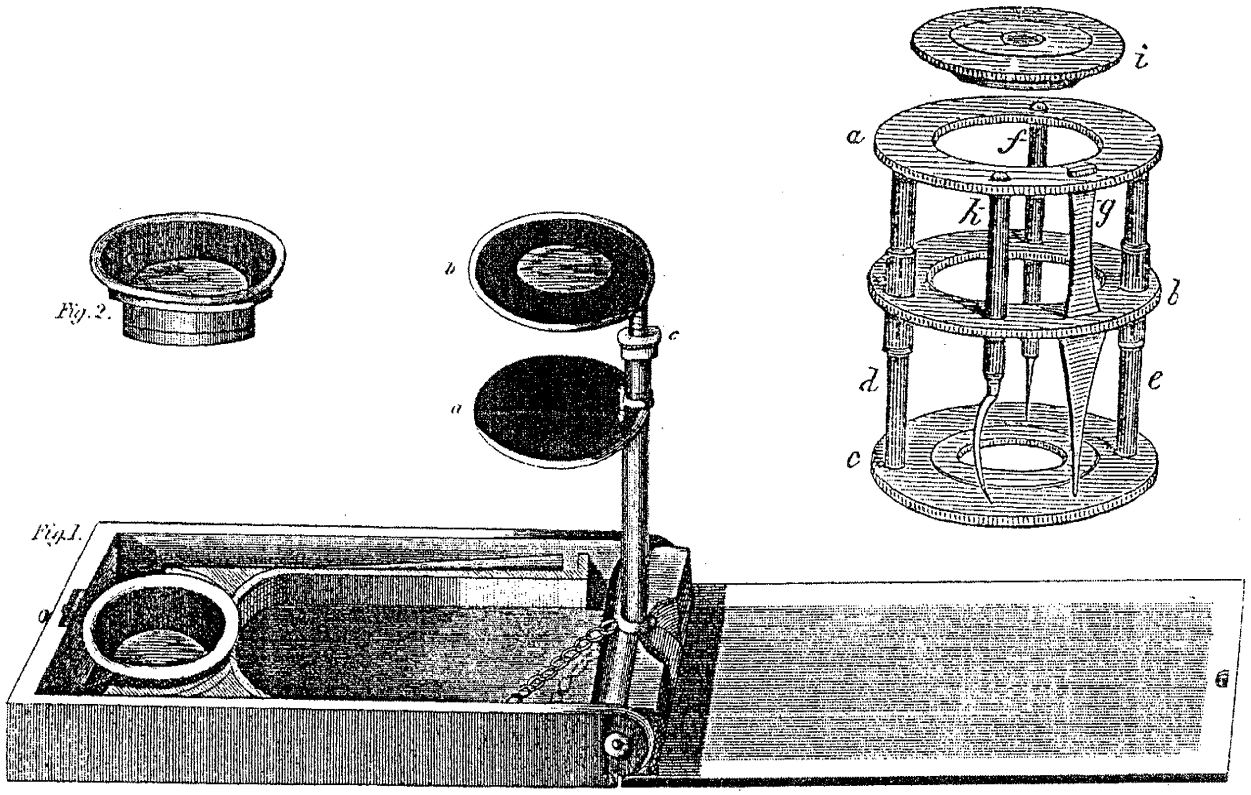
Journal of
THE MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA
Volume 4 Number 5 May 1999

WILLIAM WITHERING (1741 - 1799)

Physician, Botanist, Herbalist, Mineralogist

The Man and His Microscopes

Stuart L. Warter



In the Eighteenth Century, scientific disciplines, as we know them today, hardly existed. There was not the great body of hard facts that we now have to master, but more of a general curiosity about things poorly known and even less well understood; lines between present day areas of specialty were blurred, and there was much to wonder at. Men were not so much scientists, but natural philosophers, and thus were adept in many areas of study. In England, most who became prominent in science were men of means or of the cloth, with the time to devote to their pastimes; there were many dilettantes as well. Elsewhere, there were few "full time" scientists, except in European Universities (in the new United States, the most prominent men of science led other lives - they were the likes of David Rittenhouse, Benjamin Franklin, Thomas Jefferson, and even George Washington - and American science lagged far behind).

One such man was William Withering, who went to Edinburgh to study medicine under another such man, William Cullen, who as Professor of Medical Chemis-

try, had extensive experience with the use of herbal remedies in the treatment of sick patients, was a prolific author, and had other interests as well, all of which had a deep and lasting influence on young William, his pupil, who completed his formal training in medicine and botany in 1766.

As a physician, Dr. Withering had encountered and followed up on the use of folk medicines in vogue among the populace of the time. He set up daily "surgeries" for the poor, and experimented with remedies and dosages. In particular, he was impressed with the record of a Shropshire herbalist in successfully treating "dropsy" (an often fatal accumulation of fluids in the tissues and cavities of the body); the woman had used a mixture of herbs, which included an extract of foxglove. Withering experimented with the mixture, and after analyzing over 200 case histories over a 10 year period, published in 1785 *An Account of the Foxglove and Some of its Medical Uses*, (Fig. 1) in which he established the use of digitalis as a remedy for the condition and its underlying causes, and for which he achieved lasting fame as "the father of experimental pharmacology." But the discovery and introduction of digitalis into mainstream medical practice was not his only achievement.

Torbern Olaf Bergman was another natural philosopher who was Professor of Physics and Chemistry at the University of Uppsala, and who was distinguished as a chemist, botanist, mineralogist, physicist, and mathematician. He was a prolific author, several of whose books were translated into English, and which proved to have considerable influence in the development of geological and other scientific thinking of the day. One of the first of his books to be translated into English was his *Outlines of Mineralogy* in 1783, and the translator was none other than William Withering (another was his *Physical and Chemical Essays* in 1788; not coincidentally, the translator of this work was Withering's old professor, William Cullen). This was not the only manifestation of his interest in mineralogy, as he is known for recognizing the uniqueness of at least two crystalline minerals, Anglesite and Witherite.

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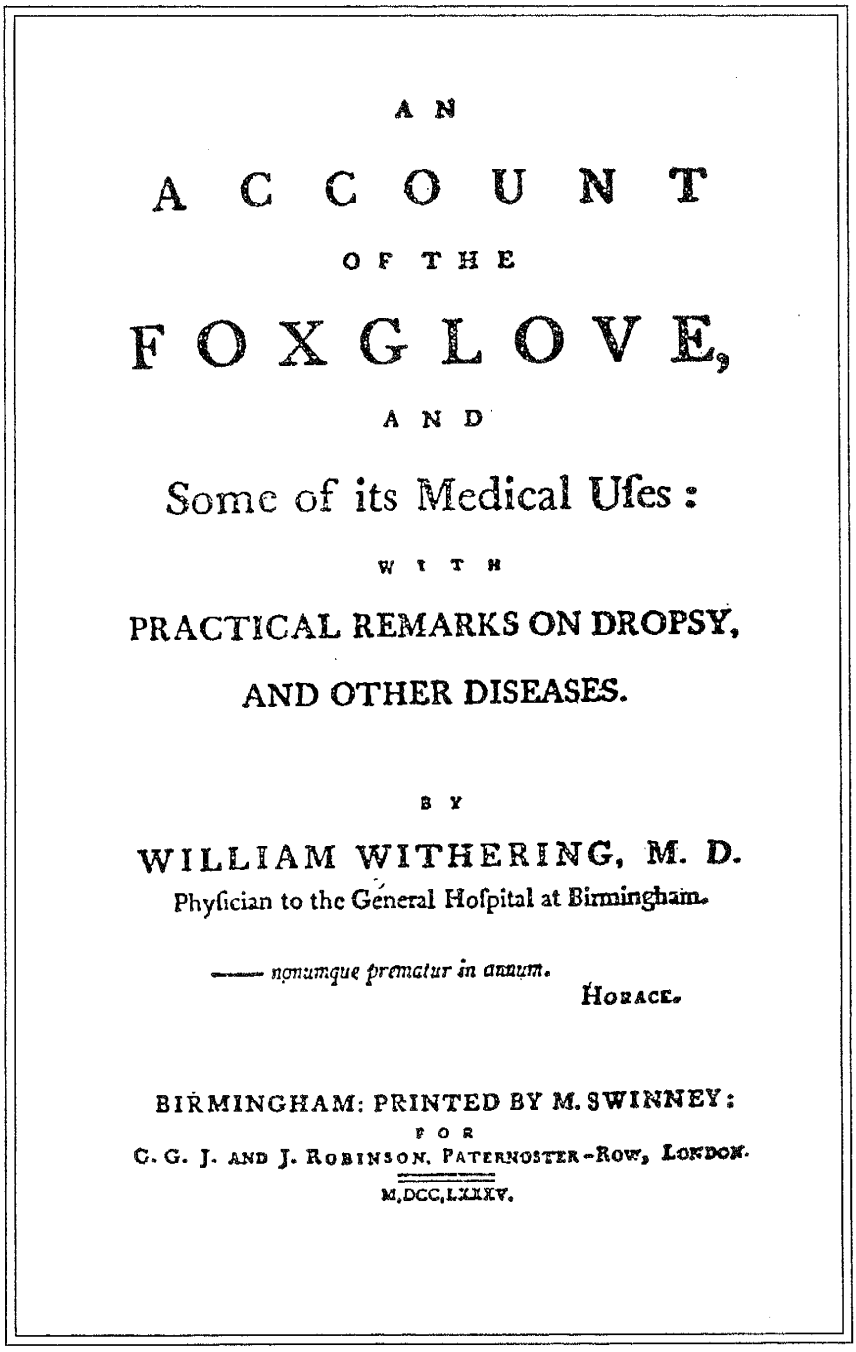


AN

ACCOUNT

OF THE

FOXGLOVE,

AND

Some of its Medical Uſes:

WITH

PRACTICAL REMARKS ON DROPSY,

AND OTHER DISEASES.

BY

WILLIAM WITHERING, M. D.

Phyſician to the General Hoſpital at Birmingham.

—— *nonumque prematur in annum.*

HORACE.

BIRMINGHAM: PRINTED BY M. SWINNEY:

FOR

C. G. J. AND J. ROBINSON, PATERNOSTER-ROW, LONDON.

M,DCC,LXXXV.

Fig. 1 Title page of Withering's most famous medical work.

Anglesite, an orthorhombic form of lead sulfate, was discovered by Withering in a copper mine in Anglesey, England in 1783, but was not so named until 1832. Witherite was recognized by Withering as a distinct mineral, an orthorhombic form of barium carbonate, in 1784, and later named in his honor.

Withering made another, more significant contribution to the science of the day by translating into English the Linnaean descriptions of plants that occurred in Britain, and using them to form the core of his landmark work, *A Botanical Arrangement of all the Vegetables naturally growing in Great Britain*, which appeared in 1776. There were two additional editions before his death in 1799, and a total of at least 14 editions with varying titles by 1877. The fourth, (Fig. 2) and later editions, were prepared by his son, William, Jr. Linnaeus' *System of Vegetables* itself was not translated into English until 1783, probably by Erasmus Darwin. Withering's treatise reached four volumes; a more ambitious work, Sowerby's *English Botany,* with text by James Smith and color plates by James Sowerby, began to appear in 1790, reaching completion at 14 volumes in 1814, and out of the reach of any but the most affluent. Withering's work was important for two reasons: it provided a substantial introduction to the Linnaean system for plants - the first in the English language - and made widely available a thorough compilation of British botany, which aided immeasurably in the popularization of that science in Great Britain.

Withering's botanical volumes included a primer for the study of botany, encompassing a dictionary of botanical terms, and instructions for the study, dissection, preparation, and classification of plant specimens. Withering himself had designed a small, pocketable dissecting microscope of brass to aid in plant study, and this was promoted in the first editions of his book. Before his death in 1799, he had designed a second, simpler microscope that folded into a flat wooden case, the better to fit the pocket, and which replaced the original in his (son's) books. While other, perhaps more suitable microscopes had been designed by others, both of these instruments enjoyed a long life, perhaps as a result of his promotional efforts by recommending them for use in his widely popular books, and of their simplicity, which resulted in their low cost.

Withering's first microscope was announced in the first edition of his botanical arrangement in 1776. Coincident with the publication of the second edition in 1787, it was also described and illustrated by George Adams in his 1787 *Essays on the Microscope.* Adams' description and illustration are reproduced here (Fig. 3), as Withering's first or second editions were not available for examination by this writer. A different illustration of what appears to be the same instrument appeared in Queckett's 1848 *Practical Treatise on the use of the Microscope,* (Fig. 4), but the description differs significantly. It is this illustration that is repeated in later works by other authors, and some apparent misinterpretations may be traceable to this source. According to Queckett, that design was still in production in 1848. Many modifications of this design had appeared over the years, most probably in the first half of the Nineteenth Century, and the original design seems to have been largely forgotten .

As described by Adams, the microscope originally consisted of three circular brass plates supported by two rods. The central plate, which constitutes the dissecting platform, slides up and down along these rods. The lower plate has three receptacles, while the upper and middle plates are pierced by corresponding holes or slots to accommodate three dissecting tools: forceps, teasing needle, and scalpel, all of which are stored in the instrument itself (which in turn is usually kept in a fishskin or leather covered cylindrical pasteboard case). There are two lenses, each housed at opposite ends of the instrument. The lenses are of different powers, the one uppermost at any moment was the one to be used; the instrument had to be inverted to use the other. The stage slides up and down to compensate for the differing focal lengths of the lenses. In order for the tools to be removed, the top lens, whose knurled flange was as wide as the plate into which it was screwed, had to be removed because it blocked the removal of the tools it was intended to retain. Queckett had described three supporting rods; examination of his figure shows he confused one of the tools with a support - an error he corrected in his second edition. He also interpreted the lower lens as a fixed horizontal mirror - a view he did not change in his next edition.

In later versions developed by others, probably mostly in the Nineteenth Century, the top plate was eliminated, and a bar was substituted, into which a stack of Carytype lenses was screwed. The bottom lens was eliminated and the disc shaped plate became a threaded ring, into which various items could be screwed. Shorter tools were housed between the center and bottom plates, so that lifting the middle plate would allow the tools to be freed from the bottom. In a few cases a substage mirror was suspended between the vertical bars. Occasionally, a compound body was added - forming a pattern that, with slight modification, was even enlarged in several stages by French manufacturers, until eventually a full sized microscope was reached!

Some of the known forms of the instrument are as follows:

1. Original pattern, with scalpel, needle, and an ivory slider instead of forceps (*Whipple Museum Catalog 7).*

AN

ARRANGEMENT

OF

BRITISH PLANTS,

ACCORDING TO

THE LATEST IMPROVEMENTS

OF THE

Linnæan System;

WITH AN EASY

INTRODUCTION TO THE STUDY OF BOTANY.

ILLUSTRATED BY COPPER PLATES.

BY WILLIAM WITHERING, M.D. F.R.S.

Member of the Royal Academy of Sciences at Lisbon; Fellow of the Linnean Society; Honorary Member of the Royal Medical Society at Edinburgh, &c.

THE SIXTH EDITION,

IN FOUR VOLUMES:

CORRECTED AND CONSIDERABLY ENLARGED

BY WILLIAM WITHERING, ESQ. F.L.S.

Extraordinary Member of the Royal Medical Society of Edinburgh, &c. &c.

"*Primus gradus sapientiæ est res ipsas nosse.*" LINN.

"*Increscunt quotannis Scientiæ, emendantur quotidie, et ad fastigium suum optatum sensim sensimque, plurium virorum opera et studio junctis, feliciter properant.*" THUNBERG.

VOL. I.

LONDON:

PRINTED FOR CADELL AND DAVIES, CUTHELL AND CO., LONGMAN AND CO., RIVINGTONS, BALDWIN AND CO., LACKINGTON AND CO., SHERWOOD AND CO., I. RICHARDSON, S. BAGSTER, MAWMAN, P. W. AND G. WYNNE, R. FENNER, HARDING, OGLES, WHITMORE AND FENN, T. HAMILTON, BLACK AND SON, J. RICHARDSON, TAYLOR AND HESSEY, J. WALKER, G. ROBINSON, W. REID, R. SAUNDERS, C. BROWN, AND

ROBERT SCHOLEY.

1818.

Fig. 2 Title page of the 1818 sixth edition of Withering's botanical work.

DESCRIPTION OF DR. WITHERING'S BOTANICAL MICROSCOPE, Fig. 1, Plate VI.

This little inſtrument is repreſented at Fig. 1, Plate VI. It conſiſts of three braſs plates, A, B, C, which are parallel to each other; the wires D and E are rivetted into the upper and lower plate, which are by this means united to each other; the middle plate or ſtage is moveable on the aforeſaid wires, by two little ſockets which are fixed to it.

The two upper plates each contain a magnifying lens, but of different powers: one of theſe confines and keeps in their places the fine point F, the forceps G, and the ſmall knife H.

To uſe this inſtrument, unſcrew the upper lens, and take out the point, the knife, and the forceps; then ſcrew the lens on again, place the object on the ſtage, and then move it up or down till you have gained a diſtinct view of the object, as one lens is made of a ſhorter focus than the other; and ſpare lenſes, of a ſtill deeper focus, may be had if required. This little microſcope is the invention of Dr. Withering, and is deſcribed by him in his "Botanical Arrangements." It's principal merit is it's plicity.

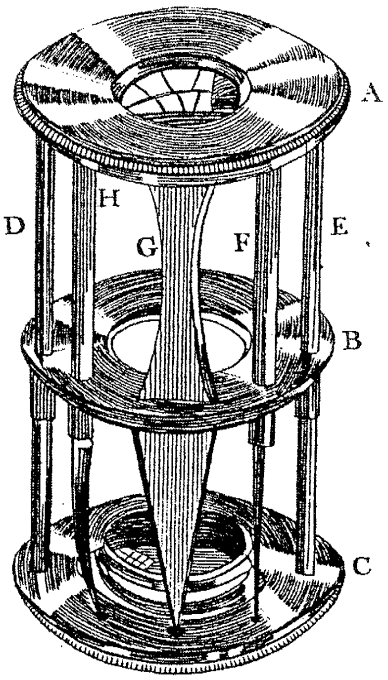


Fig. 3. Withering's original botanical microscope (from Adam's 1786 1st Edition).

In 1787 the *Microscopical Essays* of the younger Adams were published, in which were described all the instruments at that time in use. Of the single form, we have Wilson's, shown at fig. 8; those of Ellis, and Lyonet; also that of Dr. Withering, represented by fig. 18, which even now is manufactured for sale; it consists of three brass plates *a b c*, parallel with each other, to the upper and lower of which three stout wires *d e f* are rivetted; the middle plate *b*, which forms the stage, is made to slide up and down on these three wires. The upper plate *a* carries the lenses *i*, the lower one *c* the mirror. Into the stage a dissecting knife *k*, a pointed instrument *f*, and a pair of forceps *g*, are made to fit, and can be readily taken out for use by sliding the stage down nearly to the mirror; this instrument was recommended by Dr. Withering, and was first described in his *Botanical Arrangements*, its chief merit being its simplicity.

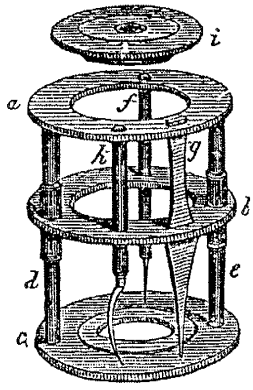


Fig. 18.

Fig. 4. Queckett's 1848 drawing of Withering's original botanical microscope.

2. Original pattern, but lenses without flanges, screwing directly into fixed end plates. No provision for tool storage (private collection). Fig. 5.

3.Top plate lacking, a bar with stacked Cary-type lenses substituted, and lower plate a ring. (private collection) Fig. 6..

4.As above, on three small feet (MHS, Oxford - in Turner, *Collecting Microscopes*).

5. As above, with substage mirror between rods (*Whipple Museum Catalog* 7).

6. As above, with mirror and body tube (in Nuttall, *Microscopes from the Crisp Collection*).

There are no examples in the Royal Society or Billings Collection catalogs.

Withering's microscope had been criticized as being clumsy and inconvenient, no doubt providing the incentive for the many "improvements" to be made in later years by others.Adams' review of the first design had not been favorable, its only considered virtue being its simplicity, but the instruments favored by Adams

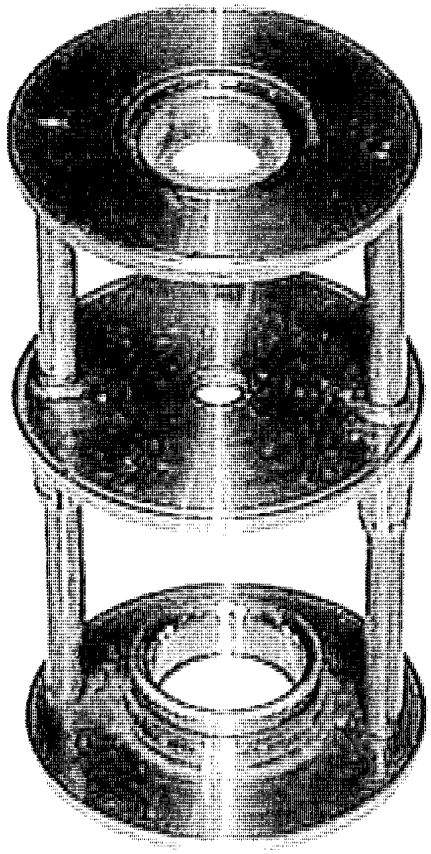
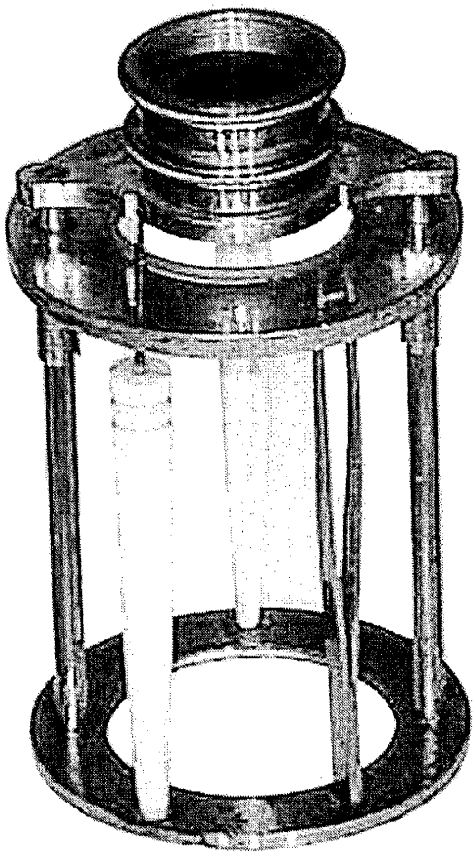


Fig. 5. Later version of the original design, maker unknown.



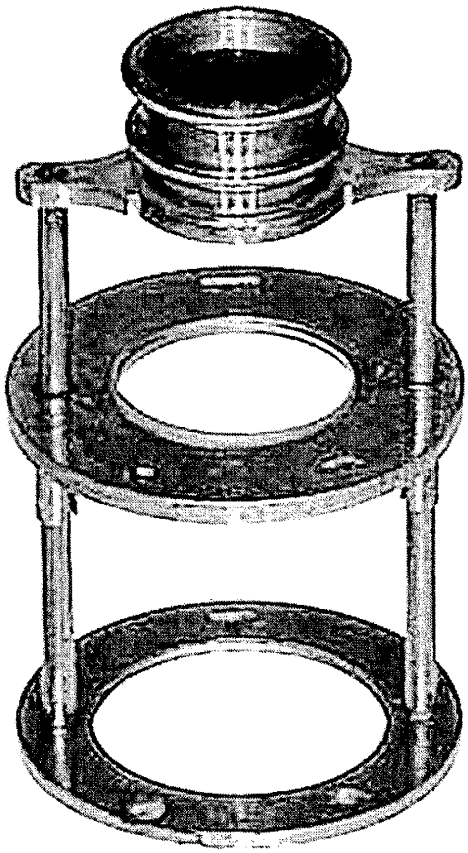


Fig. 6. Later popular "improved" redesign, with and without tools in place (tools not original). Maker unknown.

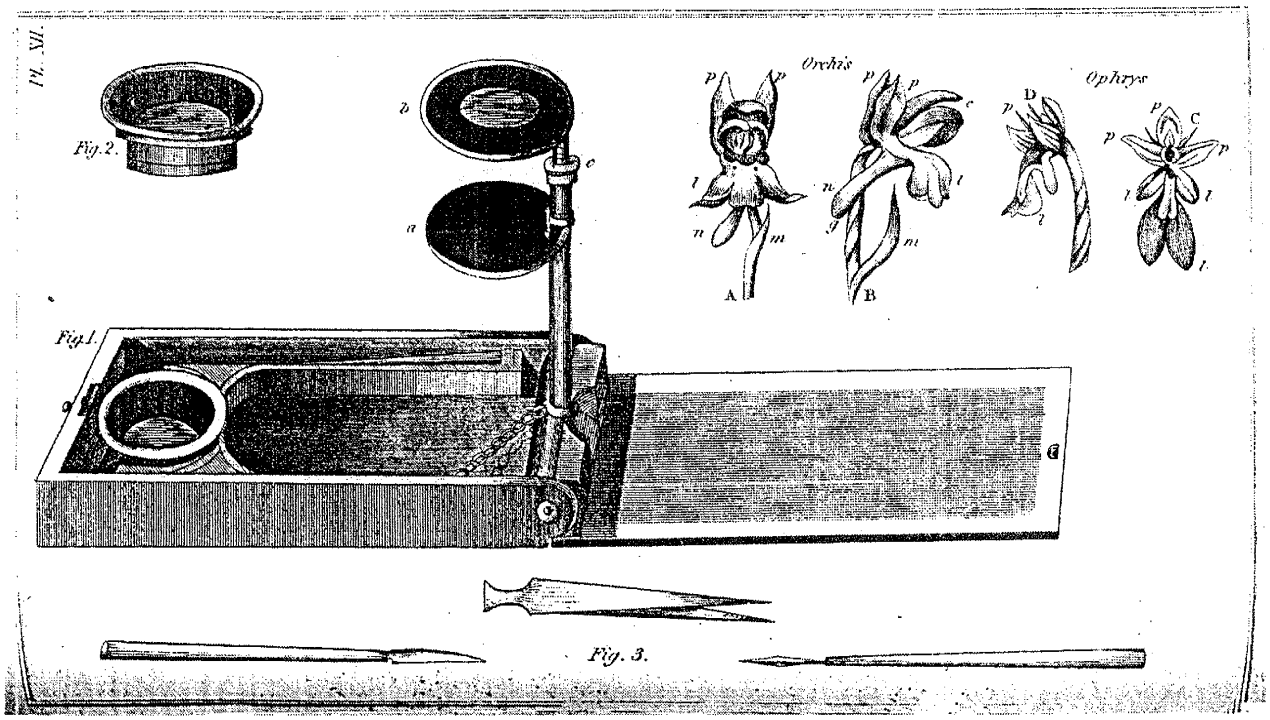


Fig. 7. Withering's second botanical microscope *(from the sixth edition of An Arrangement of British Plants).*

sacrificed the pocketability and the very simplicity that made Withering's instruments so successful. With the third edition of the botanical arrangement in 1796, the brass microscope was no longer featured, and a simpler, flimsier, more ephemeral design was substituted, with a pair of ivory discs - one for the lens, and one for the stage - mounted on a post that folded up into a flat, pocketable, wooden box (Fig. 7). Originally, the microscope was erected by a chain as the box opened, but later a spring was substituted (Fig. 8). This design was carried at least as far as the 1818 sixth edition, which included an ad for the instrument from its latest manufacturer (Fig. 9). Brian Ford, in *Simple Lens* has been exceptionally hard on this instrument, considering it so poor that "many of the illustrations in his [Withering's] book ... were surely carried out with a better instrument by far." Whether the instrument available to Ford for examination was typical of whatever quality at least the early examples may have had (when more care might have been taken in their production) is largely immaterial, since when Withering was doing the bulk of his work the wooden instrument did not exist, and he would have been using the brass instrument instead. Ford's statement is probably correct, in that when the illustrations were prepared, they were undoubtedly not done in the field, and a better instrument may in fact have been used.

PLATE XII.

BOTANICAL MICROSCOPE.

FIG. 1. Represents the Botanical Microscope in its present improved state.

FIG. 2. Is a Magnifying Glass, to be held in the hand, and applied close to the eye, whilst the object to be examined is brought immediately under it, at such a distance as shall be found to give the most distinct vision.

FIG. 3. Shews the Dissecting Knife, the Triangular Needle, and a pair of small steel Plyers. These instruments are useful in the dissection of flowers, even when the plants are so large as not to require magnifying.

When the parts in question are very minute, and require a nice and careful dissection, place the microscope upon a table, and raise it, if necessary, on a book or two, so that the eye may be applied with ease immediately over and close to the glass (*b.*) Lay the object to be examined on the dark stage (*a.*) and turn the screw at (*c.*) until you see the object upon the stage perfectly distinct. With the needle in the left, and the knife in the right hand, the elbows resting on the table, proceed in the dissection at the same time that the eye is applied to the glass (*b.*)

When the microscope is shut up, the instruments and the hand-glass are to be put into the cells destined to receive them, and the whole forms a shape and size convenient to carry in the pocket.

William Withering was justly famous in his own time, for his medical, botanical, and literary accomplishments; he was elected to Fellowship in the Royal Society by his peers. His simple, inexpensive, pocketable dissecting microscopes were

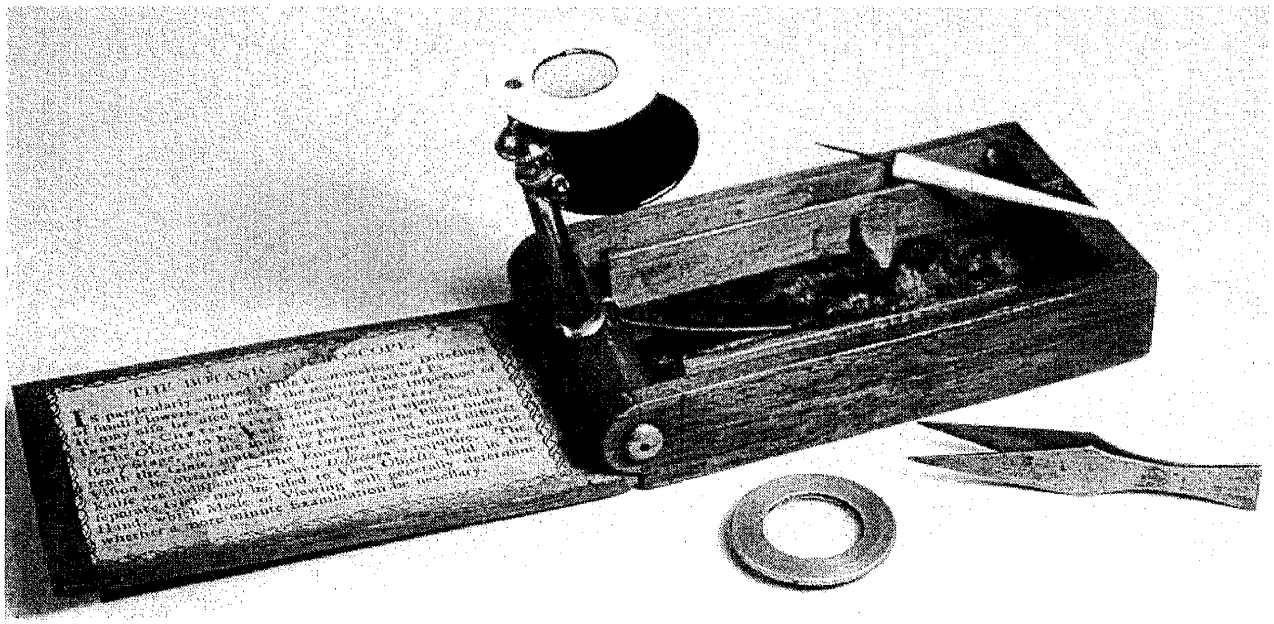


Fig. 8. Withering's second form, with spring tension mechanism replacing chain. (Photo courtesy J.D. Solliday).

THE

BOTANICAL MICROSCOPE

INVENTED BY

DR. WITHERING,

Which is more portable and convenient than any other,

IS NOW MANUFACTURED BY

MR. BEILBY, OPTICIAN, CLARE STREET, BRISTOL;

And may likewise be had of the Publishers of this Work, and of other Booksellers.

Fig.9. 1818 advertisement for the second botanical microscope (from the sixth edition of ***An Arrangement of British Plants).***

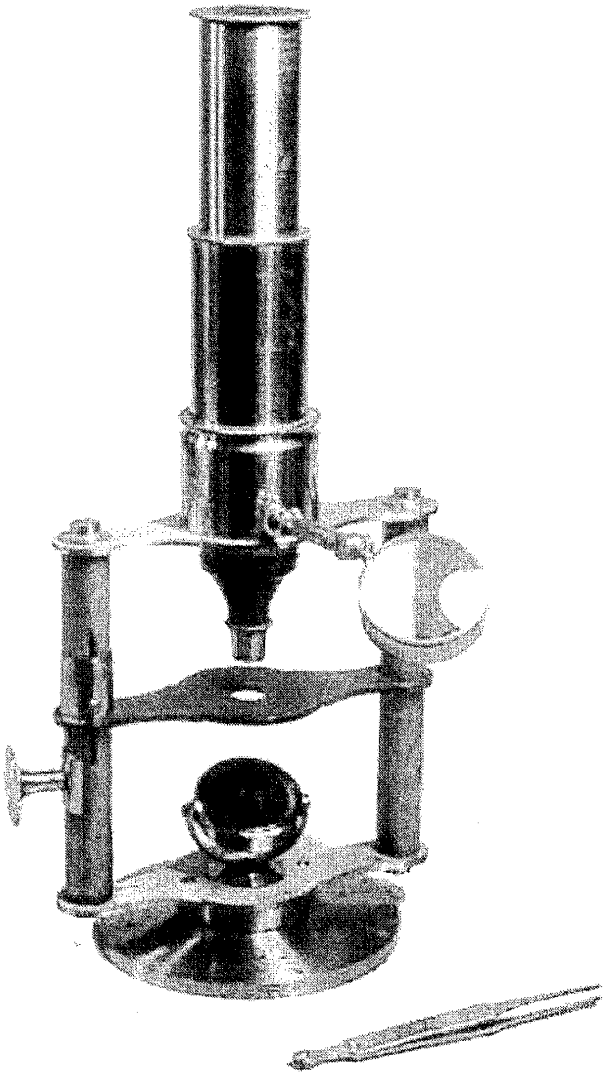


Fig. 10. Compound microscope derived from the first Withering design, maker unknown (probably French) (Photo courtesy J.D. Solliday).

of no particular significance in the history of the development of the microscope, but were of great importance in the popularization of botanical science and of the use of easily carried microscopes in the field. Perhaps most importantly, they facilitated opportunism - they could simply be carried about on one's person to be available in case they should be needed.

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■

WORKSHOP of the Microscopical Society of Southern California

by: **George G. Vitt, Jr.**
Date: **Saturday, 1 May 1999**
Location: **Ernie Meadows'** residence; 23 persons attended

1. **Steve Craig** told us that one of member Jerry Adomian's photomicrographs graces the front cover of the periodical *Microscopy Today*.

2. **John de Haas** announced that he will give a demonstration of microtomy techniques at his home after the workshop.

3. **Barry Sobel** exhibited a Ross Eclipse microscope with two objectives and swing mirror. His second microscope was a Watson & Sons (c.1912, Edinburgh) student model with "holos" objectives and eyepieces, four "parachromatic" objectives (with OI lens), with the same type of stage as on the Ross. He also showed three objectives by Charles Chevalier, c.1830, which were made of two air-spaced doublets with a diaphragm between them.

4. **Jim Solliday** gave us a definition of a "student" microscope of the 19th century, stressing that it was the type preferred by those who used the microscope extensively and, therefore, needed many accessories for them. Jim then showed a cased folding 'English Medical Microscope' c.1880 by Parkes & Son, Birmingham, with a sliding objective for quick interchangeability.

5. **Alan Bishop** showed a late Zeiss stand No.4 with a Beck type vertical illuminator and three Zeiss "apo" lenses, a 180mm adjustable draw tube, and with an x-y stage - all in pristine condition. The substage condenser os of the 'dropout' style where the substage diaphragm swings out and the condenser is removed. Its large 'E' stage is uncommon on small Zeiss stands such as this.

6. **Jim Clark** reported on his recent trip to Detroit MI where he went to the Ford Museum to research the history of machine shops and tools used in American industries. He then showed a B&L metallurgical mic. with a long lens-to-stage distance for accommodating large samples, and a cased set of B&L objectives and projection eyepieces. Jim then showed a late Leitz metallurgical microscope with accessories.

7. **Leon Stabinsky** showed a tiny Jena "Extra Microscope" in a 3x3x1" wooden case, c.1930. He then showed a workable reproduction of a brass kaleidoscope, c.1990, made to Brewster specifications by 'Van Kort Instrument Maker'. He then showed a Nikon miniature 6x15 center focusing porro prism binocular, in a zippered case. He reported that, at the height of popularity (1950-60) of this type of binocular, that this model was of much better quality than the rest. Leon then exhibited an NBS Standard wet-dry bulb hygrometer, which is used for standardization of hydrometers. It was invented by Assman in 1885. He related that he was able to replace its missing thermometer with the exact original model, through a search. Leon reported that ebay auction provided the hygrometer for $37, the replacement thermometer was $200 and that, new, the outfit cost $1100. Not bad, Leon.

8. **Larry Albright** showed a specially bound copy of the year's MSSC Journal. This superbly crafted volume which can be ordered from a certain Beverly Hills bookbinder for $60. The book is absolutely deLuxe and must be seen to be fully appreciated. (See our Editor, Gaylord Moss for details). Larry reported that Brian Ford will be here in the near future and that he could give us a lecture for a fee of $500. This was considered rather steep for our limited budget, but might be arranged through members' personal contributions, as had been done before.

9. **Gaylord Moss** gave further details on the binding of the MSSC Journal. He announced that his new Hewlett-Packard Model 2100 flat-bed scanner, with its resolution capability of up to 1200 l/in, is giving excellent results with B&W imagery destined for illustrating articles in the Journal. He showed comparison image scans done at 600 l/in and 1200 l/in to show the difference in quality, and described the effects on the printing process of different types and resolutions of 'screen'.

10. **Richard Jefts** described in detail the methods he used in photographing agatized microscopically sized Ostracods encased in fossil Turitellas. See the April 1999 issue of the MSSC Journal for full details.

11. **Gary Legel** brought his cased mint Leitz Dialux mic. with four pairs of oculars and a mono tube for camera use ($1250).

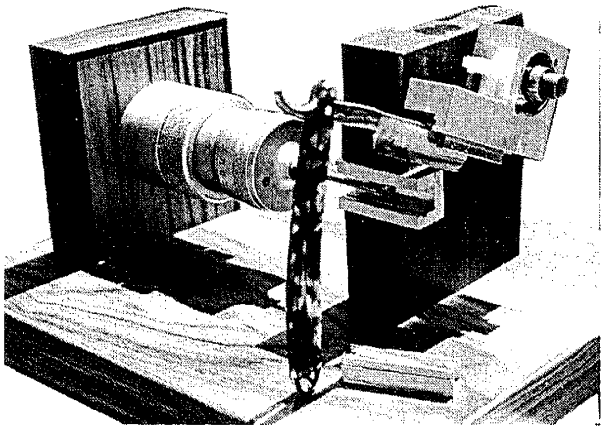
12. **Bill Hudson** showed an excellent book, *Free Living Fresh Water Protozoa* by Paterson. All photos in this fine book were done with Nomarski DIC.

13. **Alan de Haas** showed a most unusual and rare cased micro-hardness tester, c.1940-50, by A/O. The unit fits all A/O plain square stages with a receptacle for a spring-mounted diamond indentation point which can be moved by a micrometer drive (8 turns/mm). An integral spirit level checks the leveling of the device.

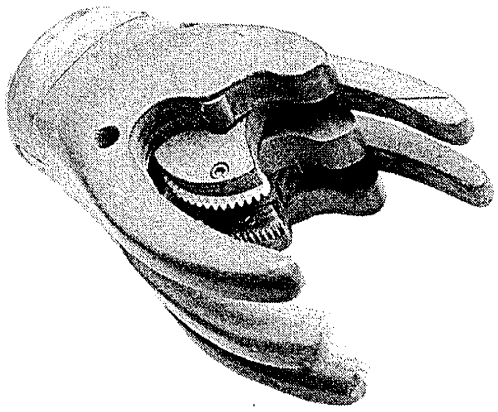
Continued on page 103

Member Profile

Ernie Meadows



Microtome built for his grandson.



Prototype prosthetic hand for limb-deficient children.

When Gaylord asked me to do a profile for the bulletin, I knew that this would be a challenge. Unlike John Barrymore, who knew which was his "good side" and always insisted that it be addressed to the camera, I, indeed, have no good profile - I am just an average old geezer with little hair and less of a story to tell.

None-the-less, Gaylord persisted - so the following is a brief look into the background story of that charming, urbane, sophisticated person about whom you have all been so curious.

My life started at about age six when my family moved to California. Prior to that time, there was little of consequence I had accomplished - except create a piece of family folklore about how, at the age of five years, I was sent off to kindergarten and lasted until lunch time. The entertainment there was rather thin, and I had an electric train, erector set, and lots of stuff to entertain myself at home - so I never went back. I started school at the first grade in Los Angeles.

A psychiatrist, child counselor or student of social deviancy might have a field day with this, but, my pattern at school was established and I was stuck with it. Several schools later, I attended Beverly Hills High School and found great teachers who really turned me on - to be myself. At sixteen, I graduated and started UCLA to study engineering. Don't ask me why. I had no desire to study hard and all the pre-engineering and science courses required a lot of study. My problem, I later decided, was that school before had been too easy; I made high grades without cracking the books, and had developed no discernable study habits, along with a rather smug opinion of myself.

The year and a half at UCLA, and then two and a half year stint in the U.S. Navy. was a major education for me. I found out about "people" who were not brought up in Beverly Hills. What a revelation to eat with some of my fellows on board ship who were taking the Navy silverware home.

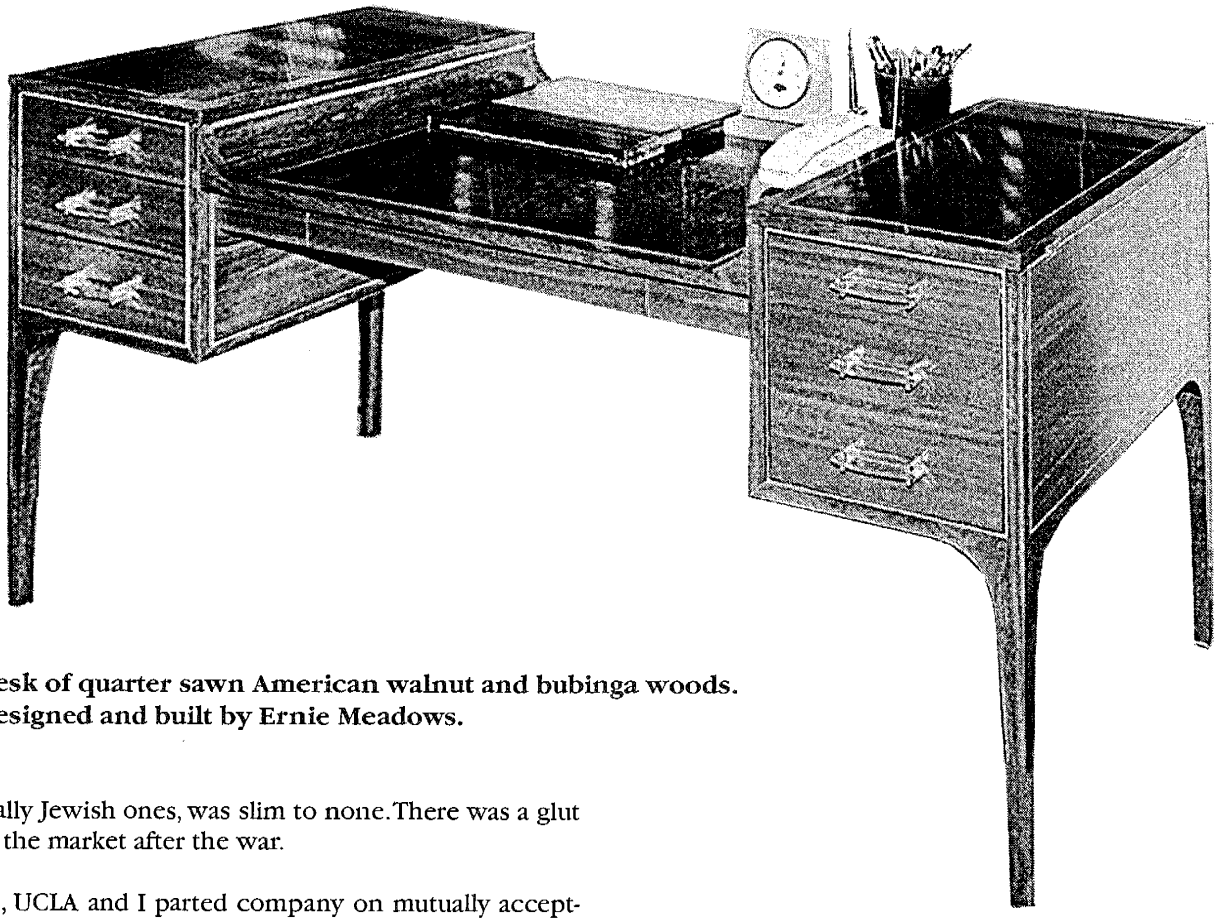
To go back in time a bit, two or three rather important things happened to me when I was about ten years old. One day, in the fourth grade, I overheard two of my teachers talking about me - and what I heard changed my life. I had suspected that my parents were over protective of me, but got proof positive of it that day. I made up my mind from that day forward, to make my own decisions - and so it has been to this day.

My grandfather came to live with us at about that time, and I learned a great deal about life and how to live it from him. He was, as was my father, an immigrant from Russia. Unlike many others, they both had good educations, were fluent in several languages and were voracious readers. My grandfather taught me the skills of reading difficult material and exploring a broad spectrum of ideas. By ages ten through twelve, I was discussing culture, religion, philosophy, gardening, mathematics, economics and anything else that came up.

When he died, I lost a great friend and source of knowledge.

I returned to UCLA after the war (that is the Second World War, you know, the good one) and studied a broader range of subjects: philosophy, zoology, and girls, in addition to the standard engineering classes. I was a lousy student.

One summer vacation, I thought it would be a good idea to scout out a job for when I graduated. I found, to my surprise, that the market for engineers, espe-



Ed. photo. Image distortion and other correction in Photoshop by George G. Vitt, Jr.

Desk of quarter sawn American walnut and bubinga woods. Designed and built by Ernie Meadows.

cially Jewish ones, was slim to none. There was a glut in the market after the war.

So, UCLA and I parted company on mutually acceptable terms and - and what? I hadn't a clue about what to do. Design had always been a sort of back-burner interest, so I thought it might be an interesting area to pursue.

Not being overly aggressive about my search, I picked up the Beverly Hills phone book and read the yellow pages. The closest thing I could find was a business that offered specially designed custom furniture. It was actually located in Culver City, about 3-4 miles from home. So, I drove down, met with the owner, told him about myself, and for the magnificent sum of forty dollars a week, I started to work for him. As luck would have it, he had inherited the business from his father who had died suddenly. He had an MBA from Harvard, found his talents underused and wanted to get on with his life.

We became friends, and after a short time, I was working with his clients on design problems, and since it was only a ten employee operation, I was quickly integrated into all parts of the business, including working in the shop.

One day, the owner and I were having lunch, at a terrible Mexican restaurant that he liked, and we got to the point in a hurry that he wanted to get rid of the business; so I bought it from him. This was a Friday, as I recall. We shook hands, went back to the business, signed a bill of sale, I gave him a check and on Monday I was the owner of a small business.

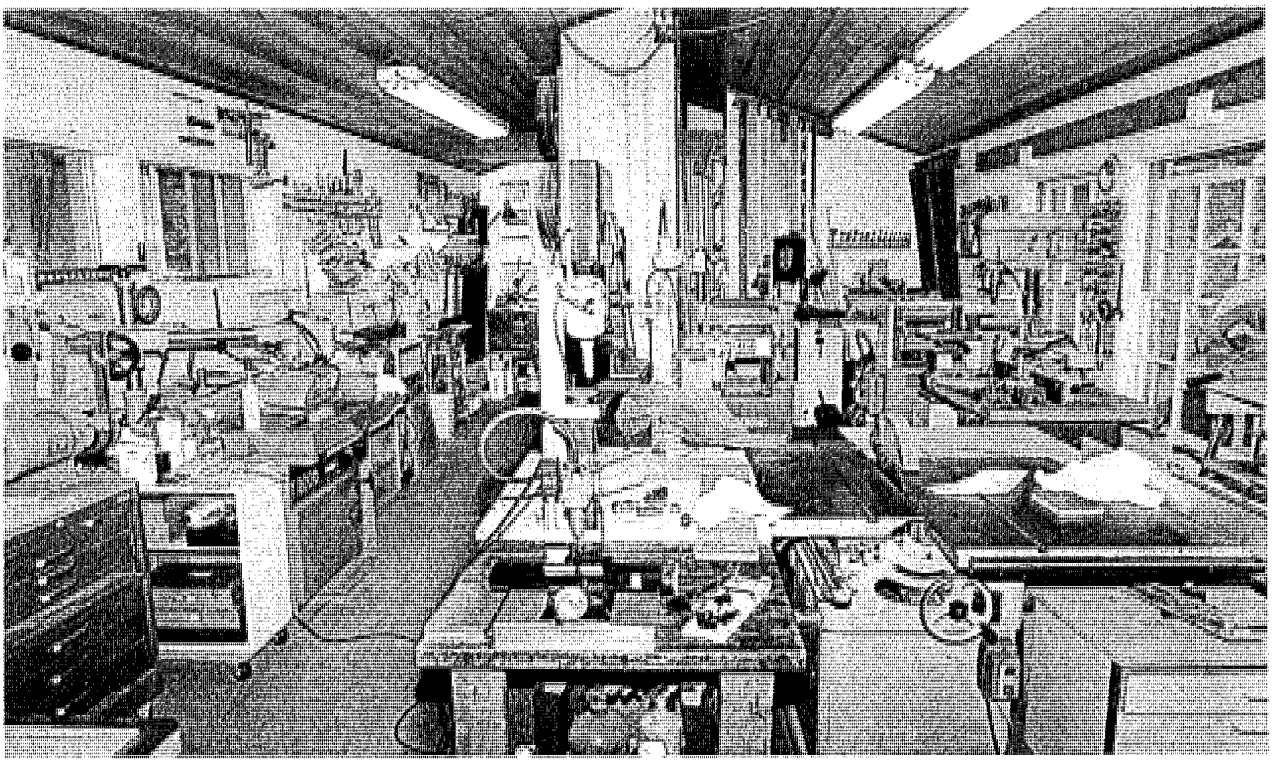
Little by little, I had expanded the client base to include production of technical models, special programs for large companies that required prototypes of products and all kinds of diverse projects. I loved it. I could be creative, and learn from my clients a great deal of design skills that I never acquired in school.

My grandfather's training helped a great deal. I kept my mouth shut and my mind open and my reputation as a problem solver only escalated.

I pushed that envelope as far as I could and had a rather unique niche market business for some thirty years. During this time, I married my wonderful wife, and somehow or other raised three children, several dogs, and managed to find our current, and for the past thirty years, home.

Those of you who have been visitors here have learned of my passion for making furniture. What you may not know is that I also like to paint, do sculpture and write short stories; murder mysteries, and children's books. I have the rejection slips to prove it.

When I retired at age fifty five, it was important to me to have something meaningful to do, so, following the advice of my long deceased grandfather, whose dictum was, "make a difference, the world has to be better for your having been here or there is no justification for life." I started doing volunteer work and that



The Meadows hobby shop (facing toward the woodworking section).

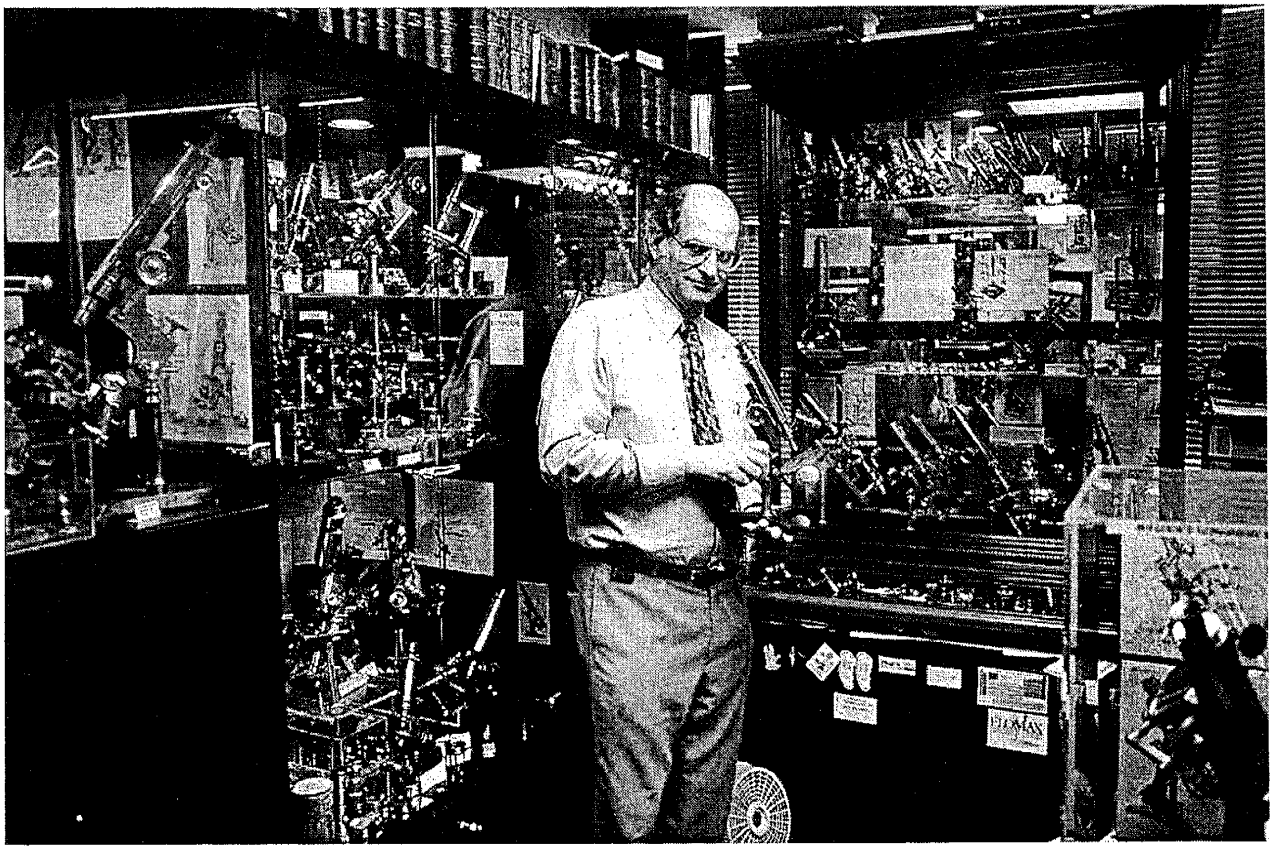
The Meadows hobby shop (facing toward the metalworking section).

justified my hobby shop. So, I spend my time on various projects for aiding handicapped children.

My microscope interest, I must confess, is rather selfish. I decided that my younger grandson was not doing well in school and lacked direction and discipline. He joined me, rather reticently at first, as a student of science via the eyepiece of an old Spencer microscope purchased from the Max Erb Company.

It has been three years now, we are still at it and both of us have benefitted from the project. Especially me-for I have met all of you.

■



Photoshop by George G. Vitt, Jr.

Photo by James D. Solliday

Barry Sobel at his medical office - or world class museum?

Workshop of 1 May 1999 **continued from page 99**

14. **Steve Craig** praised and thanked member Jack Levi for helping him with his shop stuff and various projects and who has also been a good hand therapist. Steve then announced that he had ordered (from a biological supply house) eight pints of various microorganisms and stated that he feeds them with a bit of wheat and oatmeal. He invited members to come over with stoppered vials and take some samples.

15. **Jim Solliday** showed his Compound Monocular, English, 1880 Signed J. Parkes & Son. Patentees. Birmingham. Known as the Parkes English Medical Microscope, with "Sliding" Objectives (RMS, 1880/p.1048). This microscope is provided with a "patent sliding adapter," for enabling the objectives to be changed rapidly without the need to thread the usual Society screw.

Parkes claimed that this arrangement would save time in cursory examinations, such as those normally made by medical men. This adapter is composed of a sprung tube or friction sleeve, which is screwed into the Society thread of the nosepiece. All the objectives are composed of a sliding tube, as well as the usual optical parts.

In use, the objective is simply slid into place and withdrawn the same as a normal eyepiece. If the adapter is removed, any ordinary threaded objective can be used with the microscope. Accompanying this stand are two Parkes objectives, a 1 inch and a 1/4 inch, both with the friction mount in place of the Society thread. The drawtube can be fitted with 2 eyepieces; one is marked "A" and the other "B". The microscope inclines on pins, which are attached to the top of uprights. A stem extends from the bottom of a square stage. This stem holds a double-sided mirror that pivots in its own yoke. The aperture of the stage is fitted with a sleeve, which in turn holds 3 cylindrical stops. The arm attaches to the limb by a dovetail. Coarse adjustment is by friction and the fine movement is by micrometer screw and milled head. Stored in the case is a watch glass and a pare of eccentric tweezers. There is the original magnification chart (Magnifying Powers of Objectives) mounted to the inside of the lid.

The microscope is stored in a very nice mahogany traveling case containing 2 small lids that cover drawer space. The lids are fitted with ivory knobs. The case measures 7 1/4" by 11 3/4" ; lock, but no key. The outfit is in very good overall condition.

■

My Early Adventures with Toy Microscopes,

Discovering the Great Truths of Science, and the Start of a Lifetime Hobby.

Ron Morris

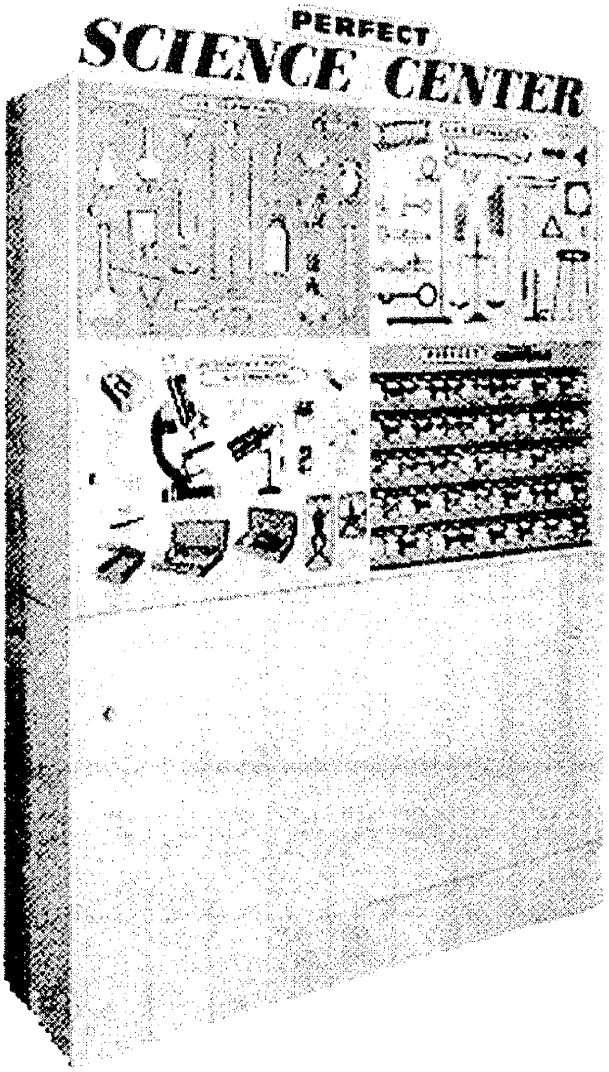


Fig. 1 Perfect display case

Fig. 2 Perfect chemical list.

Many of us today have enjoyed using some of the most modern and sophisticated microscopes available, either at home, or at work. But do you ever remember how special your first simple toy microscope was to you as a child? This article,is a fond remembrance of those early childhood memories which I would like to share with you.

Growing up in the baby-boomer era after the Korean War, I was exposed to many scientific items that were offered for sale at the local hobby and toy stores.

During this time, the great "space race" had begun, and there seemed to have been an orchestrated effort among manufacturers and retailers to make available

decent quality, fully usable microscopes and scientific apparatus for students to use at home in order to inspire and promote an appreciation for science. This, hopefully, would lead the youngster to a career later in science, aerospace, engineering, or medicine.

As a kid, I was thrilled to go to the local shopping center (before malls), and while my folks were grocery shopping, I would hurry over to the "Toy World" toy/hobby store and gaze dreamingly at the science toys on display in a locked glass case. The Perfect Parts Company had nice displays set up in most of the major hobby and toy shops. (Fig. 1) To my young eyes, this was the ultimate in scientific ware.There were glistening beakers, real wood test tube racks and all the glassware and chemicals that you could ever want. This was before I discovered Student Science Services in Burbank, California, but that is another story.

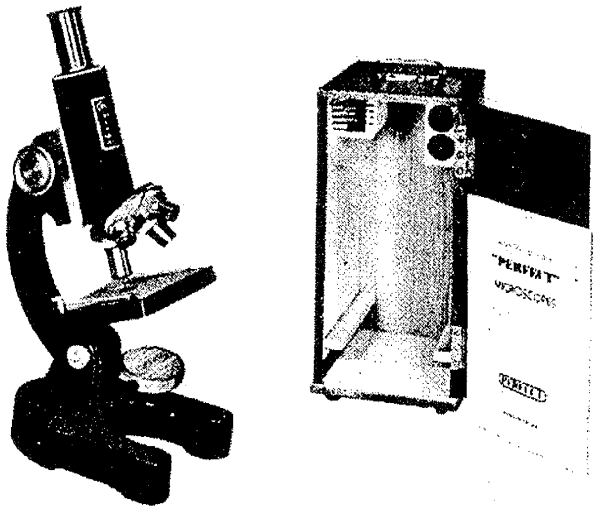
Perfect also had an extensive line of prepared microscope slides that came in little yellow boxes, with such titles as "Honey Bee parts" or "Pond Animals." I eventually managed to buy almost every set they offered.

The prices were affordable, even to a kid like me who cashed in bottles at the local dairy for a nickel apiece. Most of the Perfect brand chemicals came in little 1 ounce bottles for twenty five to thirty cents each (in the 1960's) (Fig. 2) Most of the glassware could be had for a couple of dollars.

I liked going into the store, which had a west-facing glass back door near to the Perfect display case.When the late afternoon fall sunshine hit the glass display, it would be bathed in a brilliant glow of orange light. Everything in the display case would glow brightly, and I would just stare at the goodies, with my jaw dropping. It was akin to a movie showing one of the Egyptian Pharaoh's tombs being bathed in sunlight from a mirror above. The effect would last for only a few minutes, but it was a sight to behold, and to remember fondly, even today.

Best of all were the microscopes! Perfect had a line of "Junior Professional" student microscopes that were made mostly of metal, with a black enamel, or textured black paint coating. Their part numbers were 801 to 805 (Fig. 3). The 805 was the deluxe model with 4 objectives and 2 different eyepieces. which could achieve a total magnification of 900X. It also had a modest substage diaphragm with 5 fixed aperture sizes and multi-color filters.

The 800 series microscopes were pretty basic. They came in a small fitted mahogany box, together with a few slides. Some also had a dissection kit.They were smaller than the more deluxe 900 series microscopes, that came with the laboratory sets (Fig. 4)



805 Four turret — two eyepieces — five position rotary sub-stage diaphragm and concaved duplex adjustable mirror, 50, 75, 100, 150, 200, 300, 600, 900 power, open height 10". Contains 3 prepared specimen, and 2 plain slides, and instruction booklet in wooden sectional carrying case.
Attractively Packed. Complete $40.00

Fig. 3 Perfect Model 805 microscope.

Perfect made, what they called, "Laboratory Sets for the Hobby Scientist." If that description didn't inflate our young egos, I don't know what else could! These Perfect sets, models 901 to 904, cost from twenty five to seventy five dollars and were very complete, with preserved specimens such as: frogs, starfish, crayfish, grasshoppers and even a brine shrimp hatchery.

A full array of dissecting instruments was also included with scalpels, probes, scissors, forceps, etc. Also provided was a fairly complete set of slide making materials, with flat and concave cavity slides, cover slips, labels, Canada Balsam and various dyes. I remember Eosin Red, Methylene Blue, and Acid Red stain, among others.An assortment of chemicals rounded out the supplies, with such things as Boric Acid, Gum Arabic Media, Citric Acid, Sea Salt and Glycerine.

Last, but not least, the more expensive sets had larger, more deluxe sea-green (turquoise) color enameled microscopes, with a zoom eyepiece, and real glass lenses.They were more substantially made than the 800 series student microscopes, being both larger and heavier, with a better quality casting.

The green enamel paint job was excellent, and easy to keep clean. I believe now, that the company that became to be known as Tasco manufactured these microscopes in Japan, not only for Perfect, but for other retailers, including K-Mart, JC Penny, Sears, Roebuck & Co.They were all of similar design, the major differences being in the accessories and the case size.

Fig. 4 Perfect Co. 900 Series Microscope Laboratory Sets.

The early 50's and 60's large sets had mahogany wood cases, but later 70's versions had plastic ones.

One Christmas in the 1960's, I received the deluxe set from K-Mart. It bore the "Focal" Brand name, as did many other optical goods from K-Mart, including binoculars, telescopes, rifle scopes, and cameras.

I had some of the best times of my life using this wonderful set. The microscope had a good feel to it, with a real rack and pinion focusing system, that had nice big chrome knobs. There was a very bright light source built into the base, which used a penlight bulb and 2 AA batteries. An external light source could be used by flipping the bulb housing over so that the back side mirror was in position.

This was my pride and joy and I kept the nice green paint job , as well as the chrome plating on the knobs and stage clips, shiny and clean. Later, to my folk's initial horror, I discovered the joys of cleaning and lubricating the rack and pinion .Well, you have to start somewhere.

I could clearly see bacteria and the flagella of pond life. The field of view was very small, but perfectly usable. The lenses were simple, not compound, but to my young eyes they were just like Apochromats.

The optics were pretty good for the price (around $75 for the whole set). There was also a nice polarizer included, with a cap that fit over the eyepiece. I spent weeks just making crystal mounts, and observing them under the microscope. This was an ultimate, ever changing, kaleidoscope.

Since we had a lot of pets when I was young, there were abundant specimen samples from the "backyard big game." Dogs, cats, and even rabbits gave up beasties for the sake of science! Ticks, fleas, whiskers, and hair and saliva were some of the loot I collected. Since the cats were always battling over feline territorial rights and procreation, there was also a constant supply of blood and plasma from their wounds for my slides.

I especially enjoyed growing bacteria cultures on Petri dishes from the animal saliva samples that I collected. In the garage, shelves of bubbling cultures of hay infusions, brine shrimp, and pond life rounded out my "micro-zoo." Trips to the grandparents' farm and local dairy farms added even more exotic samples.

There were other companies at that time such as Bausch and Lomb, Gilbert, Lionel-Porter Microcraft, and Skilcraft that offered student type, low cost microscopes.

I always thought that the Porter microscope looked the most "professional," seemingly patterned after the

American Optical/Spencer Series 60. It had binocular eyepieces, a rarity in student scopes. Their Microcraft Lab set also had a nice steel fitted case with prominent banners inside the case exclaiming, "Finest Authentic Metal Microscope, All Magnifications 30 to 750 times." It also came with a very detailed instruction manual showing how to perform many experiments.

The Lionel-Porter scope was offered in the catalog for S&H green stamps that were given out by the grocery stores as a premium. It, however, took so many stamps to get this microscope that it would have taken 20 years of grocery shopping!

Some of the microscope manufacturers, most notably Tasco, stretched the claims for some of their "zoom" microscopes by advertising magnifications up to 1200X. Most of the magnification above 600X was empty. However, 1200X made good advertising copy, and probably sold a lot of scopes. Having a 1200X microscope was like having a V8 instead of a 4 cylinder engine in your car.

There were a lot of toy microscopes coming out of Japan at this time, including brands such as: Milben, LaFayette, C.O.C., Jason, Selsi, and Edmund Scientific's "Edu-Science." Most of these came in nice wooden boxes, which added greatly to the pride of ownership.

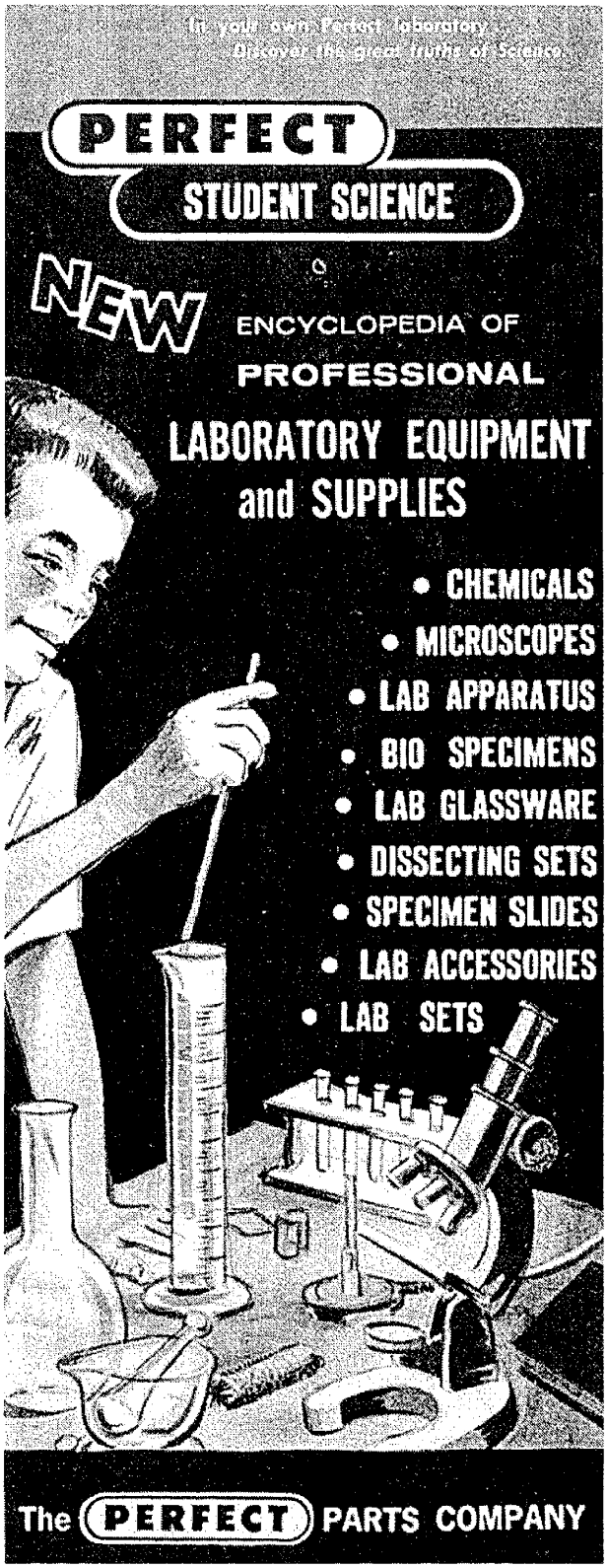
I have been lucky, in the last few years, to collect from on-line auction houses, some of the same microscope kits that I enjoyed in my youth. Surprisingly, the prices are higher now than then. A Perfect Model 805 microscope kit that sold for $33 in 1969, has recently gone for $80 on the Ebay Internet Auction.

I used to dream about owning a professional microscope, such as a big Wild, Zeiss, or Nikon like those that I would read about in the school library in one of the many texts on microscopy such as Stehli's *The Microscope and How to Use It.*

Unfortunately, today most of the hobby and toy stores don't have much in the way of microscopes or chemistry sets anymore. It seems that video games, TV and computers have captured the interest of most of today's youth.

The few student microscopes available are of such inferior quality that today, in my opinion, it would be better to give a child a used monocular microscope such as an A/O or B&L .

It is a sad state of affairs that companies like Perfect can't sell the same kinds of sets today that were available to me as a child. The potential for litigation and product liability suits over misuse of products, such as home chemistry sets, or personal injury suits over exploding chemicals has made it tougher for students



Perfect Company catalog cover.

My three childhood dream microscopes: Nikon, Wild and Zeiss.

today to find the same science materials that I did as a youngster.

We now live in an era where even the purchase of a fertilizer such as ammonia nitrate is looked on with suspicion by the authorities. It is indeed the end of the age of innocence.

Mine was a good time in which to grow up and it is a credit to the companies that produced science toys that inspired me, and others of my generation, to go on, as adults, to follow scientific pursuits, such as engineering, and microscopy.

Minutes for the MSSC Pond Life Meeting of Wednesday May 19, 1999

David L. Hirsch

Larry Albright and Ellen Cohen at the Pond Life Meeting.

Ed Jones and Colin Lamb at the Pond Meeting.

Jim Clark and Colin Lamb collecting diatoms with Jim Solliday.

About 30 microscopes of every size shape, and vintage awaited the curious gaze of the forty MSSC members and guests. Containers of water from ponds, lakes, and puddles supplied the multitudinous 'wee beasties' which take up residence in the various aquatic media. Via our microscopes, we were privy to the day to day activities of these miniscule creatures as they swam about, performing their assigned chores.

BOB FAUST skimmed his bird bath and came up with a broth rich in rotifers. ELLEN COHEN scoured pools of stagnant water in Malibu and brought in mosquito larvae. CHRIS BRUNT focussed his Leitz Binocular on rotifers. JOHN deHAAS focussed his Wild stand on diatoms of the family pleurosigma. John described his inverted tissue culture phase contrast binocular microscope which he referred to as "the Rolls Royce of microscopes". Capping our activities was the high quality audio-visual presentation by JIM SOLLIDAY titled: "Miniature Aquatics". We saw the creatures which reside in the microcosmic portion of land, water and air; animalcules with which we share the planet. Guests attending the meeting included TOMA and TARA O'BRIEN, KAREN and MARJORIE LEGEL, and JASON UTAS. We were privileged to act as hosts to COLIN and BARBARA LAMB, who were visiting "the colonies" from Balderton, England. Balderton is close to Newark, which is host to gigantic, all encompassing antique shows, thrice yearly. Colin is the past secretary of the Postal Microscopical Society and a long time friend of the MSSC. He brought a collection of literature including local newspapers, and a very interesting set of photo albums showing the microscopical activities of his associates, including the well known ERNIE IVES. Colin also distributed a generous and thoughtful contribution of a number of packets of foraminifera-bearing sand from our friend Roy Winsby of the Manchester Microscopical Society. Each packet contained samples from three different locations. Colin also overwhelmed us with a gift of a Flatters & Garnett, circa 1910, tabletop hand microtome which, following his stipulation, was the subject of a spirited auction among MSSC members with the proceeds going to the MSSC treasury. ■

Member in the News

MSSC member PARKE MEEK has a selection of microscopes that he rents as props to the movie industry from his unique store, called Jadis, in Venice. For more on Parke, pick up the May, 1999 issue of *Smithsonian Magazine* and read the article titled: "Eames, The Best Seat In the House." Pictured in the article on page 81 is a 1959 version of Parke, who was a 25 year associate of Charles and Ray Eames.

MSSC July Meeting

Wednesday, July 21 at 7 PM

Crossroads School,1714 21st Street

Santa Monica, CA

19th Century Optical Instruments

Paolo Brenni

Paolo Brenni lives in France and is the curator of several museums there. He has written several books on scientific instruments including the very important *FONDAZIONE SCIENZA E TECNICAGli strumenti di fisica dell'Istituto Tecnico Toscano OTTICA* which describes the complete collection of the Institute of Scientific Instruments in Turin, Italy. He is also associated with the Istituto E Museo Di Stroria Della Scienza Firenze in Florence. He has also written a series of articles on French instrument makers which were published in the Journal of Scientific Instruments. This is a unique opportunity to hear Mr. Brenni while he is visiting Southern California. Don't miss it.

Editor's Note.

I would like to recognize again the skills of our president and Photoshop expert, George Vitt in improving the quality of the graphics. Note particularly Ernie's desk on page 101 in which George corrected the perspective from the initial 50 mm lens shot. Previously, this would have required a view camera with tilts and swings. Also, in the photos of Ernie's hobby shop on page 102, George was able to increase the brightness of the distant areas to make up for the falloff of flash illumination. In the photo of Barry Sobel on page 103, he removed flare and lightened too-dark areas. Most of the other photos had their resolution enhanced and the tones adjusted. Thank you George. Also, many of the photographs by Jim Solliday are superb, showing the skill that makes his multimedia presentations so enjoyable and informative. Thank you Jim.

Saturday Workshop - August 7 9AM

At the home of Marj and Ernie Meadows
707 Greentree Rd. Pacific Palisades, CA 90292
310-459-4788

Directions-Take Brooktree off of Sunset Blvd (Brooktree is the first turnoff east of Chataqua). Then the first right off of Brooktree is Greentree. Go to end of Greentree main road, park and walk up wooded lane to Meadows' (first house on the right up the lane).