by Olympus, B&L, A/O, Spencer, Reichert, Zeiss, Leitz, Negretti & Zambra, Troughton & Simms, Wild, Bottomley, Hadley, Hensoldt, and even a (currently) unknown Russian theodolite maker of the last century.

Topics: In this first TECH NOTE on this subject we shall take a quick look at the fundamentals of friction, lubrication, some characteristics of different types of lubricants that make each type suitable for a particular purpose, and the requirements that lubricants must fulfill. Since all the microscopists of my acquaintance at LAMS have unequivocally demonstrated that they are "interested in everything" and have an insatiable curiosity (like Kipling's Elephant's Child), this seeming digression may not be totally inappropriate. Even though this discussion may seem to diverge from the strict realm of microscopy, for which I offer no apology, it will attempt to give an insight into "what's going on" and, perhaps, a clearer appreciation of the broad areas where lubrication is not only an invaluable engineering tool but also an absolute necessity in scientific instruments. In a subsequent TECH NOTE we shall examine some currently available "specialty" types of lubricants and the uses for which they were designed.

Friction: Without any lubrication, the force required to move one piece of material over another (such as a force pushing a block over a flat surface), is proportional to the force that one piece exerts on the other. This constant of proportionality is called the "coefficient of kinetic friction" which is dependent on the materials of the two pieces, but independent of the speed of motion or the area of contact, over a relatively large range of both. However, starting from a standstill, a considerably greater force is required to initiate movement and, in this case, the constant of proportionality is called the "static coefficient of friction". The term "Stiction" is commonly used to describe this static effect, which often leads to 'jerky motion'. In each case, energy is expended (in the form of heat) at the interface of the two pieces due to the interference of the micro irregularities of the surfaces. These irregularities must either be worn off or continually lifted out of the hollows into which they have fallen. In extreme cases, especially when the parts are heavily loaded, "stiction" may become "galling" and the parts become damaged and difficult to separate. Aluminum and its alloys are great offenders in this respect. As a general rule, dissimilar metals are recommended to minimize the chances of occurrence of this highly undesirable and destructive effect.

Dry Lubricants: Dry lubricants in the form of colloidal powder are used between sliding parts, especially at pressures that may cause galling, where the viscosity associated with greases might be intolerable. When the 'powder' is rubbed into the surfaces of rubbing parts it enters and fills the surface micropores to reduce the above described effect and, since the dry lubricant has very low shear strength, it behaves somewhat like a fluid, but of course, has no surface tension nor does it attract and trap dust and dirt. Examples of dry lubricants are molybdenum disulfide, graphite, and talc. Sometimes such powders are dispersed in a fast-drying organic liquid, for injection into out-of-the-way places.

Lubricants: Until 1883 the science of lubrication had not advanced beyond the empirical stage. In that year Beauchamp Tower proved by experiment that the general function of the lubricant was the mechanical separation of the metal surfaces by a layer of fluid of finite thickness, thus upsetting the preconceived ideas as expressed in the laws of the friction of motion that had been accepted up until that time. This layer resists only shear and, with laminar flow, the resistance is proportional to the relative velocity of one moving part to the other, the constant of proportionality being the viscosity of the fluid. Thus, by choosing a fluid (gas, oil or grease) of the proper viscosity characteristic, the desired effect can be achieved for almost any set of conditions. An air film (or another gas) is used in such high speed applications such as laser multi-facet mirror scanners, ultra-centrifuges, air pucks, and computer magnetic disk read heads. Here, one needs a lubricant of very low viscosity that forms a film and absorbs little energy at the very high relative velocities. For slow moving elements, as found in microscopes and other philosophical instruments, greases are the predominant means of lubrication.

The "Apparent Viscosity" of Greases: If asked for the viscosity of a grease, it's not easy to give a straight answer. Simple fluids, including lubricating oils, maintain a constant viscosity as a function of shear rate. Things get much more complicated when the oil is gelled and becomes a grease. The viscosity of greases is highly dependent on the rate of shear, or the rate at which adjacent layers of grease move relative to one another. At extremely low shear rates, apparent viscosity is quite high; as shear rate increases, there is a steep plunge to much lower apparent levels. This is "pseudoplastic" behavior, typical of most common greases.

A grease viscosity curve can show apparent viscosities only at a single temperature. A different temperature would involve a separate line on the graph, higher up if the temperature were colder and lower down if hotter. In contrast to many other greases, the more modern fluorocarbon polymer greases exhibit apparent viscosity at 100°C as being little different from that at 25°C. These are formulated by Nye, Halocarbon Corp., and others (3) and are quite expensive.

Thixotropy: When lifted out from its container with a spatula, a thixotropic grease will form a "string" which is self-supporting and non-flowing. "Thixotropic" greases soften on agitation, and lose viscosity over time at a constant shear rate. Also, as shear rate began to decrease, there would be a different viscosity curve for "slowing down". Thixotropic greases tend to revert back to their original viscosities on standing over time. Grease viscosity thus becomes a complicated shear rate /temperature/ time continuum. Some examples of thixotropic substances are: mayonnaise, resins with colloidal silica additive, magnetic clutches and brakes, loudspeaker damping ferro-fluids, and various organic compounds with very long molecules. Thus, the viscosity is a function of the 'interlocking' of particles. Analogously, the thixotropy of greases depends on the interlocking of long-chain molecules: the greater the shear stress, the less interlocking, and the lower the viscosity.

An Example of the Mechanics of Thixotropy: If fine ferromagnetic particles (such as powdered ferrite) are dispersed as a mechanical mixture in a liquid, such as silicone fluid, the resulting consistency is like a watery "mud" or a light oil (1). This combination behaves exactly like an ordinary fluid, i.e., flowing freely and resistant only to viscous shear. The application of a magnetic field through the volume of the fluid causes the ferromagnetic particles to cohere, forming magnetic "strings" (like gigantic long molecules), with a force proportional to the strength of the field, causing the material to become thixotropic. A thixotropic material does not flow, but can be caused to flow when a shearing force is applied (like spreading mayonnaise with a knife). At higher magnetic field strength the material becomes more and more solid and requires a greater shearing force to make it flow. If such a material is contained between two parallel plates, for example, the movement of one plate produces a force on the other plate that is proportional to the magnetically induced viscosity of the fluid and the velocity of the moving plate. This property has been used in variable-coupling magnetic clutches and brakes, and as a means of mechani-

cally damping and simultaneously removing heat from the voice coils of loudspeakers. In these cases, the advantage is that the magnetic field keeps the liquid oil portion from spreading and being lost, to places where it does not belong, by the capillary forces between the fine ferrite "strings" which act very much like a blotter.

Chemical inertness: The lubricant must be non volatile, chemically inert and stable. If it is not, it will deteriorate by slowly polymerizing over time and eventually forming a hardened varnish-like film that literally 'glues' the parts together making movement difficult if not impossible. Also, an inert lubricant will not react chemically with the parts it is meant to lubricate. These degradations are accelerated at higher temperatures. Various microscope movements, especially on stands that are 20 or more years old, give evidence of this lubricant deterioration by their greater resistance to movements which should otherwise be smooth, free and easy. Many WWII optical instruments made by both sides (Hensoldt and Zeiss artillery rangefinders in this example), as well as reel-to-reel tape recorders (particularly Sony and Teac, in my experience) have become temporarily inoperative due to deterioration of lubricant.

"Non-Spreading" Oils - The Phenomenon of Creep (Migration & Contamination): Once having been applied in the required location, the lubricant must remain mechanically in place as the parts operate, and must not migrate to other locations. If migration exists, not only would lubrication be lost where it is needed, but the migrating lubricant could contaminate other areas of the apparatus, such as optical surfaces, and serve as an attractant for dust. Certain additives are added to greases to optimize non migration properties and, in the case of oils, anti-migration compounds with low surface energy are 'painted on' around the areas where the oil is to remain confined. An example of 'migration', other than caused by creep or flow, is the evaporation of the lubricant and its subsequent undesirable condensation on other surfaces, such as optical windows and lenses.

Alternative to Whale-Oils: Federal Law has ended an era in the lubricating industry. The Endangered Species Act and the Marine Mammal Protection Act prohibit the import of either sperm oil or dolphin head oil which had been the traditional lubricants for timepieces and other fine movements. Research efforts at Nye Lubricants, Inc. (2) have resulted in a new synthetic-based line of delicate machine oils.

Jojoba Oil: A replacement for sperm oil proved the easiest to discover. By one of those weird, almost spooky, flukes of nature, there appeared from the Southwestern desert the jojoba bean, Simmondsia Chinensis, from which can be expressed an oil virtually identical in molecular structure to whale oil. The only difference is in odor - the vegetable oil doesn't smell. A variety of Jojoba based formulations are available from Nye.

Damping Greases for Motion Control: A traditional market for damping greases has been with optical instruments, where binoculars, microscopes, cameras, riflescopes, surveying instruments and, more recently, lasers can all require non-corrosive, long-lived greases of a controlled high viscosity to provide smooth motion of focusing threads and slides and avoid "coasting" of hand-turned controls. An area where the synthetic hydrocarbons have made an impressive contribution is with outdoor optics, where use well below zero temperature must be obtained along with stability in the trunk of a car in the desert sun. A wide variety of such greases is available, the extreme wide-temperature greases, usually fluorocarbon-gelled, incorporating specially synthesized silicone polymers, to provide damping quality without freezing at -65°F. or losing viscosity at +400°F.

Some examples of using the 'right lubricant in the right place' will be given In the next TECH NOTE installment dealing with instrument lubrication.

References:

1. LAMS TECH NOTE 19, New Method of Optical Polishing - Magnetorheological Finishing.

2. Nye Lubricants Inc., New Bedford, MA 02742; (508) 996-6721.
Greases: Rheolube 362, 368, 362HB;
Damping Greases: 774, 774L, 774H, 774VH.

3. Halocarbon Products Corp., 887 Kinderkamack Road, River Edge, NJ. Halocarbon grease, Series 25-5S ($80/lb in 1994): a blend of completely halogenated chlorofluorocarbons and completely inert to acids, alkalis and oxidizing agents, wet or dry.

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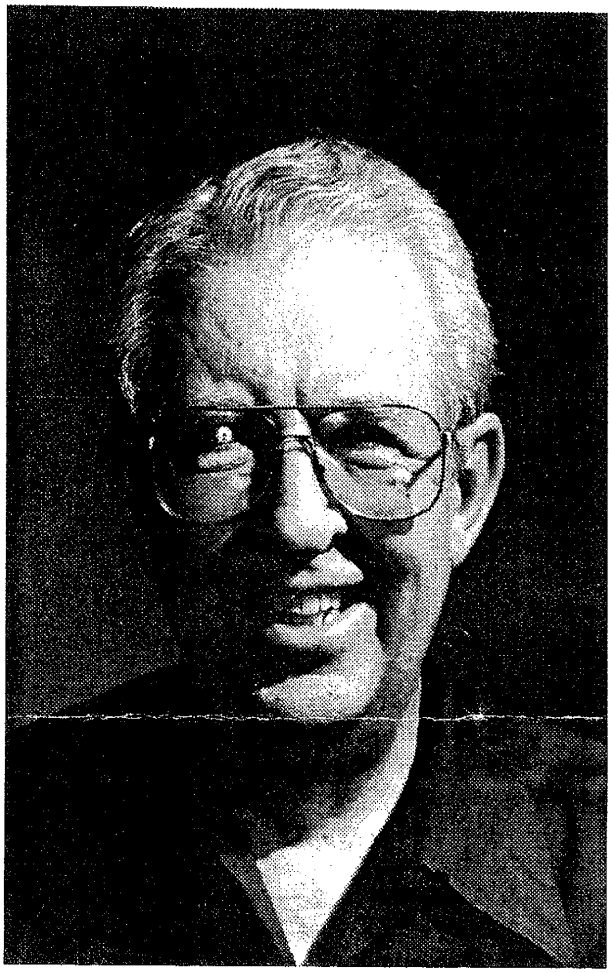
MEMBER PROFILE

George G. Vitt Jr. - 27 September 1996



George G. Vitt Jr.

At the insistence of our good Editor, Gaylord Moss, and against my better judgement, I submit the following biographical information:

My father graduated from UC Berkeley as a Mining Engineer, where he was practically the 'adopted son' of Gen. Barrows, then Chancellor. My mother attended the (girls') Castelleja School in Palo Alto, CA. Both had been sent there by their parents during the bloody communist revolution in Siberia. With the help of providence, both families managed to cross the Amur River into Manchuria, having lost their homes and fortunes. I was conceived in Stockton, CA and born in Manchuria at the family house. Speaking some six languages, my father was the representative for the Caterpillar Tractor Co. in China, Japan and the Philippines. My education, through the equivalent of the 5th grade, was at the Dostoyevsky Gymnasium in Harbin. We were fortunate in having the 'cream' of educators, who were forced to leave Russia en masse. By the time I was six, I had crossed the Pacific 5 times, via Dairen, Yokohama, Hawaii and San Francisco on Nippon Yusen Kaisha (Asama Maru) and Dollar Line ships, all of which I thoroughly explored and was never sea-sick. My interest in Oriental art and arms & armor began at this time.

Three years after the Japanese occupation of Manchuria, we came for the last time to the Good Old U.S.A. Without the help of phonetics or 'bi-lingual' classes (unheard-of in the late 1930s), I learned English the hard way - by reading, by associating with my new American pals, and by listening to news reporters on the radio who, in those days, were chosen for their command of the language. In about 6 months, my English was OK.

I was 11 when I received my first microscope as a Christmas present from my uncle Val. It was small, had a single set of optics and the substage was populated only by a simple mirror. It cost about $2.00 at Macy's Department Store. Looking through it was a fascinating revelation, and I raided the back yard in our East Orange NJ house for every sort of specimen. At age 14, I made from some thin sheet copper and solder an adaptor to balance a 2.25"x 3.25" Zeiss Nettax folding camera and, with the aid of polaroids swiped from the General Motors exhibit at the World's Fair, took my first photomicrographs of hydroquinone crystals. (How's that for a memory!)

I attended public schools in New York, New Jersey and New Bedford, MA and then went to M.I.T. in Cambridge, MA in 1943. In 1944 I and most of my fraternity brothers (Phi Gamma Delta) enlisted in the Navy. After boot camp at Sampson NTS, Geneva, NY, I took Navy courses as a Radio Technician, and met my future wife while at Navy Pier, Chicago. Here is where my trepidation of electronics was totally dispersed. The Navy then sent me to the Philippines where, with 13 others, under the direction of Cmdr. Johnston of Braintree, MA, we rebuilt an abandoned CB camp and transformed it into Magellan University, near Guiuan on the island of Samar. Here we taught many courses, from languages to photography to machine shop and weld-

ing - to biology to music! We 'appropriated' a fully stocked library and other essentials by the process of 'midnight requisitions'. Our 'reefer'- cooled darkroom and the endless supply of film, paper, chemicals, and 4 x 5 Speed Graphics, was in constant use. We explored the nearby islands. During a skin-diving expedition to Calicoan Is., I came literally within a hair's breadth of being swept into the Philippine trench (36,000-ft deep). It was an adventurous time!

After the war, I graduated from MIT, having had the rewarding friendship of Dr.Harold Edgerton as a professor, mentor, and thesis advisor. Many are the .22 bullets we 'strobed' in the lab of this marvelous man! It was he who introduced me to SCUBA diving. From 1949 to 1956 I worked for The Lionel Corp., Irvington, NJ, the toy train maker, starting at $37.50/wk! After working on 'Magne-Traction', I was involved in Gov't projects (some classified) in acoustics, ultrasonics, magnetics, etc. - and the design of a motorized prosthetic 'hand' for paraplegics. From 1956-1961 I was with the Hughes Aircraft Co. Research Labs., Malibu, CA (home of the first laser) working mostly on various display technologies. From 1961 to my retirement in 1989, I was with the Hughes Aircraft Co. Radar Systems Group, working on display and map-making aspects of high resolution synthetic-array radars, in the lab of Al Herman (who is also a member of our Society, and a very good buddy!). When Al became Technical Director of the whole shebang, he was foolish enough to keep me on his staff, helping put together our annual IR&D plans and working on various projects in tandem. One of my jobs, from 1972 to 1989, was representing the Radar Systems Group (some 10,000 people) on the Corporate Invention Evaluation Committee, and also arranging and running, while also on the Hughes Corporate staff, our monthly company-wide Image Processing Seminars.

My interest and application of microscopy has prevailed over the years and has been an integral part of the high resolution research and development work at Hughes. Even though I affirm that 'I do not collect microscopes', over the years I have, somehow, accumulated and restored quite a number. My criterion is that they must all be usable and in A-1 mechanical/optical shape. I prefer using microscopes made since about 1925 and my favorites are the Reichert Zetopan, the A/O Spencer series of Polarizing mics., the Zeiss stereo mic., and various Olympus mics. made from 60s to the 80s. (I do have a Pillischer c.1865, however). Most of these I have restored to 'as new' condition, and have learned a lot in the process. Methods of photometry in photomicrography have always been particularly intriguing to me. My other interests include Japanese arms & armor, Russian antiques, photography, electronics, hi-fi, music, computers, RC gliders, and - last but not least - attractive and intelligent young ladies.

In August 1996, the membership was 'foolish enough' to elect me president of their fine group - and I was deeply honored, since I value the friendship and diverse knowledge of every individual and of the group, collectively.

MEETING OF 21 SEPTEMBER 1996

The well attended meeting was held in a large classroom in the **Crossroads School**. The seating was arranged in a circle which gave a pleasant informality to the event in which everyone could talk more easily face to face instead of all facing a podium.

Jim Clark, Ken Gregory, Stuart Worter and George Vitt displayed several microscopes. Jim and George brought A/O Spencer Polarizing microscopes of the excellent Model 37 Series. Ken showed an excellent brass Dicke type polarizing microscope c. 1900-1920. Stu displayed his brass Reichert portable folding microscope of most clever design.

John de Haas, and the membership discussed plans for future workshops where he will focus on various specimen preparation techniques and sectioning methods. John passed around for inspection several types of small microtomes.

The members voted to adopt the name, **Microscopical Society of Southern California.** Since many members wanted a chance to exercise their creativity, they also voted to wait until the next meeting to vote on a name for the bulletin and on logos for the bulletin and the Society.

The last part of the meeting was devoted to showing a VHS video tape made by our member, Paul Ottenheimer, and featuring the superb artistic work of Klaus Kemp, who is undoubtedly the greatest maker of arranged diatom and butterfly wing scale microslide art. Having Paul's OK, Tom Mc Cormick brought many professional VHS copies of this very tape which he made available for a mere $8!

MATERIAL EXCHANGE

To obtain samples from the members listed below, send them a stamped self addressed envelope with your request.
Many thanks to those who volunteer to share these materials.

Microcircuit chips offered by Ron Morris. Ron has prepared a set of slides for the Postal Microscopical Society showing the development of the microcircuit. These were of intense interest to many who had no access to such materials. Letters from England were very appreciative of the chance to study these complex silicon circuits. Ron has given out some of these samples at Steve Craig's workshop to the delight of the attendees, and offers microcircuit chips to any other member who would like to have them.

Ronald F. Morris
1561 Mesa Drive # 25
Santa Ana Heights, CA 92707

Sand from Rincon Hill in Ventura offered by Ed Jones. Ed contributed the sand that was used in the latest Craig workshop to study cleaning techniques. Ed has more of this uncleaned sand from Rincon that he offers to anyone who was not at the workshop, but who would like to try the cleaning technique. See page 8 for a description of the material.

Edwin L. Jones, Jr.
2425 Scoter Avenue
Ventura, CA 93003

Movie Digital and Analog Sound Tracks offered by Tom McCormick. Tom has some extremely interesting commercial movie sound track film that has the sound recorded in several digital and analog formats. One of the digital formats contains a 70 x 70 array of dots in the sections between the sprocket holes.

Thomas J. McCormick
5925 Bonsall Drive
Malibu, California 90265

WANT LIST

"Polyphos" substage condenser for Zetopan microscope.
George G. Vitt Jr.
2127 Canyon Drive
Los Angeles, CA 90068

FOR SALE OR TRADE

X-Y Microscope Stage, Wild, Approx.3 X 5 $25

Nikon F-3 HP Camera
50, 35 and 135 Nikkor Lenses
DW-4 Magnifying Eyepiece $1100

Gary Legal
1306 Sheppard Street
Fullerton, CA 92631

Editor's Notes

This first bulletin of the Microscopical Society of Southern California shows some of the features that we hope to include in subsequent issues. These have been the result of many ideas generated in discussions by a number of members. I would encourage anyone who has any further ideas on how to make our bulletin more useful and enjoyable to please let me know. With everyone's help, we can use the bulletin to increase our friendship, knowledge and enjoyment of things microscopical.

One feature will be the inclusion of a wide range of writings and submissions by the members. With the range of experience, knowledge and talent among the membership there should be no shortage of interesting articles from within the society. Also, by omitting color and doing the whole layout process on a computer and using commercial reproduction services we hope to be able to include more and longer articles within our budget.
Conversely, we encourage even the shortest notes such as sources of material or tips on procedures. Even a single sentence can be included in a **"letters"** section.

Another new section is a **"member profile"** which will showcase a different member each month so that we can get to know each other, our histories and interests; the amazing diversity of which is one of the delights of the society.

To help members with similar specialized interests to contact each other, one of the future issues will include a questionaire on particular microscopical interests. A coding system will be added to an updated membership list so that someone who, for instance, is fascinated particularly with diatoms can find those who share that pursuit by seeing a "D" next to their name. Of course, some of us will have a long list of letters.

We also are adding sections for **Items Wanted** and for **Items for Sale or Trade.** This will allow some of the distant members to buy, sell and swap that we nearby members have always been able to do.

A **Materials Exchange** section will offer to share samples for study. Members who have special access to items that would be of interest , such as a particular location of fossils , or who on a vacation to Hawaii, pick up some volcanic sand, are invited to mention it so that it can be shared with others. Since the quantities needed are so small, samples can be easily mailed to interested members.

One bulletin format change will be consecutive page numbering for the entire year, so that a full year's index can be published in the December issue. The page format will also include wide inner margins to allow for 3 hole punching or other binding methods to make up an easily accessed year of information. Since we are starting in September, we will only have four months in the 1996 Volume.

Again, I urge everyone to send in articles, notes or letters that would be of interest. Also welcome are any criticisms or suggestions that might make our bulletin better.

E-mail, phone, fax or mail is fine for messages. Written material is preferred in computer format. I use a Power MacIntosh, but can handle either PC or Mac diskettes and text or pictures in almost any format. WordPerfect or Word files are best to make sure that all formatting comes through intact. For pictures, Tiff, BMP, JPEG or any other standard files are ok.

Also, if you do not have computer access, it is no problem for me to scan regular typed text, or photographs, drawings or other pictures into the computer.

There is no need to resize or paste-up anything. It is actually much easier to resize each item of picture or text and to format it and lay it out in the computer. Also, it is better to add picture captions in the page layout program rather than having them as part of the picture.

It has been a great pleasure to go through the mechanics of putting this bulletin together with the superb source material that has been submitted. The material is a real measure of the immense talent and interest within the Society.

As part of the revised Society, this bulletin can provide a place where members can publish some of their accomplishments, interests and ideas, much as we share them in person at the meetings and workshops.

It is immensely stimulating to see the participation in this first issue. I feel sure that this is just the beginning, and I look forward to helping put together articles from every member, each of whom has unique contributions to make.

Gaylord E. Moss Editor