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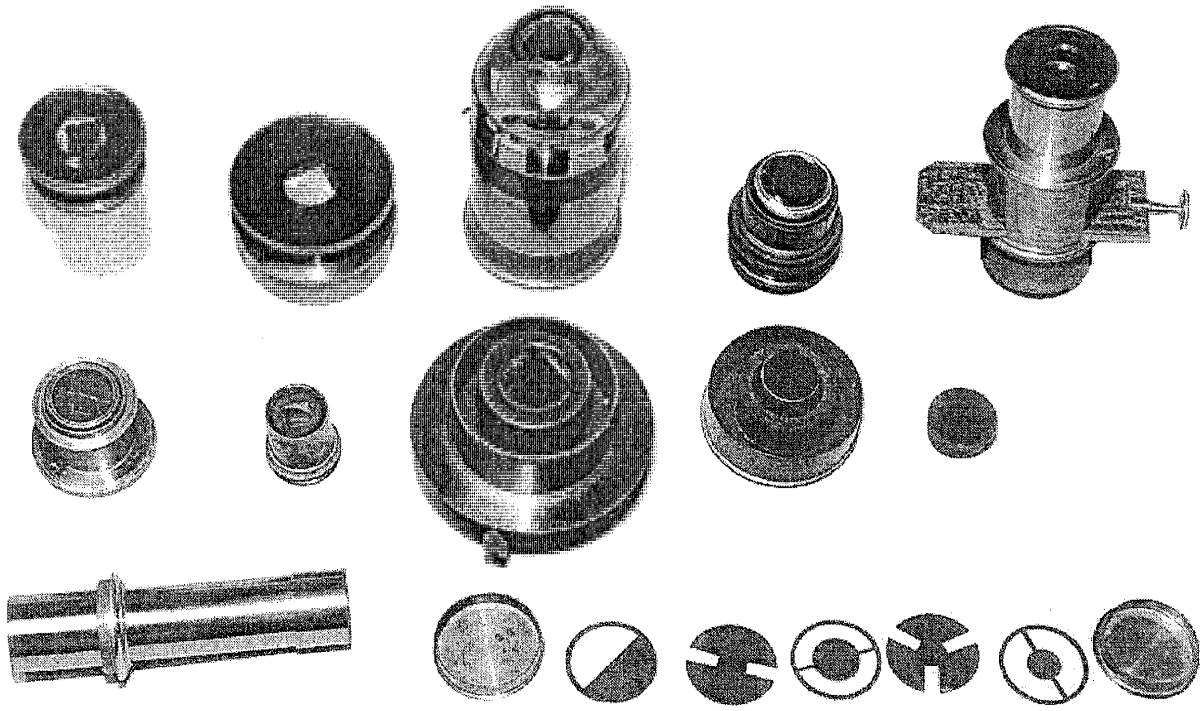
Accessories Supplied with or for Antique Microscopes

Barry J. Sobel and James D. Solliday



Over the last few years, as we have accumulated a few antique microscopes, we have been both impressed and amazed by the variety and quality of accessories often supplied with them. Nowadays, some of our greatest fun often comes from identifying and trying out many of them. In this article, we will share with the reader the results of our research[1] into these items and provide illustrations of several examples. For the purposes of this discussion, we have divided the accessories by location on the instrument. Although an imperfect system, we find it convenient and ask indulgence from the reader in this regard. We have excluded the different types of stages and substages, and generally limited ourselves to parts of the microscopes that are readily removed or replaced. This is not intended to be a treatise on these accessories but

rather a guide to identification. As such, we may not describe in detail all of the historical facts about an instrument such as the camera lucida. In some cases, we will limit our discussion on specialized attachments, like the microspectroscope, which in themselves will likely be the subject of future individual articles.

Accessories supplied with antique microscopes of the eighteenth and nineteenth century:

1. Eyepieces
    a. Usual type
    b. Micrometer eyepiece
        1) Ramsden type
        2) Jackson type
        3) Other types
    c. Pointer eyepiece
2. Eyepiece Attachments or replacements
    a. Camera lucida
    b. Polarization analyzer
    c. Microspectroscope
    d. Binocular adapters
3. Lister erector lens
4. Vertical illuminator
5. Nosepiece attachments
    a. Double
    b. Triple
    c. Quadruple
    d. Rotational (for analyzer)
6. Objectives and attachments
    a. Usual type
    b. Correction collared
    b. Dual magnification ("Smith's Quarters")
    c. Lieberkuhn illuminator objective covers
    d. Parabolic illuminator fitting on end of objective
    e. Stops
7. Stage and limb attachments
    a. Side arm illuminators
        1) Rectangular style
        2) Circular style with half cut to allow placement immediately adja cent to the objective.

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b. Stage forceps
    1) In some cases can be limb mounted.
    2) Often had a sharp spike on one end that could alsohave a black and white disc attached for viewing large opaque specimens.
c. Stage-mounted or limb-mounted bullseye condensers
d. Goniometer attachments
e. Tenaculum
f. Fiber analysis stage attachment
g. Black and White disc for stage opening (older models)
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j. Thin stage replacements for use with oblique illuminators.

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    c. Tweezers and forceps
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    b. Wheel of apertures
    c. Achromatic condensers
        1)Without additional features
        2)With simple wheel of apertures
        3)With dark-field apertures
        4)With combined aperture wheel
        5)With double wheel of apertures
    d. Parabolic darkfield condenser
    e. Wenham's oblique illuminator
    f. Substage Amici prism
    g. Polarizer
    h. Dark wells
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EYEPIECES

Although most microscopes were supplied with several different eyepieces, or oculars, specialized eyepieces were also not uncommon. Among these were the eyepiece micrometers. There were two basic types. Early on, the Ramsden type (Fig. 1), through which the user could see a row of metal points resembling a comb. Riding in front of these was a hair, usually of spider web, which could be moved across the combs via a calibrated screw and through which objects could

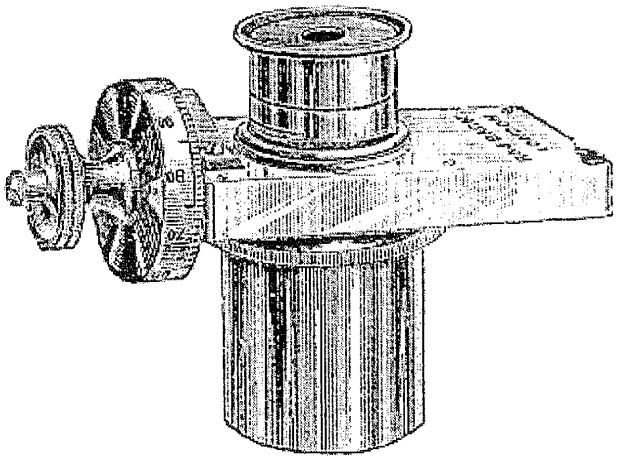


Fig. 1 Ramsden type of eyepiece micrometer. The calibrated dial moved a metal comb past a thin hair.

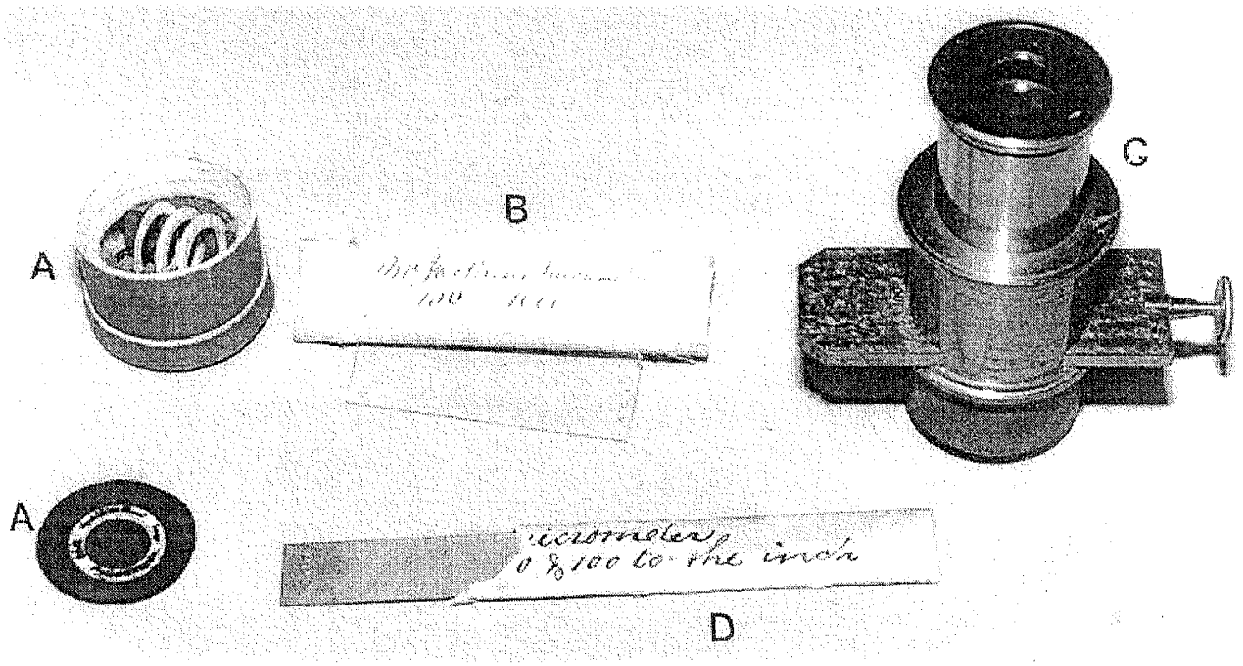


Fig. 2 Some measuring devices. A. set of drop-in ivory micrometers with parallel hairs strung across the diameter. B. "Mr. Jackson's micrometer." This type would slip into a slot of a special eyepiece such as that in Fig. 3. C. A more sophisticated form of Jackson micrometer as supplied circa 1880 with a bar-limb microscope by Watson. Turning the knob allowed fine adjustments of the position of the micrometer within the eyepiece.

then be measured. A simpler and much less expensive method was developed later once accurate dividing engines could scribe a series of parallel lines on glass slides. Such slides were inserted through a slit in the eyepiece (Fig. 2C) and used directly, much the same way as our modern eyepiece micrometers are today.

Another accessory that seems inappropriately uncommon is the use of a pointer inside the eyepiece (Fig. 3). These can be recognized by the little piece of metal rotating on a screw on the outside of the eyepiece with the screw's axis parallel to the optical path.

In addition, several ingenious makers devised attachments to fit on or over their oculars. A typical example was the camera lucida, several examples of which are shown in figure 4.

Another over the eyepiece attachment was the analyzer (Fig. 5) for polarized light microscopy. Although most of the time the analyzer sat above the ocular, occasionally it could be attached between the optical tube and the objective with an adapter which allowed it to rotate (Fig. 5A). The polarizer usually fit into the substage (Figs. 5B, 5G).

Finally, there were some very sophisticated microspectroscopes which were first devised by Sorby and constructed by John Browning (Fig. 6). These will be the subject of a future article.

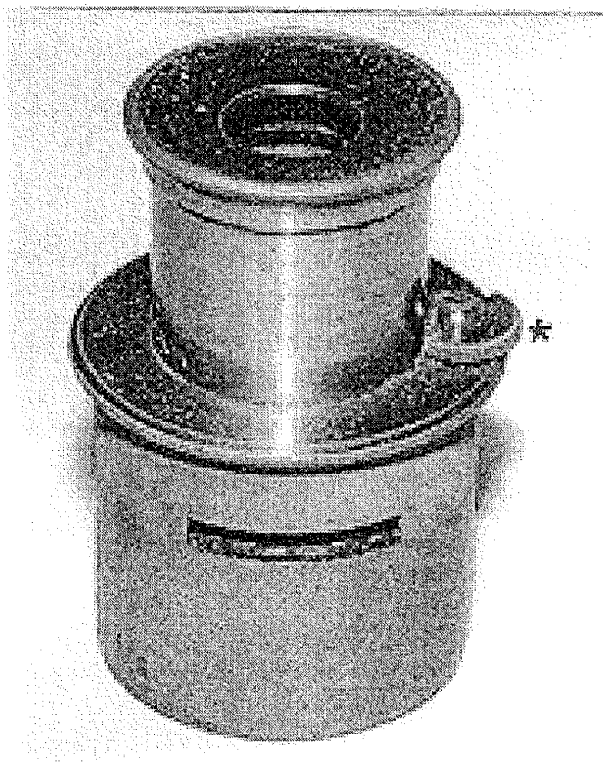


Fig. 3 Eyepiece supplied with Smith and Beck microscope circa 1853. The semicircular knob (*) moves a pointer within the field. A glass micrometer such as that in Fig. 2B could fit in the slot.

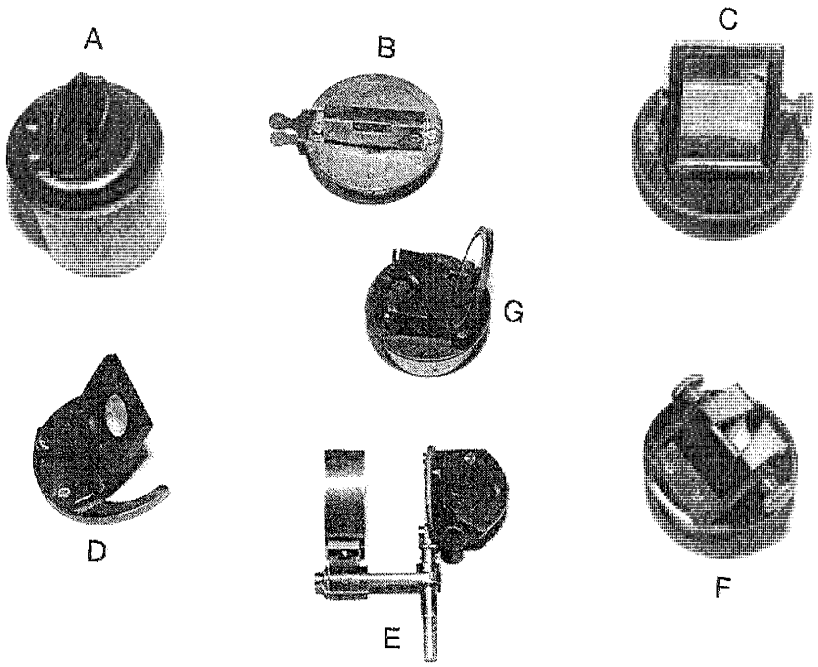


Fig. 4 Camera lucida attachments. A. Beale type by C. Colins, screws on top of the eyepiece. B. Type fitting over eyepiece as supplied by James Smith circa 1840. C. Unusually large prism type. D. Beale type by Bausch and Lomb circa 1890 made of hard rubber. E. Clip-on type signed by Nachet. F. Type commonly supplied with English achromatic microscopes of the late nineteenth century. G. Wollaston type adapted for the microscope.

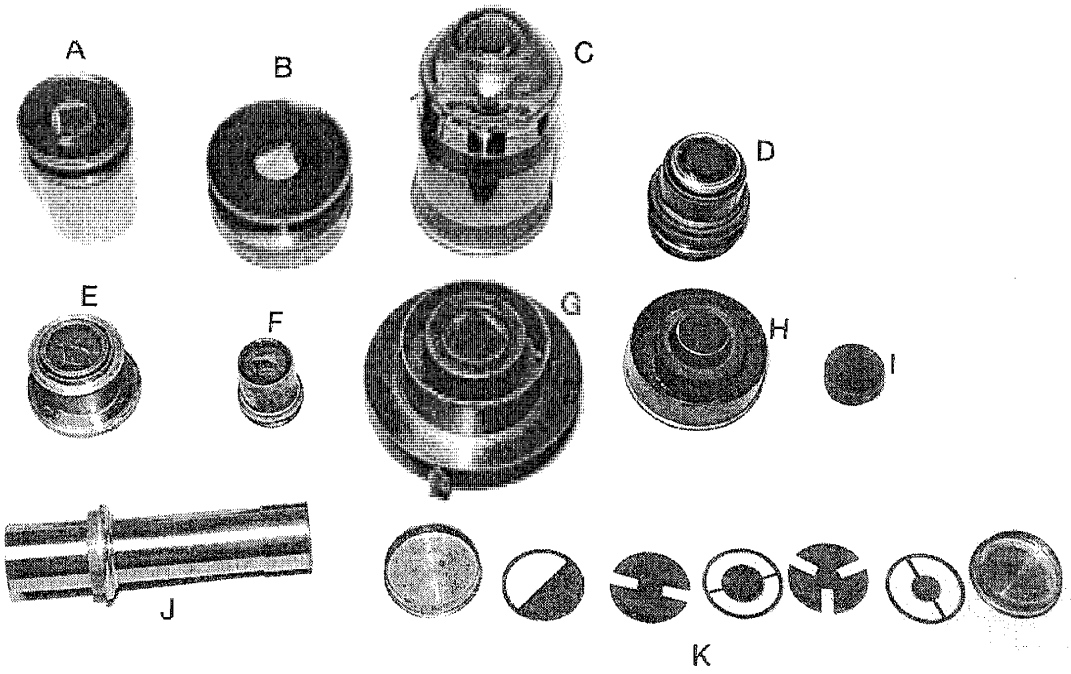


Fig.5 Some microscope accessories. A. Over the eyepiece analyzer supplied with Smith and Beck microscope circa 1853. B. Polarizer for same which fit in the substage. C. Wenham's parabolic condenser for darkfield work. D. Later achromatic darkfield condenser. E. and F. Screw-on polarizer and analyzer. G.. Calibrated substage polarizer. H. A simple pinhole was used as a "condenser" both in early non-achromatic instruments and also later in less expensive versions of the achromatic form. I. The pinhole could be exchanged for another size. J. Lister erector lens (as supplied with James Smith microscope 1840) was installed inside the draw tube. This allowed for erect image viewing and made following a moving organism much simpler. K. Some condensers were provided with a slot for one of a variety of stops to be inserted for various forms of oblique illumination; more sophisticated condensers had a wheel of different stops.

INSIDE THE TUBE

Although many microscopists are familiar with the field lens mounted inside the main ocular tube to give a wider field of view, few are familiar with another attachment called the Lister erecting lens system, or simply the erector lens. This narrow optical arrangement (Fig. 5J) is often attached to the draw tube, screwing into its bottom. This accessory allowed easier manipulation of the stage, when following a moving organism, since movements were in the same apparent direction as that of the organism.

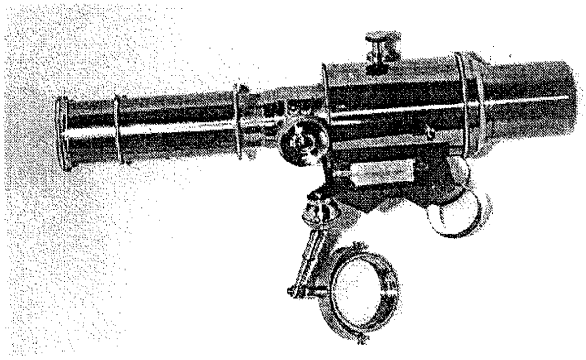


Fig. 6 Sorby - Browning microspectroscope. c 1880.

THE NOSE

Not only were objectives (Fig. 32) of varying focal length usually supplied, but some were either more specialized, or had provision for further attachments. Perhaps the earliest specialized objective was the Lieberkuhn. Although initially intrinsic to objectives, Cuff soon developed the slip-over Lieberkuhn reflector that could be put on or removed; these were supplied with early nonachromatic instruments such as the 'Cuff Double Microscope' (Fig. 9). Later slip-over Lieberkuhns were supplied for achromatic objectives (Fig. 10 C,D & E).

Lieberkuhns, however, were not ideal illuminators for opaque objects , and various types of vertical illuminators were developed. An example by Richard Beck is shown in Figure 31. It used a thin circular disc of glass to allow light to enter and be reflected downward through the objective.The user would view the illuminated object while looking through this same glass.

Although developed quite early, and found on microscopes by Benjamin Martin and W & S Jones (Fig. 11), the use of a multiple objective nosepiece was not initially supplied with the achromatic microscopes with their larger, heavier, and more complex objectives. In the second half of the nineteenth century, multi-objective nosepiece attachments were again introduced, this time accepting the individual objectives (Fig. 12).

As noted above, in addition to these attachments, an accessory was also sometimes supplied which joined between the nosepiece and the objective and accepted the analyzer providing an alternative location to the over-the-eyepiece configuration (Fig. 13C).

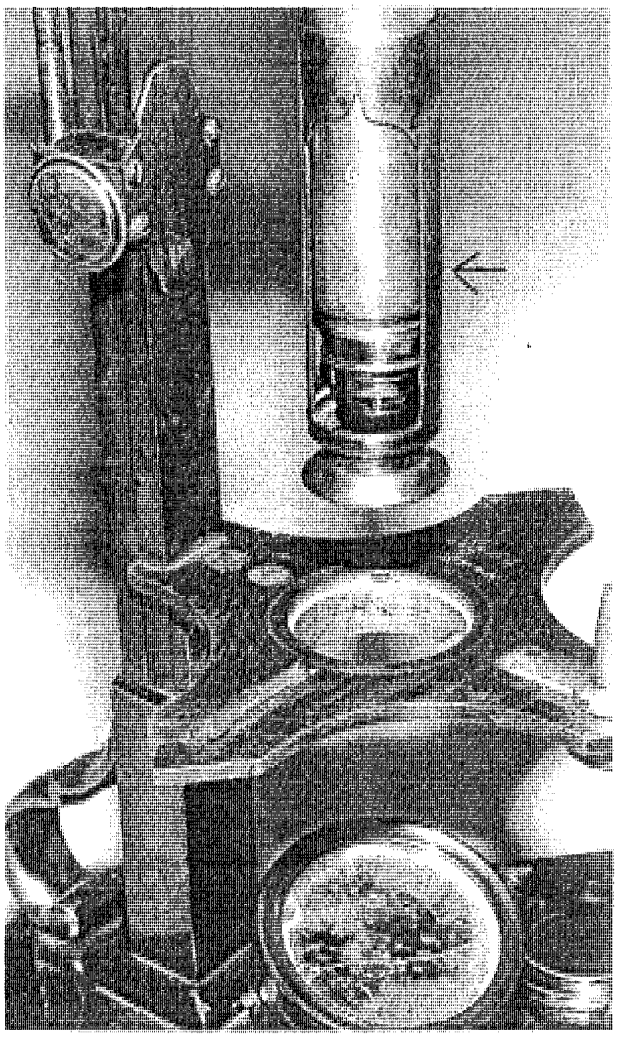


Fig. 9 Slip - over Lieberkuhn (arrow) on a Cuff - type microscope circa 1760.

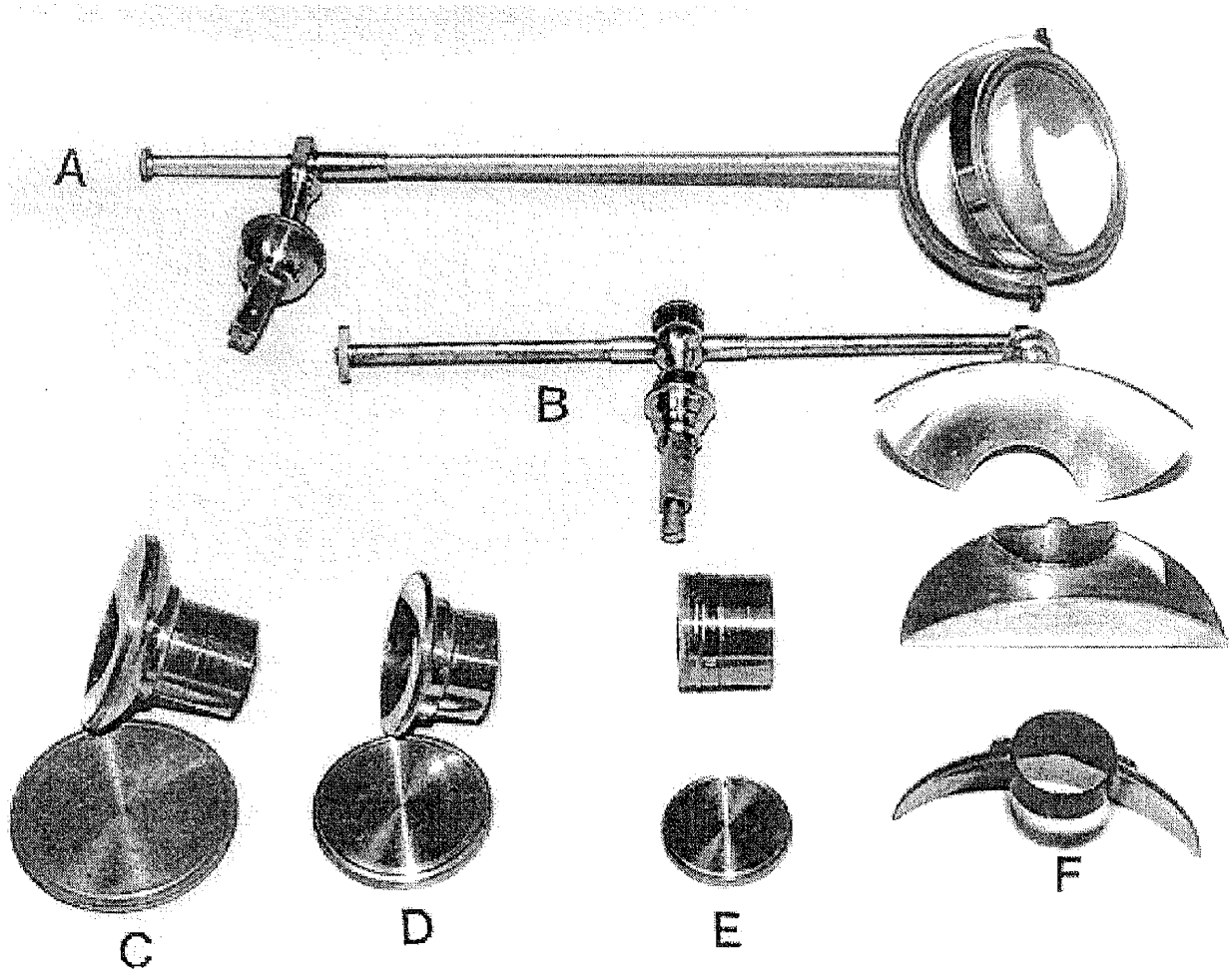


Fig. 10. Illumination accessories. A. Bullseye condenser by James Smith (circa 1840) attached to limb. B. Parabolic hemi - illuminator by Smith and Beck circa 1843 also attaching to the limb. C, D, E Lieberkunhns fitting over achromatic objectives by James Smith 1840. F. similar to B , but fitting over the objective.

SPECIAL SLIDES AND OTHER STAGE FITTINGS

In place of ordinary slides, a variety of measuring devices were supplied; the more common of which was the slide micrometer (Fig. 14).

Selenites, used to enhance polarization microscopy, were supplied either as a slide or in specialized brass fittings (Fig. 15). Some of these had provision for mechanical rotation of the selenite or even multiple selenites.

As for observations of living organisms, a variety of methods were used. For small organisms, various shapes and sizes of depression slides were eventually supplied(Fig. 16). But for greater capacity, various types of "live boxes" or larger glass chambers were supplied. Figure 17 shows a variety of live boxes that could be used for wet or dry animals. Early models were constructed of ivory or brass and would often fit into the hole in the stage. Later, they were fitted onto a rectangular brass slide above the stage; some contained micrometer markings.

Glass chambers were supplied by many makers in several different configurations. Smith supplied one with a little brass handle (Fig. 18C) and Smith also started a tradition of supplying a rectangular glass chamber with an ivory wedge to adjust the space in which the specimen was trapped (Figs. 19,20).

Some living organisms were so active that it was convenient to immobilize them. This could be accomplished with a compressor, various types of which are shown in figure 21.

Following the description of the circulation of the blood by Malpighi, it became popular to view capillary circulation. This could be seen in the tail of a fish using a fish-plate(Fig. 22A,22D), in the web of a frog foot using a frog plate (Fig. 22B, 22C), or in a smaller fish using a thin test tube (Fig. 23).

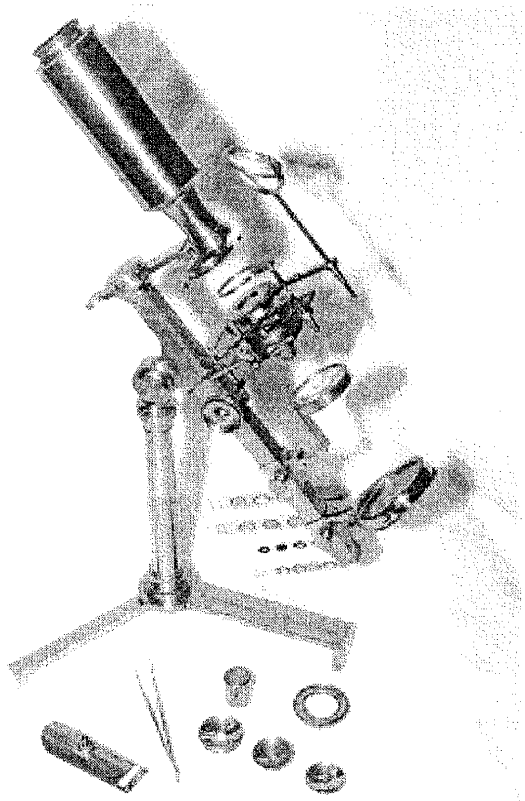


Fig. 11. W & S Jones 'Most-Improved' microscope circa 1820. This microscope was equipped with a revolving nosepiece of objectives. It also had a substage pinhole diaphram and a substage non-achromatic condenser lens. The bullseye condenser attaches to the stage. Slides were of bone and Lieberkuhns were integral to their objectives. Also note the fish-plate and talc box.

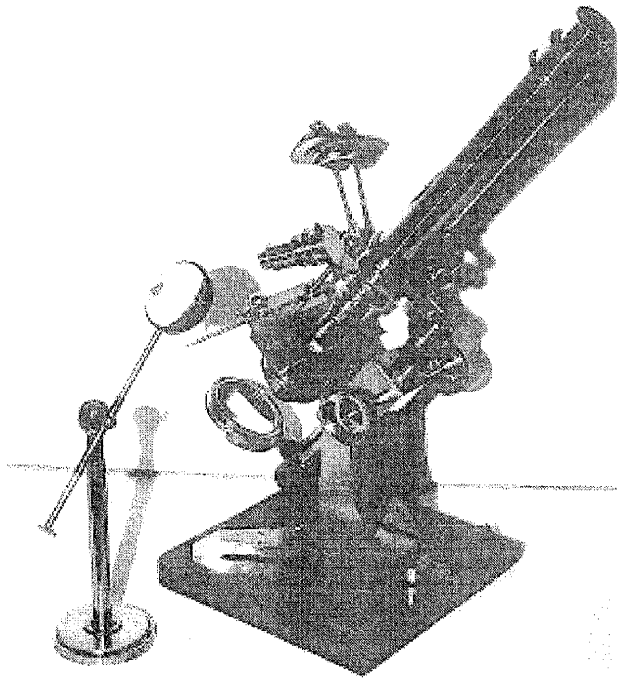


Fig. 12 Achromatic microscope of the later 19th century. Note the double nosepiece, stand-alone bullseye or bench condenser, and stage-mounted side reflector.

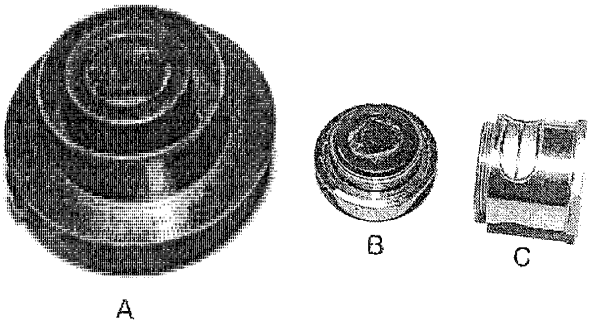


Fig. 13 Polarisation attachments. A. Calibrated substage polarizer. B. Nosepiece analyzer. C. Nosepiece adapter allowing rotation of the analyzer.

For cruder work, such as looking at a plant or a dead fly, a stage forceps was often used (Fig. 24). These could be attached to a hole on the stage or to the limb assembly.

To illuminate opaque objects, in addition to Lieberkuhns, the bullseye condenser was very popular. It could be attached to the stage (Fig. 11), the limb (Fig. 10A), or as a separate accessory on its own weighted stand (Fig. 12).

SUBSTAGE ATTACHMENTS

In addition to the mirror, several accessories were available for the substage. The earliest was a simple set of pinhole apertures to adjust the amount of light and size of the cone of light (Fig. 35A). Soon, a wheel of apertures became available; this continued to be supplied even with achromatic instruments of less than first class. Later, a single-lensed condenser was used. Finally, with the development of achromatic lenses, achromatic condensers of various types were developed (Fig. 35D). These initially were supplied with wheels of apertures; iris diaphragms were not supplied until the end of the nineteenth century.

Polarizers also fit into the substage, which were usually provided with a method of rotating. Some had graduated scales (Fig. 13A).

Dark field microscopy could be done using the standard condenser with dark field stops or with a parabolic condenser (Fig. 5C). Another accessory often fitting into the substage area was a dark well holder and dark wells (Fig. 23D). There were used to view small opaque three-dimensional objects in conjunction with a Lieberkuhn.

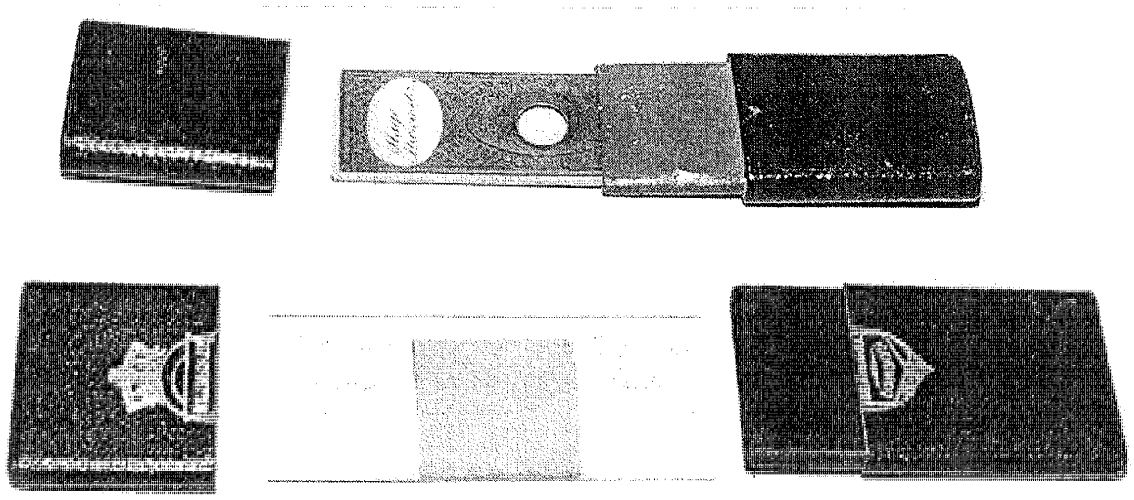


Fig. 14 Special slides. On top is a stage micrometer. The bottom item is a Maltwood finder as often supplied by Smith and Beck. The Maltwood finder has a grid of coordinates, allowing the user to easily, repeatedly find the same location on a slide. For a brief period of time after 1900, Swift incorporated this type of grid directly onto the stage of some of their instruments.

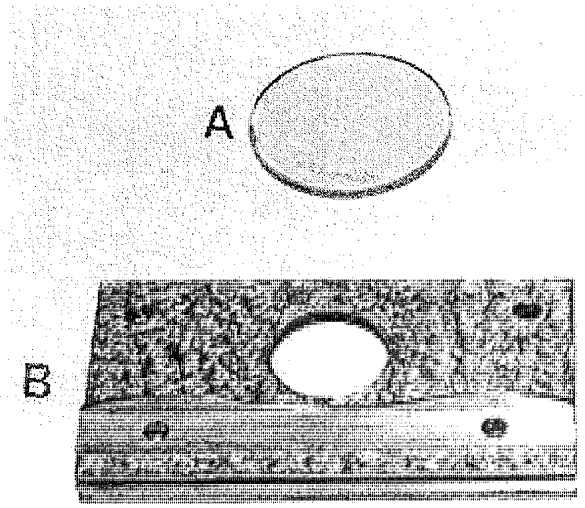


Fig. 15 B. Selenite stage. A. Selenite.

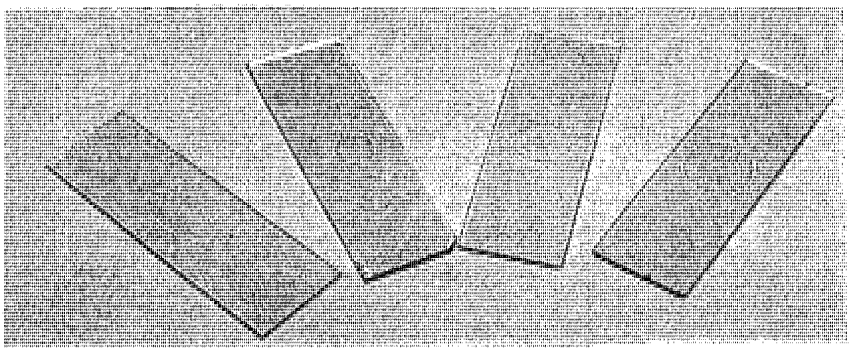


Fig. 16 Some depression slides

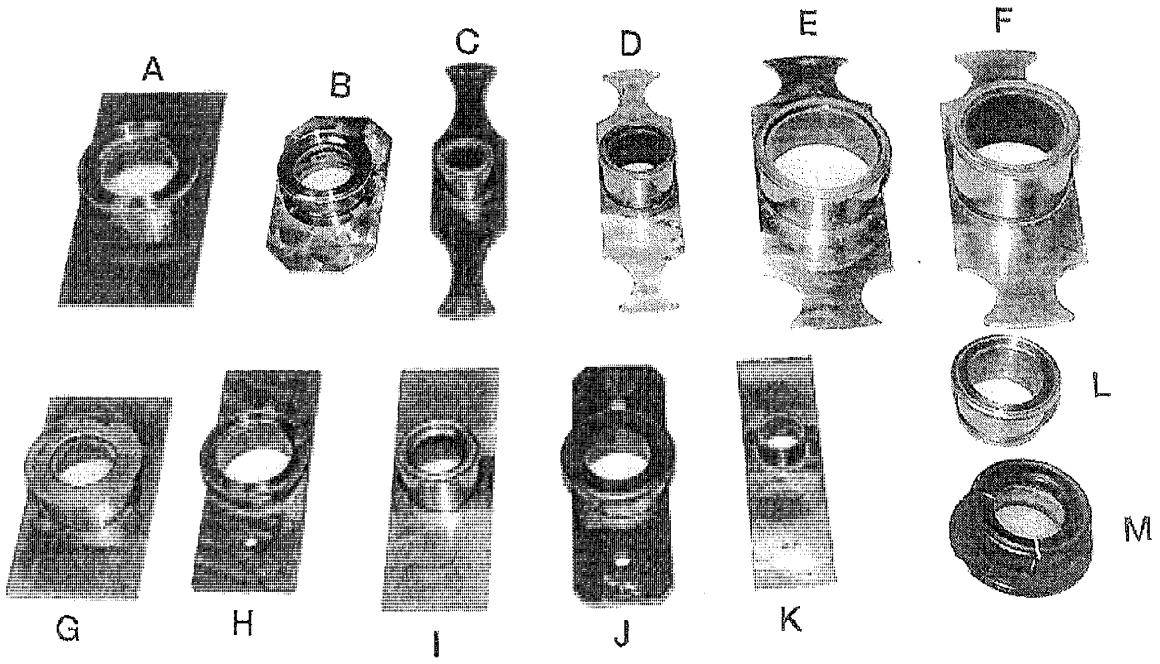


Fig. 17. Liveboxes. A. Signed Bausch and Lomb circa 1890. B. Supplied with Charles Collins "New Histological Microscope" circa 1885. C through F are all by James Smith. C has a built-in micrometer scale. G through K were supplied by various makers. M is quite early and is made of painted ivory.

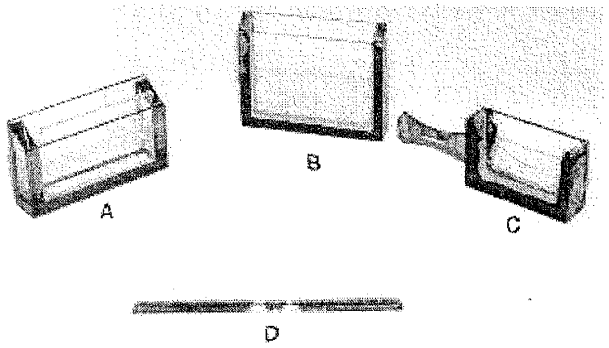


Fig. 18. Glass chambers A and C supplied by James Smith.

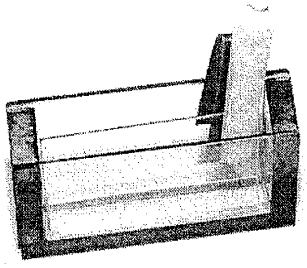


Fig. 19 See caption below

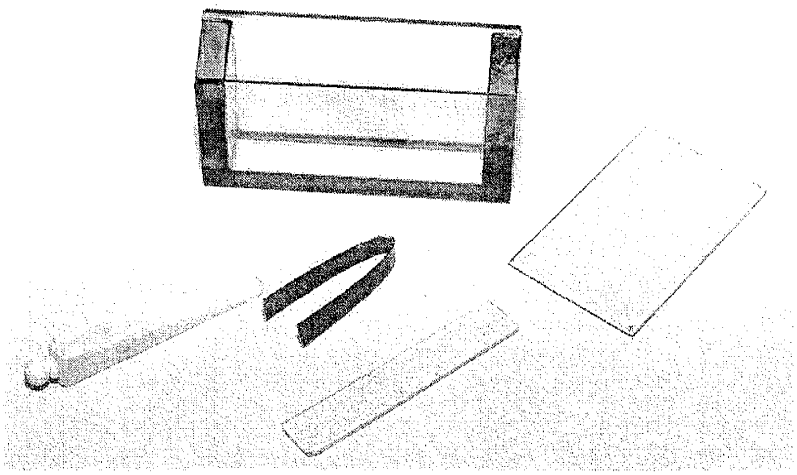


Fig. 19 and 20. Smith and Beck glass live-chamber. The organism was trapped in the triangular shaped compartment formed by the glass plate within, trapped on one side at the bottom by a narrow piece of glass and held up against the other side at the top by a spring. An ivory wedge was used to adjust the arrangement.

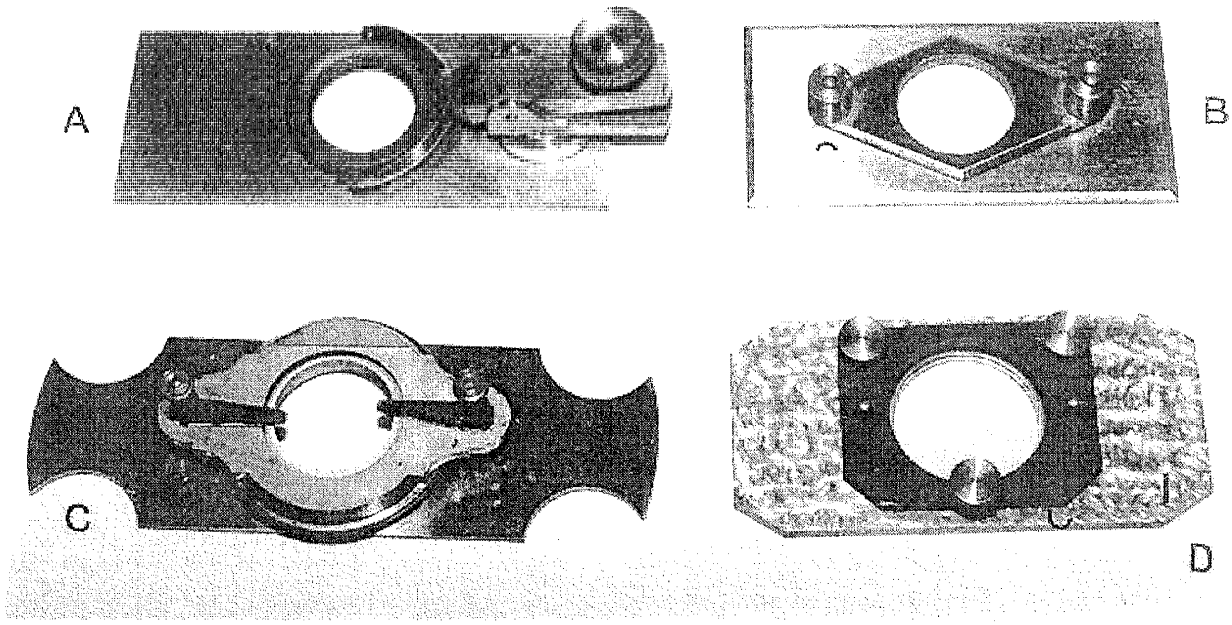


Fig. 21. Compressoria. A. Queckett (after 1848) type supplied by Smith and Beck c. 1860. B. signed "REG^{D} 244895"; C. Lister type made by James Smith circa 1840; D. supplied with Watson bar-limb circa 1880.

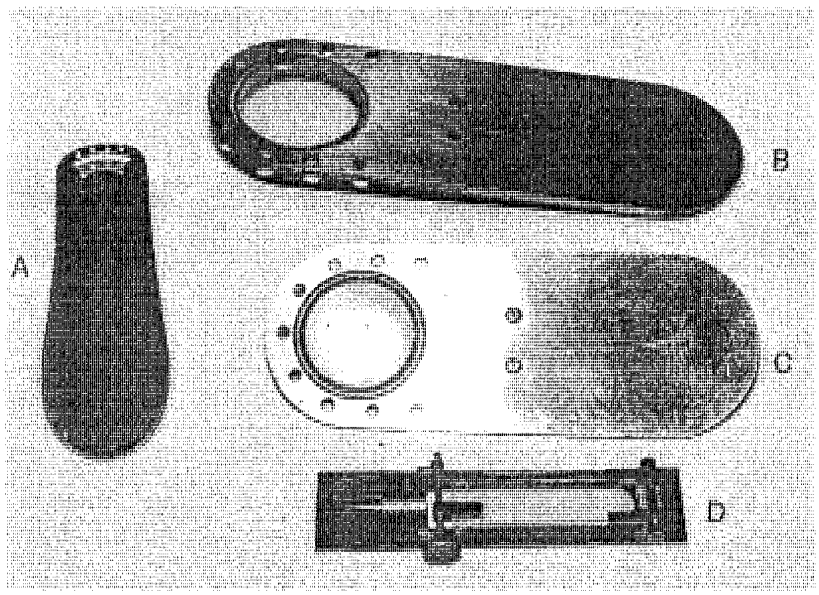
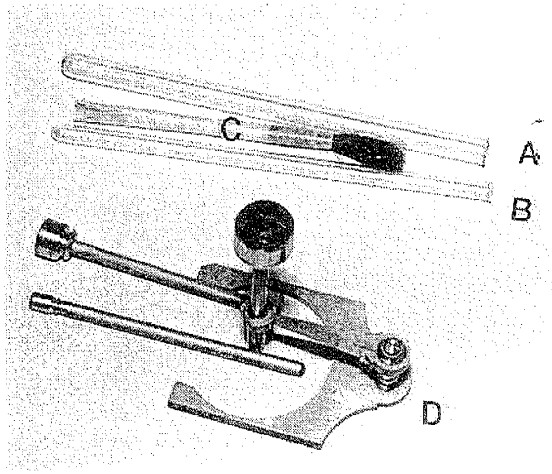


Fig. 22. Frog and fish plates. A. type commonly supplied with pre-achromatic microscopes of the 18th and early 19th centuries. B and C. Type supplied with larger achromatic microscopes; D. unusual fish-plate supplied with a nineteenth century French solar microscope.

Fig. 23. Fish Tubes (A and B), cleaning brush of quill and hair (C) and dark well apparatus (D) to view small opaque specimens.

OTHER APPARATUS

Illumination could be accomplished with sunlight, a candle, an oil lamp(Fig. 25), or later, gas or carbon arc lamps. To concentrate light, especially for opaque objects, a stand-alone bullseye bench condenser was frequently supplied (Fig. 12). Slide making and dissecting instruments were often supplied (Figs. 26, 27, 28, 29). Dipping tubes were used to retrieve microorganisms from a liquid medium (Fig. 30).



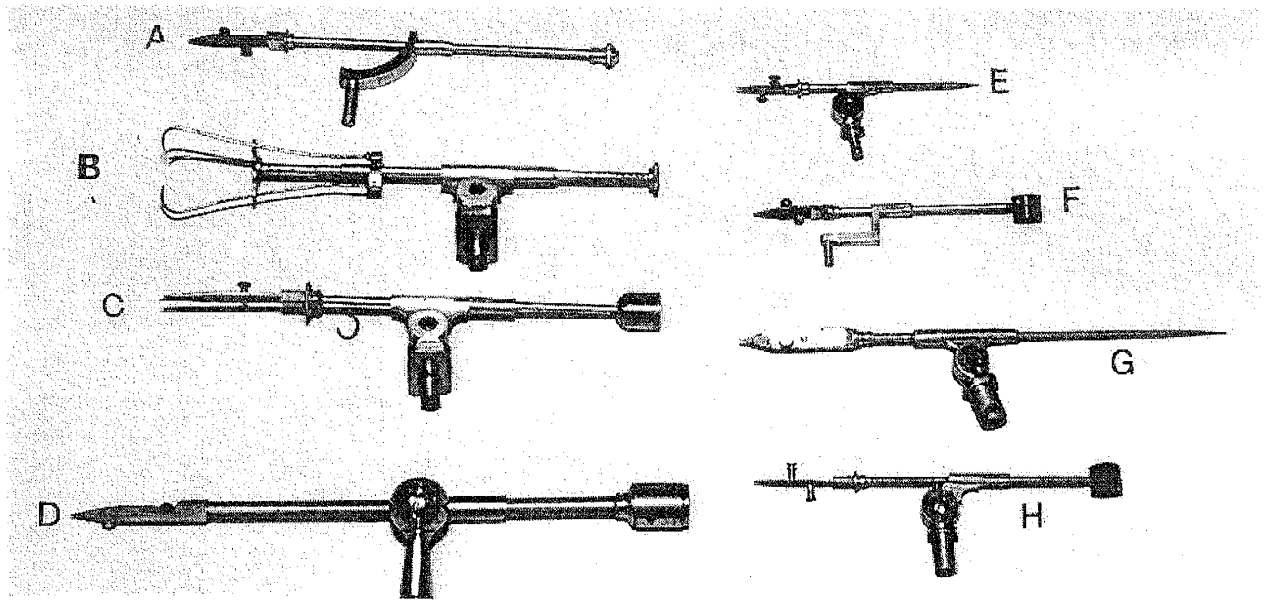


Fig. 24. Stage forceps. A. Supplied with drum microscope signed by J.H. Steward circa 1875. B. Three-pronged tenaculum supplied by James Smith circa 1840. C. Usual forceps supplied by James Smith circa 1840. D. Type supplied by Ross and successors. E. Supplied with miniature Cary-Gould type microscope circa 1830. F. Supplied with slightly larger Cary-Gould microscope signed by Cary; note the black and white disk on the end which has a slight depression to view light and dark opaque objects respectively. G. 18th century stage forceps as supplied with Cuff-type microscope. H. Mid 18th century as supplied with an Ellis-aquatic type of microscope.

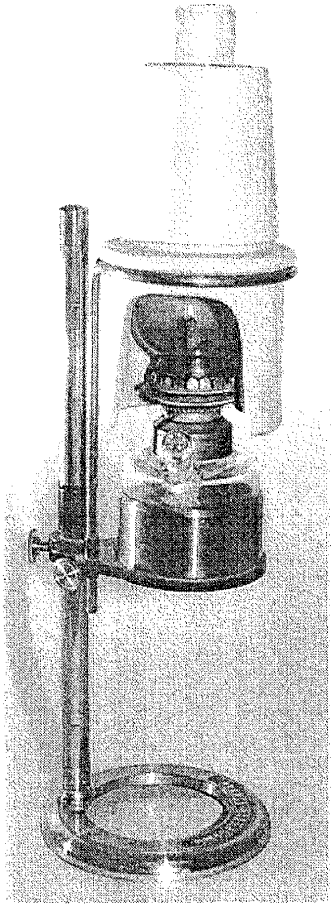


Fig. 25. Oil lamp by Swift & Son c 1890

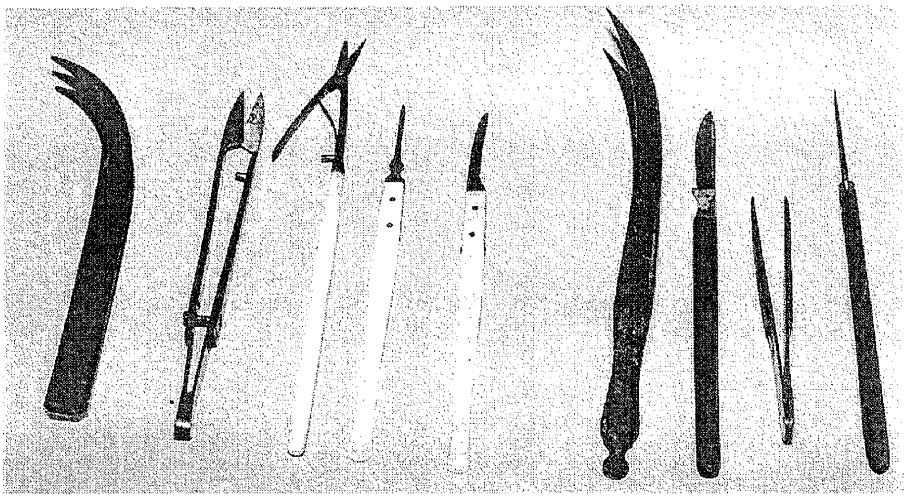


Fig. 26. Dissecting instruments. The five on the left were supplied with a Watson bar-limb c 1880 and three have ivory handles; the four on the right were supplied with an 1840 microscope by James Smith and two have ebony handles.

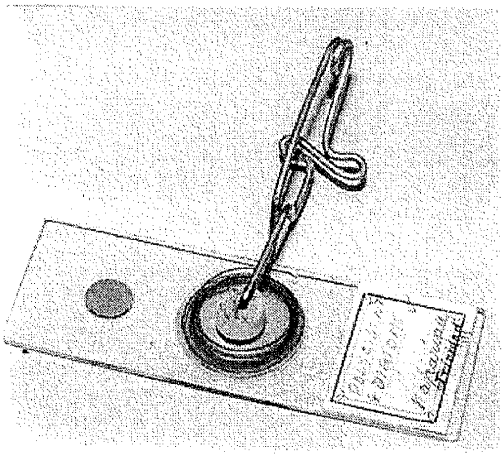


Fig. 27. Clamp for gluing on a cover glass.

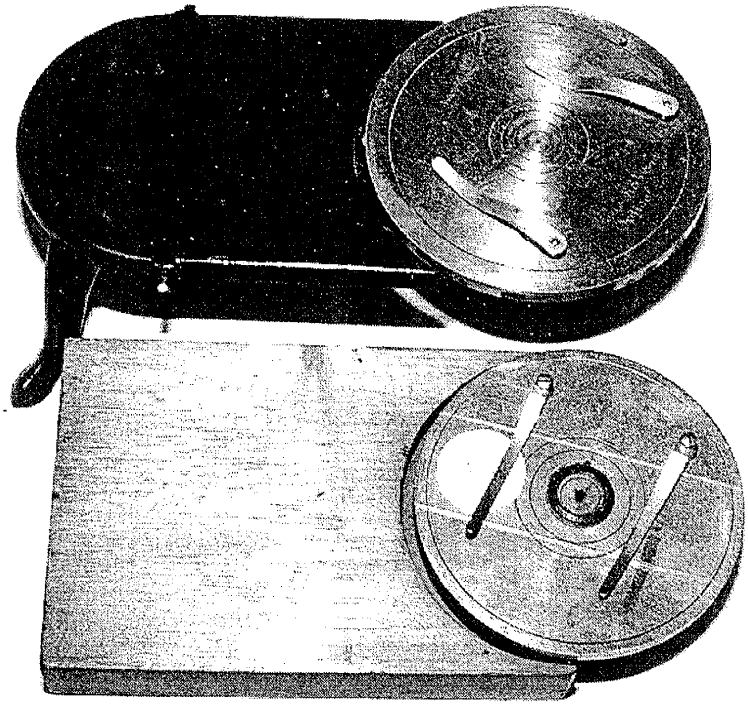


Fig. 28. Slide ringing turntables. Top, by Bausch & Lomb; bottom, English but unsigned.

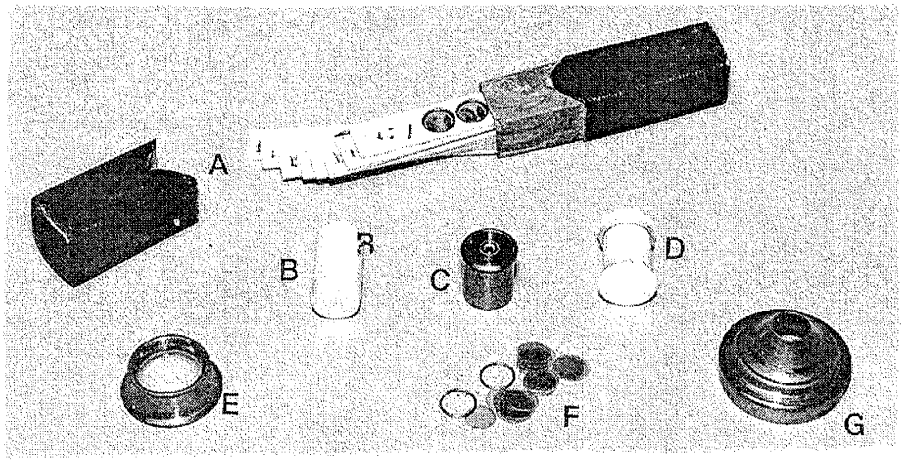


Fig. 29. Some accessories supplied with 18th century microscopes. A. Bone sliders. B,C,D. Talc boxes containing mica cover slips (talcs) and brass retaining rings. E. Hand lens. F. Some talcs and rings. G. Substage aperture.

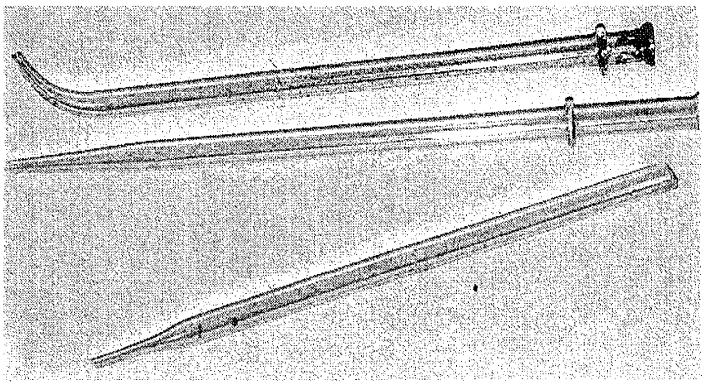


Fig. 30. Dipping tubes

Fig. 31. Aperture stops for objectives and a vertical illuminator by Beck.

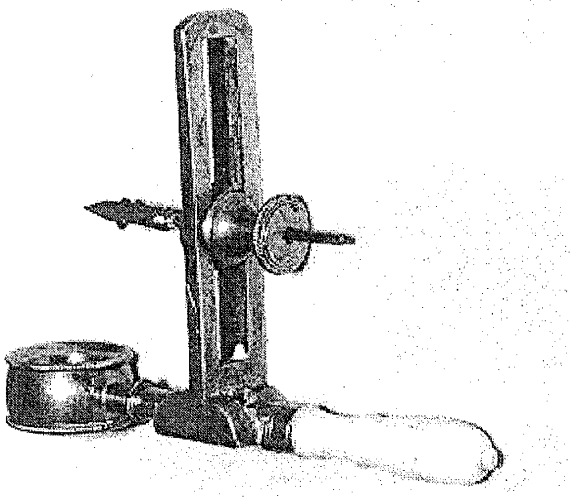


Fig. 32. Hand-held botanical microscopes were sometimes included as accessories.

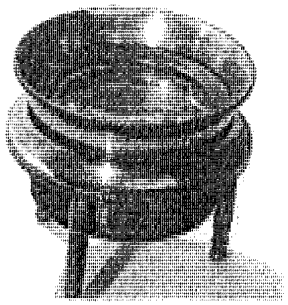


Fig. 33. Tripod magnifiers were produced for many years and even into the 1930's

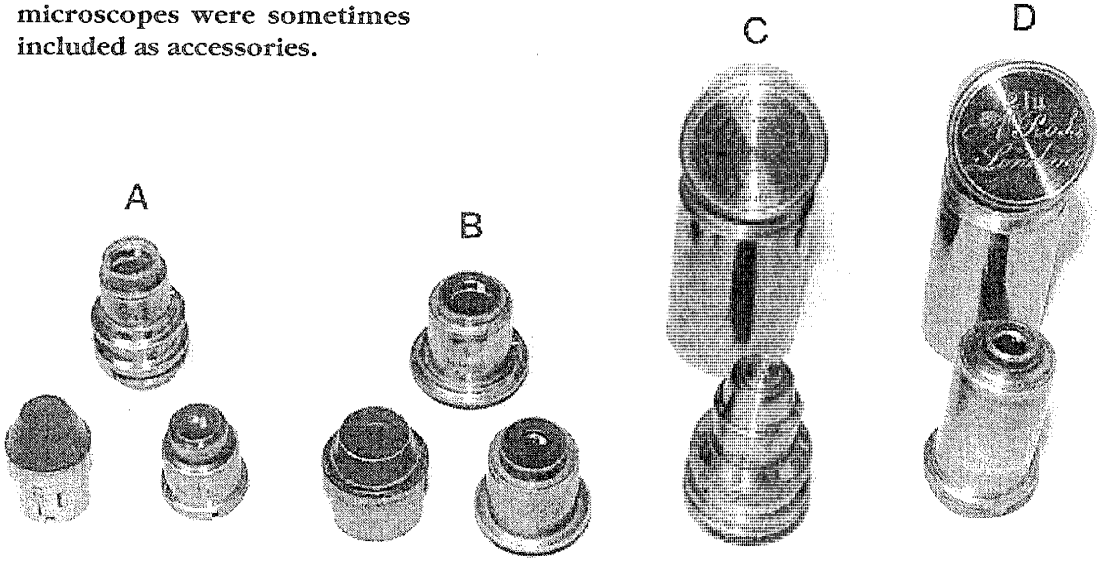


Fig. 34. Achromatic objectives were supplied on a regular basis from about 1839, although perfected in 1826 by J.J. Lister. To lower costs, James Smith developed the 'Smith Quarter' which could be used for two different powers. For the lower power, a stop was used over it; the higher power was achieved by adding an additional lens in a collar over the first. A. is a 'Smith Quarter' by J.B. Dancer. B. is by James Smith and was produced in 1840. C. A fine 1/8 inch water immersion objective by John Browning with correction collar. The correction collar, first devised by Andrew Ross, allowed correction for aberration introduced by varying thicknesses of cover glass. D. A Ross 2 inch circa 1850.

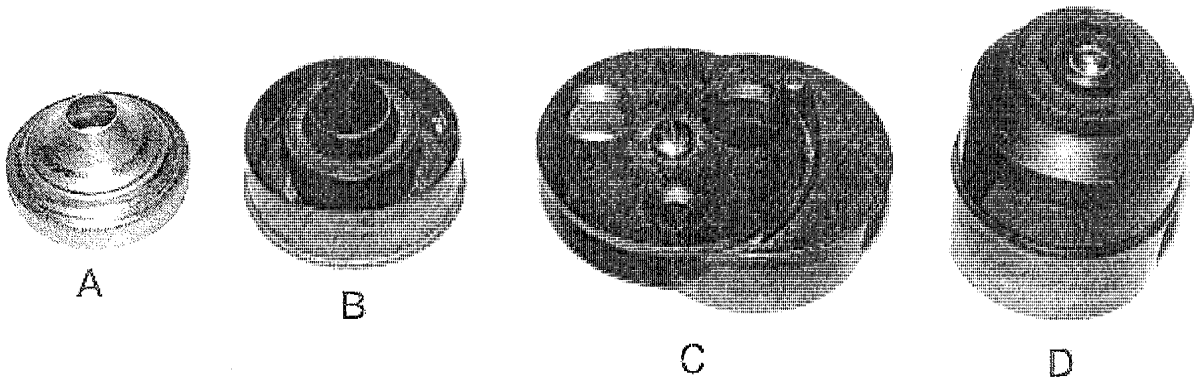


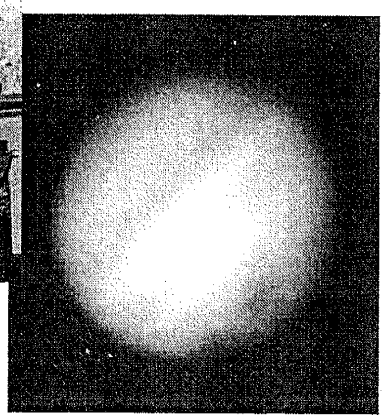
Fig. 35. Some substage condensers. A. Simple aperture used with Cuff-type microscope circa 1765.B. Simple pinhole condenser supplied with a student microscope of the late 19th century. C. A wheel of apertures without optics from the mid 19th century. D. Achromatic condenser supplied by Ross circa 1880.

1. For the most part, we have not speculated as to the nature or origin of the accessories we have discussed. The information is derived from well documented references such as records of instruments supplied to the Royal Microscopical Society, or personal documentation. For example, a Smith camera lucida is identified because it was supplied with a signed Smith microscope AND was found in a fitted compartment into which it fit perfectly, and a second identical instrument had the exact same camera lucida. Similarly, a Nachet camera lucida was signed by Nachet. In a few cases, we have concluded the nature of an accessory based on experience, along with consultation with acknowledged leading authorities. In some cases, the nature of an item would not require speculation (e.g. microscope illuminator lamps, bullseye condensers, or scalpels). Of course, the fact that an accessory was supplied by a maker, does not mean that it was made by that maker.

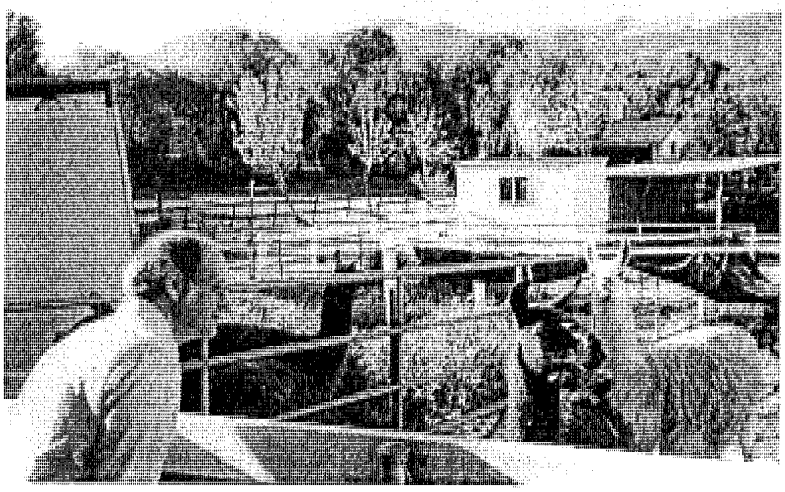
Member Profile

Barry J. Sobel

Agoura Hills Observatory 1998



Great comet crash. Comet Shoemaker-Levy. 9 July 1994. Showing 3 comet impacts in the Southern Hemisphere.



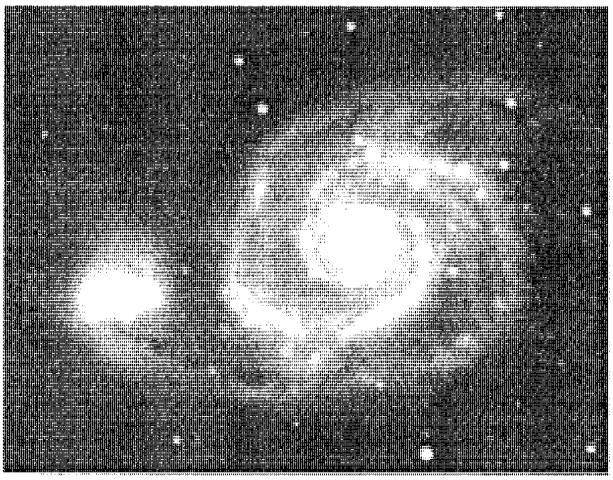
With the llamas. Agoura Hills 1998.

I grew up in a lower middle income neighborhood across from the Bronx VA hospital. We lived on the third floor of a five story apartment building without elevators. I was the third child of three siblings, but my brother had died from complications of heart surgery before I was born. My father was a salesman for the Spaulding sporting goods store in Manhattan. I remember very little from the first nine years of my life. My father died when I was nine and my mother went to work as a secretary to support our family. My mother was gone most of the time trying to make a living, and I was a "latch-key" kid often coming home to an empty house, as my older sister was already married by the time I was eight. I think it was probably this fact that led me to find interests in all aspects of science, as well as collecting. I initially collected stamps and Matchbox cars, but later my interests turned to electronics and chemistry. I used to work on a paper route and save for a long time to buy various chemicals and glassware. As a matter in fact, there was a chemical store in the neighborhood run by two disheveled older gentlemen. There I could buy an ounce or more of virtually anything from elemental mercury to arsenic, or even elemental sodium or elemental phosphorus! One of my friends shared this interest and we enjoyed comparing notes on our experiments. He was even more hooked than I was; I remember trading him a photoelectric cell for an entire box of premium baseball cards (how I wish I had kept them!)I got a very small allowance, but every penny eventually went into something electrical or scientific. We had a lot of fun with our "experiments." One of our favorites was tossing some elemental sodium into a sewer! We also made remote controlled detonators, fulminate of mercury, and even nitroglycerin. My favorite experiments were those in a little book I borrowed from the Public Library entitled *Chemical Magic*. Amazingly, I recently acquired a copy of that book, some thirty years later. Some of the experiments would be considered more than dangerous today, even illegal. My experiments led outside on occasion and once I was picked up by a policeman for "experimenting" in a trash can which caught fire. We moved to Brooklyn when I was about 14. As time passed, my interests branched into biology and also astronomy. One summer, my mother was impressed that I landed a job and worked every day all day. After I accumulated $125.00, I bought my first telescope, a 4 1/4 inch reflector on an equatorial mount, and promptly quit my job, a decision which frustrated if not puzzled my mother. For many years, much of what I learned about science was self-taught. By my second year in high school I was doing experiments on isolated perfused frog hearts. For this purpose I ordered a container of

Alexis Age 13

Harrison Age 9

Jason Age 5



Whirlpool Galaxy (M51)

(live) frogs from a supply house. I naturally wanted to preserve them in a hibernating state, and stored them in the refrigerator. My mother was not very sympathetic to this use of her refrigerator. Somehow though, I convinced her to allow me to keep them in there at least for a while. I was so busy with my self-taught science that in high school my grades were not particularly high. My education though was good, if not novel. I ended up with a C grade average but scored high enough on standardized tests to earn a Regents College scholarship - ironic because I was not accepted to a single New York School where I could use it! I was accepted to the University of Miami. Off I went and there I found paradise. Not the paradise of Miami but the science departments, especially biology. There I found studying science rewarding and I also met my future wife, Meril. I was accepted to medical school after three years of college. After I graduated from medical school, I was accepted to a residency at Wayne State University (WSU) in Detroit. I studied to be become a physician in a specialty that could be one of the most "scientific" medical disciplines, internal medicine, and its subspecialty, nephrology. There, I found a niche where I could combine my skills as a physician with my passion for science. Meril eventually transferred to WSU medical school and when I finished my fellowship, she graduated WSU medical school. By then she had demonstrated her talent as a clinician and had her choice of residencies. She decided to go to USC where she went on to complete her training in Neurology. At that time, I joined another nephrologist in Tarzana and have been in private practice here ever since. My office is now in Encino and I devote a large portion of my time to treating patients with high blood pressure, a subject about which I have written a textbook for physicians, published in five languages. Although I had a cursory knowledge of astronomy, I yearned for more.Then came Halley's comet. Despite trying, I never found it! This annoyed me and I found my astronomical salvation in an orthopedist who belonged to an astronomy club and he gave me some guidance. I joined the club and began to learn all I could about observational astronomy. I soon learned astrophotography and became good enough at it to get some of my pictures published in books and magazines. I built my own roll-off-roof observatory so that when I wasn't on an astronomy trip, I could still do some limited observing from my back yard in Agoura Hills. In about 1985, I was looking for an antique globe as a present for my wife but found they were generally very expensive. One day I found one for 65 dollars. I found its patent number, but was disappointed to find that the English Patent Office renumbered all the patents yearly so that a number without a year was useless. I proceeded to study the history of geography and within a few months was able to pin down the date of the instrument to within 2 years. I wrote to the Patent Office and back came the original patent from 1905. It turned out to be a 1905 Richard's Chronosphere, an all-time-zone globe-clock. This was exciting and led to my hobby of collecting additional scientific instruments that continues today. As I started to attend scientific instrument shows and fairs, I met others with similar interests including one of my very best friends, Leon Stabinsky, who introduced me to the Microscopical Society. As a result of that introduction I have made many other good friends. I find a kinship in the society which goes far beyond microscopy. I especially love continuing to learn more about science and its history from our talented and knowledgeable membership. My other interests include my three children Jason, Harrison, and Alexis as well as Rascal, Tiby, Tara and Lindsay (our four llamas), G scale model trains, and a vineyard.

An Idea for a Universal Phase Attachment

Alan G. deHaas

The advancements in liquid crystal technology made necessary by the demands for inexpensive displays have made it possible to design broadly useful optical devices. The nature of the liquid crystal device, however, makes most of them unsuitable for placement in an image forming beam. If we restrict ourselves to the control of illumination alone, we can devise some rather useful items.

The first of these is very simple - a shutter with the application and removal of the required control voltage. Light will either be stopped or allowed to pass through the shutter with the percentage of transmission and occlusion depending mostly on the quality of the polaroid filters which must be placed as integral components on each side of the nematic device.

In 1992, it occurred to me that liquid crystal devices had a direct application to the control of illumination for microscopy. Please consider the following: any number of active layers can be used. In the first layer deposit a series of liquid crystal annuli. In the second layer deposit another series of rings so dimensioned that the rings of the first layer overlap, at their edges, the edges of the rings in the second. (Fig. 1) The individual width of each annulus can be as small as the manufacturing process or economics will permit. Let us say that a convenient size is 0.5 mm. Each ring is provided with an electrical connection to a small control box. By means of this electronic control, one can select the annuli to be activated. We now have a system by which we can generate: A) any size aperture, B) any size darkfield stop and C) any size phase annulus that we might wish to use. It is also possible, by segmenting the annuli, to create electronically variable oblique illumination.

By selecting the liquid crystal medium, one can also generate Rheinberg illumination, obtain filters for contrast control with stains, etc. It is easy to construct adapters that will allow the use of such a device on virtually any microscope. It would no longer be necessary to buy a phase condenser at two or three thousand dollars and then have it useable on only that manufacturers instruments. With an auxiliary nematic system, the phase annulus diameter could be adjusted to suit the annulus in any manufacturer's objective. By rotating one of the polaroid filters it would also be possible to control the contrast rendering.

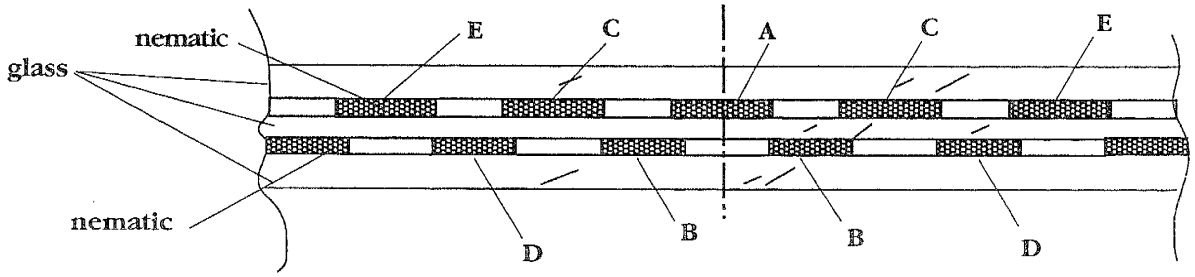


Fig. 1 Side section view of concentric rings. A. Center circle. B. first ring. C. second ring. D. Third ring. E. Fourth ring.

For Sale

1. Lacquered brass Objective engraved " M.& B. sec A.N.S." excellent condition, best offer.
2. Circa 1955 pairs of Leitz lenses: eyepieces: 6 X ; periplan GF 16X; periplan 10X
3. Leitz circa 1955 or earlier centerable darkfield condenser in case with stop. High power, round fitting.
4. Circa 1970's Zeiss photomicrographic camera equipment consisting of the Basic Body II, Focusing telescope, special eyepieces etc, 4-stage photometer which uses a VACUUM photomultiplier tube - and looks like a prop from a 1930's science fiction movie, C 35 camera, shutter, adapter for bayonet mount Leica camera, and fitted wooden case - all like new.

George Kleinman. e-mail: gmkleinman@att.net Tel Home: (203) 256-5990 Tel Office: (203) 384-3591
20 East Common Road. Easton CT. 06612-1505

Wanted

Olympus PM-6 with original light meter. Contact Barry Sobel. 16133 Ventura Blvd. #360. Encino, CA. 91436-2424. (818)-986-6009. e-mail ak657@LAFN.org

Minutes for the MSSC meeting of 18 March, 1998.

David L. Hirsch

Our well stocked refreshment table seems to become depleted much faster these days. The cause: an increase in attendance at MSSC regular meetings and workshops. This brings to mind, the unofficial MSSC slogan: WE MUST BE DOING SOMETHING RIGHT! Doing something right means starting the evening's program with an attention grabbing speaker. ZANE PRICE met the challenge by showing fascinating color films, which he had made in years past, of the flora and fauna existing in a drop of water. One took us on a fanciful journey in a 'Cosmosphere,' wherein two 'micronauts' and their vehicle shrunk to miniscule proportions, navigated the watery medium. It was a very imaginative and beautifully made film originally made to interest students in science. We mingled with daphnia, hydrae, paramaecia, amoebae and a host of formidible denizens of the microscopic world. Following our voyage, and via time lapse cinematography, we watched the fertilization and division of sea urchin eggs and other miracles of our natural world.

An important objective of MSSC is to support educational activities. In addition to our continuing support of the Crossroads School programs, we have, in the past, worked with the Natural History Museum of Los Angeles County. A representative of the museum, MS MARIETTA ORCHARD spoke to the membership concerning the ongoing educational programs offered by the museum. They are seeking volunteer docents who, after training, will conduct natural history educational programs for school children and the general public. For information regarding these programs, contact MS. Orchard at: (213) 763-3341.

SALES TABLE. Each meeting and workshop brings a mind boggling array of good stuff - and sundry freebies. This time, attendees availed themselves of assorted chemicals in ancient bottles. A number of catalogs and technical magazines were also distributed. To expedite direct contact with members offering items for sale, wherever possible, the name and phone number of the seller will be included.

ALLAN BISHOP (310)454-1904 offered two early 1900 B&L stands in good condition: one model BB for $450. obo, and a B&L 'jug handle' microscope for $300. obo. Both stands come with cases and some accessories.

JIM SOLLIDAY (714) 775-1575 offered an Oberhauser type drum based monocular microscope with a tilt focus stage and sans case. The price is negotiable. Dave Hirsch (310)397-8357 had 2 items for sale; a USSR made, contemporary students microscope and kit, for $18., postpaid, and a lapel button in the form of a highly detailed B&L microscope for $10. postpaid. Maurice Greeson displayed several old books on microscopy and a Gilbert chemistry set, all of which were snapped up in nanoseconds. The MSSC Show and Tellers were out in force.

HERB GOLD showed his newly purchased Spencer Convertible Binocular Microscope with multipositional capabilities. Included were three objectives and two eyepieces and a well fitted carrying case.

JIM CLARK, (619)443-6154 showed a circa 1980 Leitz SM - LUX HL binocular stand customized for use in the semiconductor industry. Call Jim for pricing.

BARRY SOBEL showed a magnficent Powell & Lealand 1858 Improved microscope. This was a very rare, important piece which was a transition between the standard bar limb to the No. 1 whch came out in 1860,: It had six objectives and several other accessories in the original fitted case.

KEN GREGORY our dedicated hunter and gatherer, showed his Corradi (Swiss) roller planimeter, a Leitz single lens type dissecting microscope and a B&L stereomicroscope.

THE ULTIMATE POCKET TOOL. Many MSSC members who collect, restore and repair old scientific instruments may possess plier type multiple pocket tools such as those made by Leatherman and other firms. At about fifty bucks a pop, these tools are cheaper to collect than old microscopes. Many firms, such as Gerber, Sog, Buck Tool, and others have entered the market. DAVE HIRSCH demonstrated his latest multitool acquisition, a Schrade Tough Tool with (count 'em) 21 separate functions! He bought this sturdy, well designed tool for $48.00 at Home Depot here in LA.

Ms SANDY PERKINS of Virginia Tech cybertyped her message via the Internet requesting sources and availability of cedar wood oil. Books on microscopy and microtechnique discuss the subject. One such book is Simon H Gage's, *The Microscope*, (14th) edition. JOHN DEHASS offered to respond to MS Perkins' query. For the record, cedar wood oil would make an excellent topic for an article in the MSSC JOURNAL. Any volunteers?

ANOTHER INQUIRY. I received an inquiry from long time corresponding member, FRED TULLENERS, concerning the provenance of what appers to be a 'B&L Professional' model microscope." Included were three photographs of the stand with an eyepiece mounted perpendicular to the body tube. At the MSSC workshop on April 4, our learned members in attendance can examine the photos and offer their input. All MSSC members, both regular and corresponding, (that goes for non-members too) are invited to submit microscopically related questions to our Society.

APRIL MEETING

Wednesday, April 15 at 7 PM
Crossroads School
1714 21st Street
Santa Monica, CA

Gallery Exhibition Microphotography Show and Selection

An Evening of Beautiful Images

plus the usual display of interesting microscopical gear

The program for the April meeting will be the showing and selection of photographs for the MSSC art show to be presented at the Palos Verdes Art Center, a beautiful small art exhibition gallery, which has been in existence since 1931. The center has many programs including art courses. This is a unique opportunity to show others the wonder and beauty of that which can be seen through the microscope.

The display period will be from Sept. 11 to October 9th. There will be an official museum party for the show on August 14 which 200 people typically attend. Hundreds more will see the pictures during the course of the exhibition. The gallery will select for exhibition approximately thirty of the photographs that we submit. At our MSSC meetings, we will vote on the pictures to be sent to the gallery for their final selection.

The Art Center Curator of Photography, Phil Lohmann, suggests that photographs that show known objects in a new perspective would be especially interesting. Although abstract pictures of polarized materials are beautiful, and some should be included, many other media show abstract images. The gallery is particularly interested in pictures that are unique to microscopy. Electron and other types of modern photomicrographs are also of great interest. The material need not be new, for example, some of the superbly prepared slides from previous centuries would be very interesting, along with their historical description.

Our selection at the meetings will be by popular vote, assigning a rating to each picture shown. The easiest format for display at the meetings is the 35 mm slide, although prints can also be submitted. The pictures that the gallery selects for display will need to be printed, matted and framed. During the exhibition, members can offer their pictures for sale with a percentage going to the gallery.

For those members attending the April meeting, just bring your slides or pictures with you. For those not able to attend, such as corresponding members, send your photographs to Jim Solliday. All will be returned.

James D. Solliday
1130 S. Austin St.
Santa Ana, CA 92704
Tel: 714-775-1575
e-mail solliday@juno.com

It is hoped that many of our corresponding members will participate, so that we will have a representative selection of the photographic and artistic talents of the whole membership.

Editor's Notes

Early Publication of this Issue

This issue is published earlier than usual because I will be traveling on the East coast for the next three weeks. Unfortunately, this means that it is too early to include some items such as George Vitt's review of the, still to come, April workshop, Jim Clark's Lab Report and Herb Gold's "Other Voices," review of the publications of other microscopical societies. These will appear in the May issue.

Page Numbering Error in March

The March Journal was misnumbered, having the same starting page number, 23, as the February issue. For those who keep a year's issues, included in this mailing is a new front page for the March issue with the correct numbers in the table of contents. Please renumber your March issue accordingly, from page 45 to 64. Apologies from the editor for the error.

April Workshop

The special topic of the April Workshop on Saturday, April 4, 9 AM, will be polarizing microscopes. Everyone is encouraged to bring their polarizing or petrological microscopes for the "show and tell" session. Other items are, of course, also welcome.
Steve Craig's Lab. 3455 Meier St, Los Angeles, CA.
Tel: 310-397-8245.

Gaylord E. Moss