Journal of
THE MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA
Volume 7 Number 3 March 2002

WORKSHOP OF THE MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA

by Jim Solliday and Allen Bishop
Photoshop by George G. Vitt, Jr.

Date: Saturday, 2nd March 2002
Location: Ken Gregory's Residence

The workshop began at 9:05 AM and was brought to order by the President, Jim Solliday.

It was noticed that Jim Clark was not present and the reason for his absence being due to ongoing treatments for lymphoma. There was much expression of support and well wishing for the speedy recovery of our beloved member.

A question was raised as to the disposition of the electron microscope which was donated to the Crossroads School and if it could be transferred to the New Roads location. It was the President's understanding that the matter was still in question and that Dr. Joe Wise did not yet know if the instrument will be relocated. As the microscope was donated to the Crossroads School, who maintains the service contract, it was felt that Dr. Wise

would have very little to say as to its final disposition. Alan deHaas felt that it would not be very difficult to obtain a replacement, but the question remained as to whether the New Roads School would have need of this sort of instrument.

John Fedel showed an EM book borrowed from Alan deHaas. He also talked about several mineral slides that were made by Leonie Fedel's grandfather.

Leonie Fedel briefly described her efforts in bringing the Journal up to speed and back into publication. She assured the members that she had many years of experience in working with PageMaker. She also indicated that she was very open to all information and contributions that might be appropriate for the Journal. She would like the members to use email if possible <mssc@attbi.com>. She also needs member profiles from the newer members - you know who you are. She indicated that she grew up in the company of microscopes and very much enjoys the activities of the Society. Finally, the Mac clone computer, that was donated to the Society by Tom McCormick, has been successfully transferred to our new editor. She should now have the service of both a Mac and a PC and this should prove very helpful in the production of the Journal.

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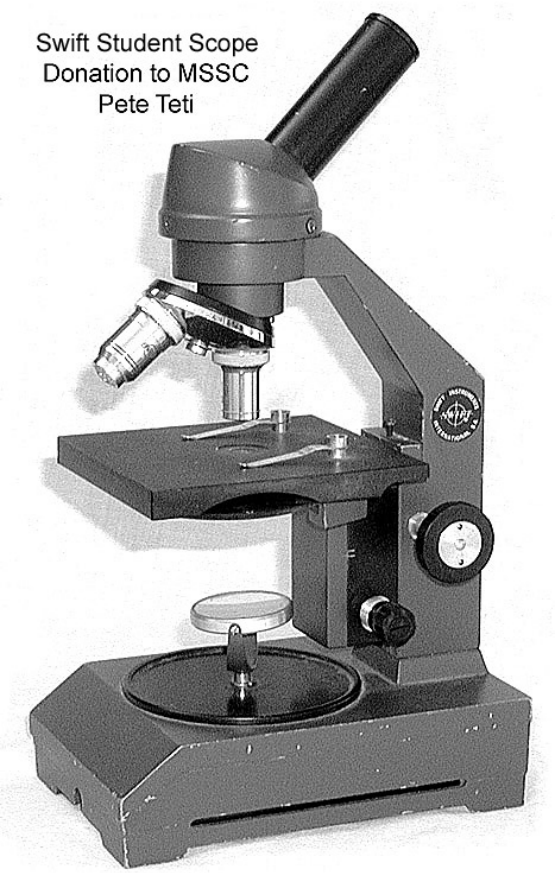
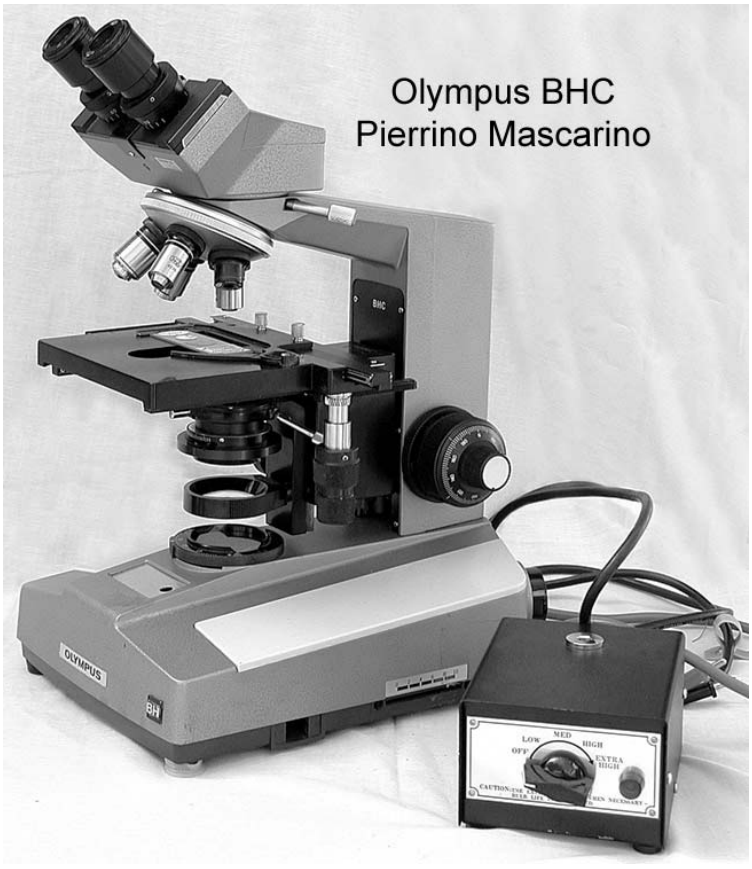
MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA

Pete Teti announced that every 3rd Saturday was the target date for the hands on (extra) workshops. Members who are interested in participating are asked to contact Pete Teti for details, subjects and requirements for each event. A microscope or stereoscope will be a must. Members will be required in some cases to pay a fee for certain classes that require the acquisition of special supplies. Common supplies such as slides, coverslips and a personal microscope should be provided by the members themselves. Pete then showed his kit of tools that he put together with items that cost about 99 cents each. Pete suggested that members who plan on participation should begin assembling similar kits. The source of many of his items came from Tri-Science in Burbank. If you are interested in a pre-made dissecting kit, they can be had from a home teaching supplier (Contact: Gardner Laboratories, 460 E. Sheridan Ave., Williams, AZ 86046, (520) 635-9441, <homescischool@hotmail.com>, the kit is about $40.00). The business had indicated they will guarantee our members this same low price, just mention that you are from the MSSC. The first workshop will be an organizational meeting as well as a discussion on the "Rocks & Minerals". Among the books exhibited on the subject were, *Simon & Schuster's Rocks & Minerals Guide*. Pete also exhibited a Swift Student microscope (see photo) which he has donated to the cabinet for the upcoming workshops. Thank you Pete for your kind donation.


Swift Student Scope
Donation to MSSC
Pete Teti



Pierrino Mascarino brought an Olympus BHC mic.which was offered for sale at $500. (see photos). He also showed a guide book, on the subject of protozoa, with which he was very disappointed. Many editing errors were described as well as blind references, associated with the key, were also pointed out. This guide book was authored by Theodore Louis Jahn, et al, and pub-

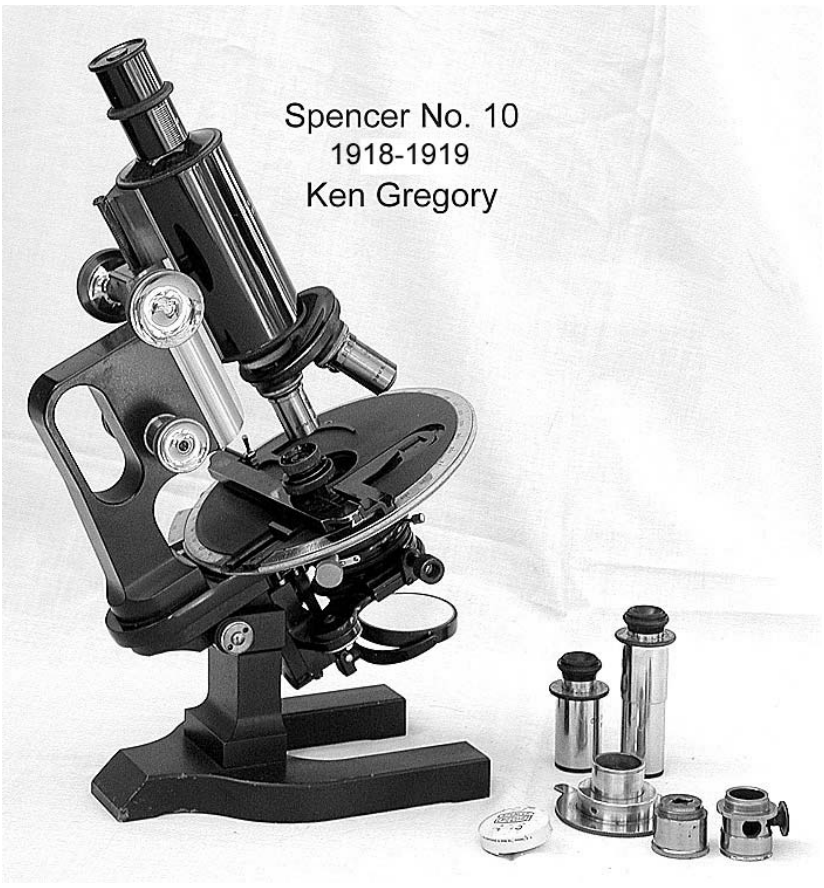
Olympus Objectives - Pierino Mascarino

lished by McGraw Hill, *How to know the Protozoa*, 2nd Ed., 1949, the recent printing of 1978. The booklet comes in a spiral binder for convenient use in the field and does have good illustrations. The overall feeling towards the booklet however, came with a "NO" recommendation. Pierrino also inquired as to the feasibility of converting the European 220v to 110v, and Larry McDavid said that converters are available at Fry's and Marvac.

Stuart Warter exhibited three magnificent rare microscopes all with similar features and of generally the same style (see photos). The first and the largest was by Andrew Pritchard, the second was a Chevalier and the third was unknown but likely of French origin. Andrew Pritchard was a well known English maker who worked from the early part of the 19th Century into the 1850's (1827-1854). He was also well known for his numerous publications on microscopy. Pritchard was often a co-author with Dr. Goring. It was he who helped design the characteristic Pritchard microscope (known as Goring's Aplanatic Engiscope). The large Pritchard on exhibit was of the older style and was made from ca.1830 to the 1850's. At the Great Exhibition of 1851 in London, Pritchard

was only noted for how old fashioned his microscopes were. Stuart next exhibited Chevalier's "Student Stand" which was imported and sold in America by Pike. This microscope is illustrated in Pike's catalogue of 1856 where it is inappropriately associated with Andrew Ross (London). Stuart also showed two different books published by Pritchard which were co-authored by Dr. Goring (the books were *Micrographia* and *Microscopic Illustrations*). Stuart's Chevalier was said to have been made sometime between 1830 and 1850.

Ken Gregory exhibited a Spencer No.10, made 1918-1919(see photo). This is a large jug-handle type research grade microscope which at the turn of the 20th Century was very much in style. The condition of the instrument is almost as new and it is very substantial in size and weight. An illustration of this microscope can be found in the 1908 edition of *The Microscope* by Simon Henry Gage. The original owners were four Canadian brothers all of whom went to medical school, one after the other. The microscope was passed down the line until it ended up in the medical practice



Spencer No. 5 (1941) on
A-O "Ortho Illuminator"
Jim Solliday

of the last brother. It then, somehow, ended up in the State of Florida where Ken obtained it through eBay. As usual, Ken provided the group with wonderful hospitality which includes a table full of refreshments.

Jim Solliday exhibited a Spencer No.5, Research Microscope, Ser.176248, 1941 (see photo). This is a very large research microscope second only to the Spencer No.8 "Reverse" in size and features. The binocular is the Type L and can be removed and replaced with a monocular tube. The fine adjustment is at the base of the arm, low enough to be operated by either hand resting on the table. A solid connector - located within the hollow arm serves the double purpose of connecting the moving parts at the top of the arm with the micrometer below and of lengthening the fine adjustment bearing in order to make it more substantial and sensitive. This fine focus adjustment, graduated in intervals of one micron, automatically compensates for wear and ceases to function (disengages) when the objective comes in contact with the cover glass. The little knurled button on the top of the arm is for regulating the tension in the fine adjustment, this adds to its sensitivity in different positions. If the microscope is to be used in the vertical position this button is turned clockwise until it stops. If the body is horizontal for photomicrographic work, it is turned in the opposite direction. This stand is fitted with a circular revolving mechanical "Stage V" (Stage No.1531). It measures 150mm in diameter and is made of vulcanized rubber on a bronze foundation. Centering screws are provided to bring the center of revolution coincident with the optical axis. It may also be locked so that it will not revolve. The bearing for the X & Y movement fits into a groove on the surface of the stage. The parts in this groove all remain below the upper surface of the stage, the slide easily passing over them. The controls for operating the movements are on a concentric axis. The X & Y movements operate in a 50mm by 75mm range, with verniers reading to 0.1mm. All the movable parts of the stage are easily removed and a plate can be provided to cover the groove, thus converting it to a plain circular stage (plate not present). The pe-

ripheral margins of the stage are beautifully graduated and read to three minutes of arc. This microscope is equipped with a complete substage having both coarse and fine adjustment. The substage arrangement consists of a fork focussed by a diagonal rack & pinion. The attachable condenser (1.30 n.a) is known as the "complete research substage" having centering screws and an oblique light control. The oblique light feature is independent of the iris diaphragm. Also the condenser features a mounted auxiliary lens which slides into the substage slot (at bottom of the condenser). This auxiliary lens raises the focal point for hanging drop work as well as filling the field when using low power objectives (No.333 condenser element). The achromatic elements of this condenser are threaded into a mount that can be slipped in and out of the top of the condenser. This mount is equipped with a Society Thread and can also hold an objective in place of the usual element. The objectives are mounted on a four place nosepiece. Objectives that accompany this stand are the following: B&L 4x, Spencer 32mm (Brass), 16mm 10x, 44mm, 1.8mm oil. Four of the objectives are stored in plastic canisters. There is a set of 10x eyepieces, set of 6x eyepieces and a 10x micrometer eyepiece. There is also a high N.A. darkfield condenser with a lightbulb element attached to the bottom. The finish is black baked enamel and chromium plating. The case is hardwood with leathercloth cover and a drawer for accessories. The overall condition of this instrument is like new. Also on exhibit was an A-O Spencer "Ortho Illuminator" which allows the microscope to be placed over its field lens and eliminates the microscope's mirror. It features a 100 Watt light source and a revolving set of filters. Together this exhibit represents the state of the art research microscope arrangement for the 1940's to 1950's.

Alan deHaas contributed a discussion on the merits of various condensers (see photos). The Spencer achromatic-aplanatic condenser that was on the Spencer No.5 was described with emphasis on how well made and designed this item was.

The history of how spherical aberrations were corrected was brought to the floor by Jim Solliday. J.J. Lister's work of the late 1820's was discussed with the importance of his discovery of the two aplanatic foci and how lenses were made after that time. We talked about the work of Pritchard and Dr. Goring and their efforts to make the so called jewel lenses and the fact that this sort of material was thought to be easier to work with. Many jewels have a higher refractive index than glass and thus required less of a curve to the surface of the optical element. The fact that the dispersion was also different did not come to their

understanding for quite some time. The production of jewel lenses was never much of a success.

Larry McDavid showed an example of his neonatal oxygen and carbon dioxide transcutaneous sensor that measures arterial blood gases without the need to draw blood. They were built from miniature glass pH and platinum polarographic electrodes and assembled entirely under a microscope. He also talked about and showed a hemoglobin oxygen saturation sensor that uses two different wavelength LEDs. Larry has worked on a number of very interesting engineering projects which he has kindly shared with the group. Much discussion is always stimulated by the contributions of Dr. McDavid.

Alan deHaas brought to the attention of the group a wonderful hand spectroscope which was sold by Medizinisches Warenhaus AG Berlin (see photo). This little instrument is identical to the Leitz, but as it seems was not actually made by Leitz. Alan feels that some yet unknown firm seems to have constructed both spectroscopes. He also exhibited a rather complete set of post-war East German Zeiss incident illuminators (see photos). They were designed for the NF microscope, the last permutation of the pre-war Zeiss Lp "Lumipan" microscope. East German Zeiss equipment has begun to surface in the USA over the past year, much through eBay. The quality and ingenuity is incredibly high.

The whole incident lighting system is stored in a large fitted case and remained in almost perfect condition. Alan also presented a number of interesting books, one of which caught the interest of Stuart Warter and featured a chapter on the history of the microscope.

Gary Legel brought in some interesting electrical equipment that he announced was for sale. These items were recently obtained at the TRW swap meet.

The meeting was adjourned a few minutes after 12:00 and the group moved to the local Coco's restaurant for lunch.

Alan de Haas Zeiss DDR

Alan de Haas
Pocket Spectroscope

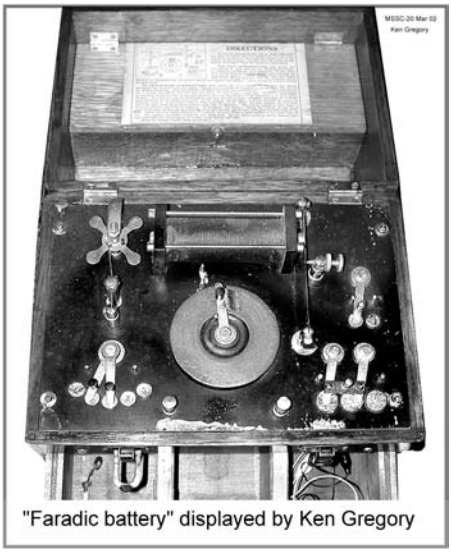
MSSC Meeting Minutes

by Dave Hirsch

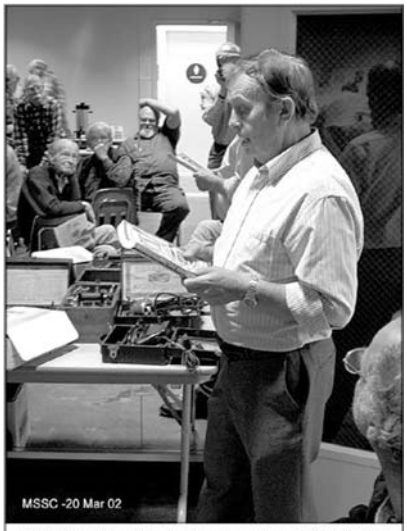
7:00pm 20th March 2002 at New Roads School

Ken Gregory expounds on "quack" medical devices

A most unusual meeting! Traditionally, our "show-and-tell" submissions would include a plethora of microscopes, accessories and a slug of related books and freebies. This meeting was a little different. Instead of the offerings of Bausch and Lomb, Cuff, Zeiss and the like, our meeting chamber at the New Roads School was crammed with doodads, gizmos and gadgets relating to 20th Century quack medicine. The membership was treated to an impressive display consisting of the tools and contrivances foisted upon a gullible but demanding populace by pretenders of medical skill.



"Faradic battery" displayed by Ken Gregory



Bill Davies describes book on 'quack' medical devices

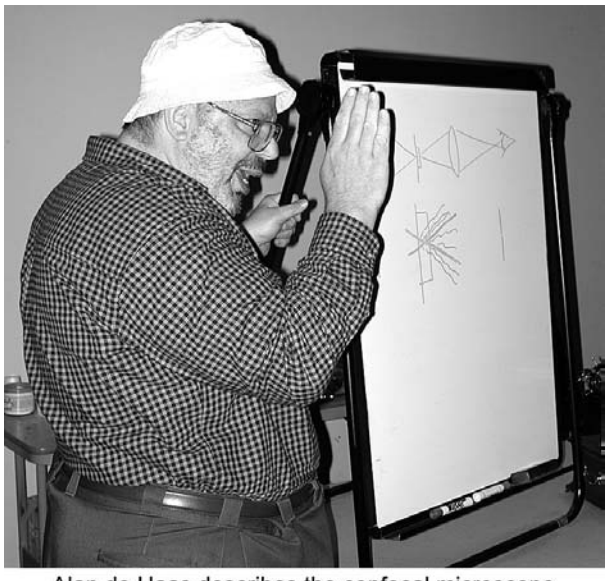
Essentially, the devices produced sparks, electric shock, ultra violet and infrared emanations. 'Miracle machines' to cure everything from acne to zoonosis! Ken Gregory displayed his large and eclectic array of old time hardware, accompanied by an impressive lecture on the whys and wherefores of quack medical equipment. Bill Davies brought in a group of electromechanical and electromagnetic "health" machines. Bill also offered for sale a new paperback book: "Quack", by Bob McCoy that describes many of these devices.

Larry Albright describes early X-Ray machine

Larry Albright, our resident expert on high voltage discharge apparatus, showed several items, including a Mattison electropsychometer for measuring skin resistance and a portable x-ray and high-frequency apparatus.

George Vitt's work with InkJet printing

Kudos to our resident artist, George Vitt. His works offer proof that science enhances art. With his digital camera as the palette and his computer as the easel, George has created a magnificent and impressive collection of high quality digitally enhanced prints, a number of which were in display this evening. Alan de Haas presented another of his series of minilectures on optics. His subject dealt with pinholes as a means of eliminating stray light, thus improving image quality. He used this to explain how a confocal microscope works.


Alan de Haas describes the confocal microscope

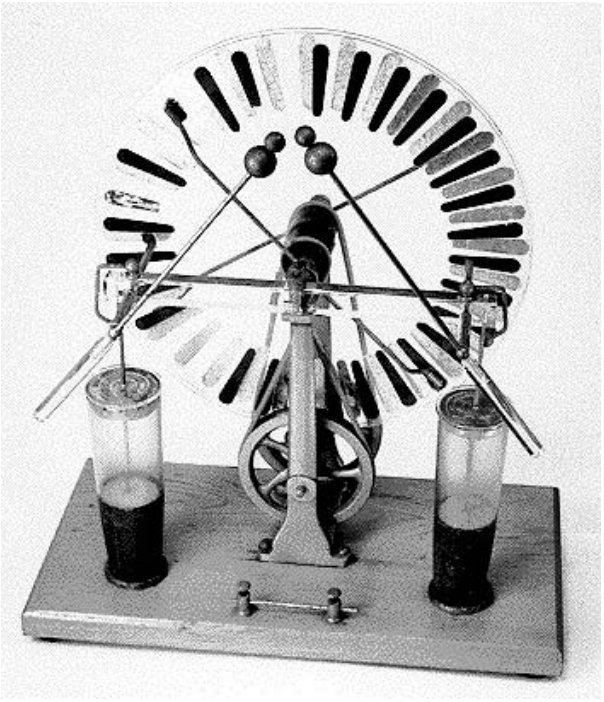
In our past life it was a mortal sin to broach subjects non-microscopical at our meetings or workshops. Your intrepid Treasurer joined the membership by presenting yet another of his pseudo-scientific "antique" instruments. My interest in optically oriented hardware includes kaleidoscopes and teleidoscopes; parlor toys of the 1800s and the brainchild of David Brewster of Scotland. More about that later on.

The MSSC Workshop shall rise again! We commend Pete Teti for his admirable work in organizing our practical workshops. Watch for announcements detailing coming workshops. We were pleased to welcome as our guest; Lori Matsumoto from the Museum of Jurassic Technology. Through the efforts and artistry of Leonie Fedel, the January issue of the MSSC Journal was distributed to all members on record. If you have not yet received a copy, contact Dave Hirsch email: dave.hirsch@verizon.net, or tel: (310) 397-8357. Hey Hey, by the way - 2002 dues are due and payable: $50.00 for regular members and $40.00 for Corresponding Members. Please send checks payable to David L. Hirsch to Dave Hirsch/MSSC, 11815 Indianapolis Street, Los Angeles, CA 90066-2046.

See ya at the next meeting!

My Recalcitrant, Gender -Specific Wimshurst

by Larry McDavid



I bring for your consideration a Wimshurst static electricity generator. In keeping with our Society's focus, please note that this device exhibits two planar optic discs! This is a 1920's Phillip Harris model with two counter-rotating, 10-inch glass discs and dual Leyden jars. I have several similar Wimshurst generators in my collection, some smaller, some larger, and some without Leyden jars. But, this particular one is my only Wimshurst with a tale. And, I'm here today to tell you that tale. You might say that this is a tale of my recalcitrant, gender-specific Wimshurst.

This tale begins with a friend's voyage to England where he found two similar Wimshurst generators in a British public—that is, to us, *private*—school. Both generators were carefully inspected, tested and found in good working order; both generated satisfying arcs when cranked. The purchase transaction complete, both generators were then taken apart, carefully packaged and shipped home. One was to remain with my friend and one was for my collection.

Happily, the generators survived the flight home without incident. My friend unpacked and reassembled both generators. Upon my arrival at his home, we together admired their excellent condition and promptly turned their cranks, only to find that neither immediately produced any noticeable static discharge—certainly no arcs. Now, there is a variety of ways to reassemble these generators: the angular positions of the neutralizing brushes and the charge collectors can be exchanged, for example. And, of course, the disc rotation directions can be reversed. My friend and I tried all reasonable combinations of these variations but, in the end, produced no discharges.

We noted that it had uncharacteristically (for Southern California) rained the morning of our work. I was not too enthusiastic about humidity as the cause of our problems but, after all, the physics of these generators is straightforward; no other likely cause presented itself. I unhappily carried my generator home to ponder its future. The following day, with the relative humidity back to its normal low value, turning the cranks once again produced no static discharges. It was a mystery.

Later, I had an idea and called my friend. I asked how the machines had been packed for the trip home. He explained that all parts were disassembled, individually wrapped in bubble wrap and carefully double boxed. Umm, I thought! Isn't bubble wrap made of polyethylene, the same basic material as anti-static bags? But my friend explained that he had not used the well-known pink poly antistatic material. Nevertheless, I had pre-

viously experienced sample contamination by leaching of plasticizer from polyethylene bags and I felt this was a reasonable explanation for our problem: the generator surfaces had been contaminated by the packaging and were dissipating the static charges before they could accumulate.

My friend offered to completely disassemble his generator and clean it. He called me the next evening to enthusiastically report that he was now producing discharges and arcs as he turned his crank. He called me the Wizard of Wimshurst. Great, I thought, that was a simple fix! Now for my own generator. Unfortunately, this tale does not end there.

I, too, cleaned my generator parts. I used Triton X-100, a laboratory grade surfactant used to improve reagent wetting. I washed my parts in my kitchen sink, rinsed them in pure reverse osmosis water and baked them in a warm drying oven. I happily reassembled, turned my crank and—nothing happened. Several combinations of component positions later, I still had no static discharges.

Back on the phone to my friend, I inquired exactly how he washed his parts. Well, he said, he didn't wash them; he gave them to his wife! Said wife then explained she washed them in the kitchen sink (well, this part sounded familiar). "Is that all, I asked?" "Well, noooo," came the reply. Turns out that after washing, she treated the parts to a vigorous rub (dare I say "buff" job?) with some feminine unmentionables to give them a good shine!

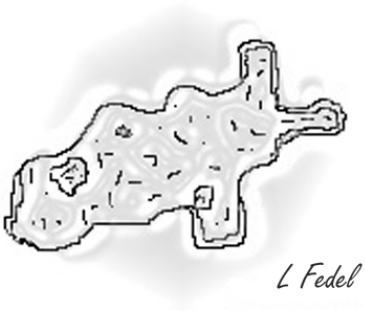
Friends, the physics of this treatment seemed a bit elusive, but who could argue with success? Now, these aforementioned feminine unmentionables (at least the adult variety) are in short supply in my household. So, back goes my generator to my friend—actually to my friend's wife this time—for "proper" treatment. She does the kitchen sink thing again (Ivory liquid, thank you very much; no Triton X-100 for this lady.), followed by the now-famous feminine unmentionable buff job. Upon reassembly, I turned the crank and—resounding crackles, sparks and arcs!

Now, I'll leave it to you to contemplate the true root cause of my Wimshurst troubles. One might imagine a whole series of enlightening experiments—which unmentionables produce the best result, for example. I've decided to just enjoy the final results.

With that, I present for your consideration today one 1920's, Phillip Harris, 10-inch, recalcitrant, gender-specific Wimshurst generator—with a tale.

What The Heck Is It? Pond Life Then and Now

by Stuart L. Warter



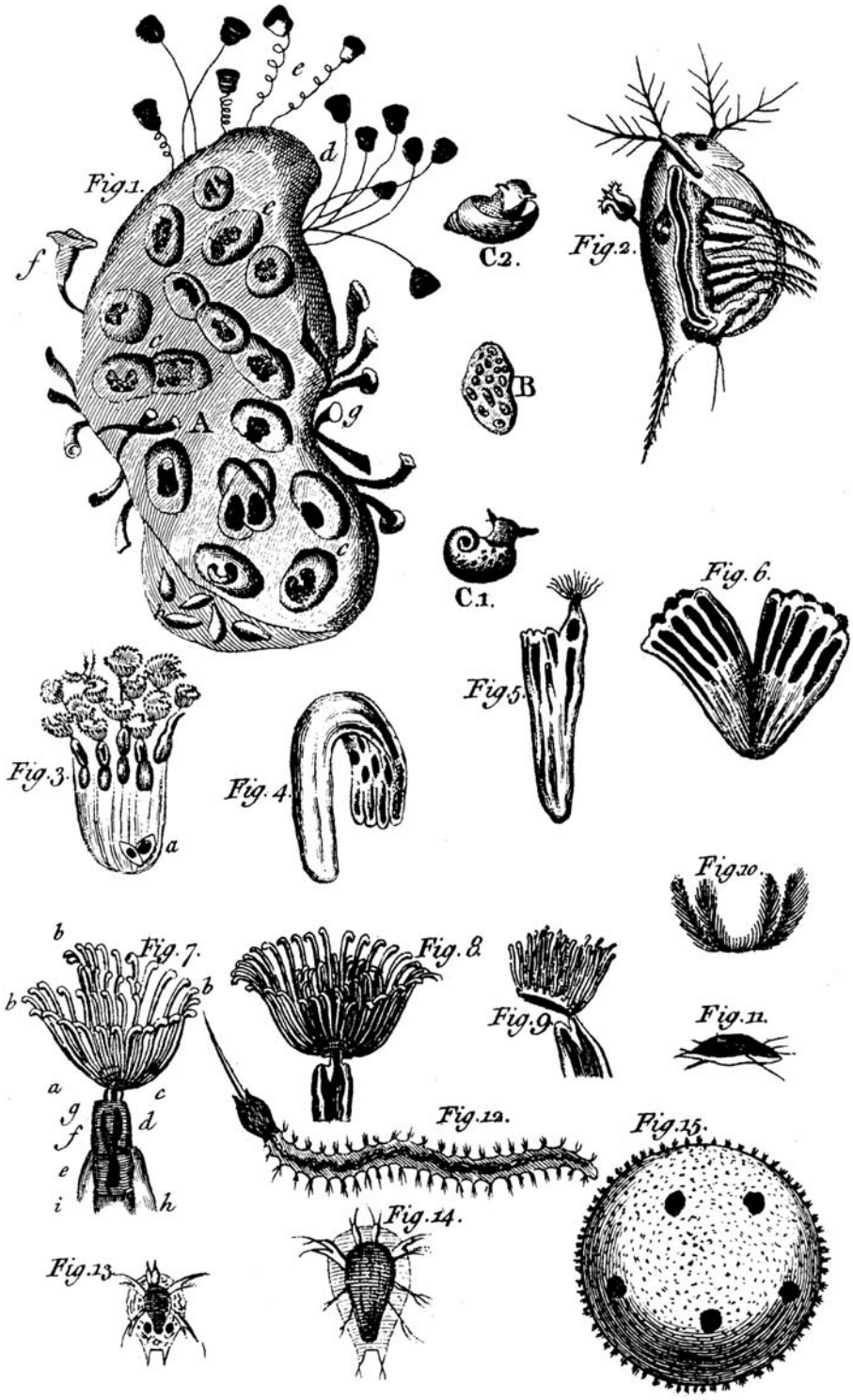
In a 1764 Supplement to the Universal Magazine (London), there appeared an article from an anonymous correspondent who describes some of the objects he had observed through his microscope. Since most of the figures seem to be more or less identifiable, his instrument, whichever it was, proved equal to the task, as did his observational and drawing skills (in most cases). His knowledge and abilities in describing the forms familiar to him, and his labors in describing those unfamiliar, are reminiscent of those experienced by people today engaged in similar recreational observation.

Try your skills at identifying his critters, and see the discussion at the end for some answers.

The annexed Plate, being a Microſcopic View of ſome curious Inſects and Animalcules, was engraved from a Drawing, with an Explanation, lately ſent to us from a Correſpondent in Exeter.

THE group of figures A. (fig. 1.) repreſents the magnified appearance of a congeries of the ſpawn or eggs laid by a water-ſnail, which, as ſeen by the naked eye, is ſhewn at the letter B. The parent ſnail is exhibited of its natural bigneſs C 1; its back upwards towards the eye, and its body extended beyond the ſhell, in the action

A Microscopic View of Some Curious Insects & Animalcules.



tion of creeping from place to place. The ſame ſnail is turned upon its back C a; that the true form and opening of the ſhell may the better be underſtood.

I have frequently kept numbers of theſe ſnails, for many months together, in a large glaſs jar, with polypes and other water animals; and it is very common for them to faſten their ſpawn, in little maſſes, againſt the ſides of the glaſs, where the eggs hatch in about three weeks or a month's time. The ſpawn, when firſt depoſited, appears to the naked eye like a tranſparent jelly; but, if examined by the microſcope, one ſees in it numbers of ſmall and exceedingly pellucid oval bodies, at little diſtances from one another, inveloped in a gelatinous ſubſtance; having each of them, towards one of its extremities, a very minute dark ſpeck, wherein, if carefully examined by the greateſt magnifier, a pulſation may be diſcerned. This ſpeck will be found to grow larger from day to day, and to become a perfect ſnail, with its ſhell complete, ſeveral days before it burſts through its integuments. When the eggs are about a week old, the embrio ſnail may be diſcerned in its true ſhape, turning itſelf very frequently within the fine fluid in which it lies; and the heart is then a moſt agreeable and amazing ſpectacle; ſhewing itſelf very diſtinctly, and reſembling a little oblong bladder, much leſs at one end than the other: The pulſation proceeds under the eye with great exactneſs and regularity, ſomewhat more than ſixty pulſations being performed in a minute, as I have found by ſeveral trials, keeping my finger at the ſame time on my own pulſe, which uſually beats two or three ſtrokes more. The heart is large in proportion, and may be always ſeen, until, the animal increaſing in bulk and becoming conſequently more opaque, in ſome poſitions it hardly can be perceived; but, as the animal frequently turns itſelf within the egg, a little patience will bring the heart in full view again, and that as long as the embrio continues within the egg. Nay, even after it is hatched, the heart may be diſcovered for ſome days through the tranſparent ſhell.

The general plan of nature is ſo uniform, in the production of living animals, though with ſome little variations as to the manner of its execution, that from what we are able to diſcover, in the very tranſparent eggs of this little creature, ſome reaſonable conjecture may be formed of what happens in thoſe of much larger kinds. According to the uſual order of nature, every embrio of an animal is lodged for a time within the uterus of the parent, incloſed in a caſe or egg, whoſe outer coat is either hard and ſhelly, or tough and membranaceous, affording a proper bed and covering, to preſerve it from external injury. In animals that are oviparous, this egg is excluded out of the body of the parent, ſome conſiderable time before the embrio has attained a ſize and ſtrength ſufficient to endure being expoſed to the open air without prejudice; during which time, it takes in nouriſhment, and its limbs acquire a continual growth, from proper juices in which it floats, and wherewith the egg is replete. For the egg, between the time of its being laid, and that of its hatching, can receive no other benefit from the parent, than what the natural heat of her body can afford it; and experience teaches, that the like degree of heat ſupplied by any other means, with the ſame conſtancy, will be of equal ſervice. In the eggs of numberleſs ſpecies, which ſhew no concern for them after they are once laid, no more heat at all is neceſſary, than what is common to the air or water in which they are expoſed.

In viviparous animals, the egg is retained in the uterus of the parent, till the embrio, having attained a certain ſtate of maturity, endures confinement no longer, burſts open the integument, caſe or ſhell that incloſed it, and iſſues therewith from the body of the parent; until which time the embrio receives its nouriſhment from the blood and juices of the parent, which are conveyed into the body of the embrio by certain veſſels of the parent, that inoſculate with correſpondent veſſels of the embrio, and at the birth become ſeparated therefrom. Hence it appears probable, that the original principle of life, the gradual expanſion and unfolding of the members, and the progreſſion towards maturity and birth, are nearly the ſame, whether the embrio be hatched within the body, or without the body of its parent: which ſeems to be the chief difference between viviparous and oviparous production. But to proceed.

For ſome days after the water ſnail has laid its tranſparent egg, the microſcopic ſpeck of life, wherein the tender limbs and rudiments of the animal are moſt wonderfully folded up and contained, has no other appearance of life, than only a languid pulſation, but juſt diſcernible by the beſt glaſſes and the moſt curious eye. As this ſpeck increaſes in bigneſs, it exhibits, gradually, the figure of a minute ſnail, and acquires an ability of moving itſelf very ſlowly. After this, its ſize and motion become every day more conſpicuous, its ſpiral revolutions ſhew themſelves more diſtinctly, its form becomes more perfect; a ſhell, unconceivably delicate, is produced over its tender body; it now occupies a conſiderable part of the egg, turns itſelf vigorouſly, and even creeps within it, and in due time breaks it

and iſſues forth. It is not unlikely this is nature's conſtant and regular courſe in the production of all creatures that are oviparous; and that ſhe proceeds nearly in the ſame manner to promote the growth and birth of the embrio in the human race, as well as in all other creatures that we term viviparous, ſeems no leſs probable.

The eggs which the drawing exhibits, were about a fortnight old, at which time the young ſnails were of ſuch ſize, in proportion to the whole room contained within the eggs, as thoſe marked *c*, *c*, *c*, may pretty nearly ſhew.

The other aquatic animalcules, repreſented as hanging about this parcel of eggs, are no other than what were really found adhering to it, when it was viewed by the microſcope; and they were exactly ſituated as in the picture, which was taken without the leaſt exaggeration. Their extreme minuteneſs rendered them abſolutely inviſible to the eye, for which reaſon no attempt is made to ſhew them at the figure B.

A little colony of bell-animals appear at *d*: Their long tails are faſtened to the gelatinous ſubſtance, wherein the eggs are laid; they ſtretch themſelves out, and play vigorouſly in the water; numberleſs fibrillæ, round the mouth of each bell, agitating the water to a conſiderable diſtance. More of the ſame bell-animals are ſeen at *e*, curling their tails, in the manner of a ſcrew, and pulling themſelves back with a ſudden jerk, as they conſtantly do when diſcompoſed by any thing. But, when all is quiet, they ſlowly extend again in the water, as far as their tails permit.

On both ſides this parcel of ſnails eggs, are ſhewn, in different attitudes, ſeveral little creatures, called the funnel-animal. They faſten by their tails to whatever comes in their way, and then opening their anterior end, exhibit a wide mouth, ſomewhat of a funnel form, though not completely round, but having a ſort of ſlit or gap that interrupts the circle. The lips or edges of this opening are furniſhed with multitudes of little fibrillæ, which by their briſk and continual motions excite a current of water, bringing with it abundance of minute particles of matter and living animalcules, which they ſwallow greedily. One of them, in the poſture above deſcribed, may be ſeen at *f*. They can faſhion this mouth or opening into the ſeveral appearances ſhewn in the picture. If any thing touches or approaches very near them, they ſhrink back and contract as at *g*. Theſe funnel-animals never keep together in cluſters, but live ſeparately and independent of one another, ſwimming freely through the water, ſeemingly in ſearch of prey, and after a while fix themſelves to any thing they meet with.

The little oval bodies at *h* were inveloped in the ſlimy matter of the ſnail's eggs. They appeared ſomewhat opaque, but without motion, and were probably the aureliæ of ſome water inſects.

At figure *z*, is repreſented the water-flea with branched horns. It is found in reſervoirs of rain water, in baſons, ponds, ditches, &c. where the water is not often renewed; and that ſometimes in ſuch abundance, as by its red colour to make the whole ſurface of the water appear like blood. Some ſwarms of them are green, but whether this difference be owing to their food, or ſome other accident, or whether they are of different ſpecies, I am unable to determine.

This animal is cruſtaceous, being covered with a thin oval ſhell in the manner of a lobſter or cray-fiſh, but with this difference, that, the ſhell being open a good part of its length, the animal can thereby put out and draw in its legs, and part of the body, when it pleaſes. The upper part of the ſhell bears a near reſemblance to the head of a bird, having a ſharp-pointed proceſs very much like a beak or bill, but intirely fixed and immoveable; and the eyes being placed near thereto, in a ſituation much correſponding with thoſe of a bird, adds much to the reſemblance. A little below the eyes, two horns, which are moveable, are joined to the ſhelly head. Each of theſe horns comes out in one ſingle trunk at firſt, but divides ſoon into a pair of branches, each branch having three joints. A ſmall hair briſtle grows out from either of the two firſt articulations, and three pretty long ones from the extremity of the laſt. Juſt beneath the inſertion of theſe horns, a long kind of gut runs down almoſt the length of the whole body, where it joins to a part which, in ſhape, very much reſembles the toe of a bird, having a large claw or talon at the end thereof. The creature can move this part beyond its ſhell with a great deal of force, and by that means performs its ſpringing or leaping motion. Beſides this, it has eight legs or fins, which, when the creature lies otherwiſe ſtill, are nevertheleſs in a continual and nimble motion, forming a briſk current of water, like that of many other animals. They are alſo very ſerviceable in ſwimming, and aſſiſt in its circular motion. Behind the abovementioned gut, and as it were detached from the reſt of the body, the heart is placed, and may be ſeen dilating and contracting, alternately. The lower part of the ſhell terminates in a long ſpike or tail, which is without motion, but thickly ſet with ſix rows of ſhort ſtrong ſpines,

ſpines, making its appearance like the prickly horn or ſnout between the eyes of lobſters, cray-fiſh, ſhrimps, &c.

Fig. 3. repreſents the bell-flower-animal, or plumed polype. Theſe animalcules dwell together, from the number of ten to fifteen, (ſeldom exceeding the latter, or falling ſhort of the former number) in a filmy kind of mucilaginous or gelatinous caſe; which out of the water has no determined form, appearing like a little lump of ſlime, but, when expanded therein, reſembles nearly the figure of a bell with the mouth upwards; and is uſually about the length of half an inch, and one quarter of an inch in breadth or diameter. This caſe being very tranſparent, all the motions of its inhabitants may be diſcerned through it diſtinctly. It ſeems divided, internally, into ſeveral apartments, or rather to contain ſeveral ſmaller ſacculi, each of which incloſes one of theſe animals. The openings at the tops of theſe ſacculi are but juſt ſufficient to admit the creature's head, and a very ſmall part of its body, to be thruſt out beyond them, the reſt remaining always in the caſe. The animal can, however, when it pleaſes, draw itſelf intirely down within the caſe, which is an aſylum to ſecure it from its enemies, (for it is not unlikely many of the larger aquatic inſects prey upon it) and a ſafe and agreeable retirement, wherein to perform the functions of digeſtion, ſleep, and the other neceſſary calls of nature. This caſe it can therefore retire into at pleaſure; and it never fails to do ſo when any ſudden motion of the water, or of the veſſel it is in, diſturbs it; as alſo when it has ſeized with its arms any of the minute inſects which ſerve for its food.

The arms are ſet round the head to the number of 40, having each the figure of a long *ſ*, one of whoſe hooked ends is faſtened to the head; and all together, when expanded, compoſe a figure ſomewhat of a horſe-ſhoe ſhape, convex on the ſide next the body, but gradually opening and turning outwards, (ſee fig. 7, and 8.) ſo as to leave a conſiderable area within the outer extremities of the arms. And when thus extended, by giving them a vibrating motion, the creature can produce a current in the water, which brings the animalcules, or whatever other minute bodies are not beyond the ſphere of its action, with great velocity to its mouth, whoſe ſituation is between the arms; where they are taken in, if liked, or elſe by a contrary current, which the creature can excite, they are carried away again, whilſt, at the ſame time other minute animalcules or ſubſtances, that, by lying without-ſide the incloſure made by the arms, are leſs ſubject to the force of the ſtream, are frequently ſeized by them; for their ſenſe of feeling is ſo exquiſite, that on being touched ever ſo ſlightly, by any ſuch little body, it is caught immediately, and conveyed to the mouth.

Beſides the particular and ſeparate motion each of theſe creatures is able to exert within its own caſe, and independent of the reſt; the whole colony has together a power of altering the poſition, or even of removing from one place to another the bell, or common habitation of them all. Hence this bell is ſeen ſometimes ſtanding perfectly upright, as fig. 3 and 5. ſometimes bending the upper part downwards, as fig. 4.

It has been mentioned already, that between ten and fifteen of theſe animals dwell together; but, their number increaſing, this bell may be obſerved to ſplit gradually, beginning from about the middle of the upper or anterior extremity, and proceeding downward towards the bottom, till they ſeparate, at laſt, intirely, and form two complete colonies, independent of each other; one of which ſometimes removes itſelf to another part of the veſſel. The manner how the ſingle animals propagate I have never been able perfectly to diſcover, though there is ſome reaſon to conjecture it may be by the means of eggs, as ſmall opaque bodies of a conſtant and determinate figure are ſometimes ſeen lying in their bells; and, unleſs they are eggs, I know not what to make of them. Their ſhape is nearly that of a weaver's ſhuttle, being compoſed of two circular arcs, whoſe concave parts are towards each other. The breadth is about two thirds of the length, and in the middle of each a circular ſpot appears more opaque than the reſt, which poſſibly may be the embrio. They are repreſented at *a* fig. 3.

The bells, or colonies of theſe animals are to be found adhering to the large leaves of duckweed and other water plants; and may eaſieſt be diſcovered, by letting a quantity of water, with duckweed in it, ſtand quietly for three or four hours in glaſs veſſels, in ſome window, or other place, where a ſtrong light comes; for then, if any are about the duckweed, they will be found, on careful inſpection, extending themſelves out of their caſes, ſpreading their plumes, and making an elegant appearance.

Fig. 3. repreſents one complete colony or bell, ſtanding erect, with all the animals out of their caſes, and their arms extended for prey; exhibiting all together a very pretty appearance. Here *a* ſhews the opaque bodies ſuppoſed to be eggs.

Fig. 4. ſhews all the creatures withdrawn into their cells, and the end of the bell inclining downwards.

Fig. 5. The bell erect, with only one of the animals coming out, in order to ſhew its connection with the bell.

Fig. 6. repreſents a colony dividing.

Fig. 7. One complete animal, greatly magnified, to ſhew its ſeveral parts more diſtinctly, viz. *a*, the horſe-ſhoe-figured head; *b*, *b*, the arms ſeen from one ſide; *c*, the narrow neck; *d*, the oeſophagus; *e*, the ſtomach; *f*, the gut or laſt inteſtine, through which the food paſſes, after being digeſted in the ſtomach; *g*, the anus, where the fæces are diſcharged in little pellets; *h*, *i*, that part of the bell which ſurrounds the body of the animal, and cloſes upon it when it retires down.

Fig. 8. The head and arms ſeen in front.

Fig. 9. The head and arms cloſing together, and diſpoſing themſelves in order to be drawn down into the bell.

Fig. 10. The arms arranged in a feather-like appearance.

I frequently have taken notice, in ſeveral infuſions of vegetables, of a little cruſtaceous animalcule, whoſe ſhell is ſo exceedingly tranſparent, that, unleſs great attention be given, it cannot be diſcerned at all. It ſeems to cover the back only of the animal; (ſee fig. 11.) its belly, and under parts, appearing to have no ſhell. The middle of the body, containing the bowels, (whoſe periſtaltic motion may be diſcerned) is ſomewhat opaque, and in the ſhape of a bottle with the mouth downwards; the ſides are tranſparent, and ſhew many veſſels running through them. Four legs, or fins, divided near half their length, and ſerving either to walk or ſwim, iſſue from the opaque part, and reach beyond the edges of the ſhell; and two thicker and ſhorter limbs, pointing directly forwards, each of them armed with a ſharp claw, are placed at the head end, and probably are the inſtruments wherewith it takes its prey. On each ſide of the narrow part of the opaque body, at ſome little diſtance therefrom, one ſees a round black ſpot, the uſe whereof I don't pretend to gueſs.—This animal is briſk and vigorous, ſwimming ſometimes with great ſwiftneſs through the water, and now and then ſkipping nimbly like a flea. It often ſhews itſelf in profile, as repreſented by fig. 11. M. Joblot calls an animalcule, ſomewhat like this, the ſatyr, as having on its back a maſk or exact repreſentation of a ſatyr's face.

Figures 12, 13, and 14, are three different minute aquatic animals, which I had never before obſerved. The firſt of theſe ſeemed to the naked eye like a very ſmall and ſlender worm, of about one third of an inch in length; but the microſcope ſoon ſhewed its real form, and the ſingularity of its ſeveral parts. From the fore-part of the head of this animal a long proboſcis, horn, or ſnout was extended, moving itſelf every way with great readineſs, and iſſuing from that part of the head where the mouth ſhould be; which anterior part changed its appearance, according to the motions of the inſtrument, ſometimes extending itſelf and becoming more ſlender, and at other times ſhortening itſelf and growing thicker. About the head it had ſomewhat of a yellowiſh colour, but all the reſt of it was throughout perfectly colourleſs and tranſparent, except the inteſtines, which were conſiderably opaque, and diſpoſed as in the picture. In them alſo a periſtaltic or internal motion was diſtinctly viſible. Along its ſides were ſeveral papillæ with long hairs growing from them; its tail ended very bluntly; it had two black eyes, and was extremely nimble. In the whole, the form of it, when magnified, reſembled in many particulars ſome of our caterpillars that feed on vegetables. It is inſected as they are, and hairy.

The ſecond ſort (fig. 13.) was about a line in length, having a large head, with two black eyes in ſockets, conſiderably projecting, and pretty long antennæ. Its head, body, and tail, were divided like thoſe of the bee or waſp kind; from the end of the tail iſſued three long branches beſet with hairs, and each appeared ſomewhat like the ſtem of a peacock's feather: They could ſeparate more or leſs, be brought together, or move in any direction that ſuited the conveniency of the creature. It had four legs, which ſerved either to ſwim or creep, with claws at the end of each. The head, body and tail, were covered all over with a ſort of hair or down, and under the tail were a couple of moving parts like fins, wherewith it ſeemed to guide its courſe in ſwimming. It was extremely agile.

The third ſort of animal (fig. 14.) had an odd head, flattiſh before, without any appearance of eyes; a body ſomewhat opaque, and a tail that could divide occaſionally. From about the middle of the body a very thin membrane was extended on each ſide, as low as the upper part of the cleft in the tail; this was moveable, very tranſparent, and ſerved as a fin in ſwimming. It was very minute, and ſwam along with a direct progreſſive motion, very ſmooth and regular, but not faſt. Sometimes it would change its figure, and appear ſomewhat crooked and triangular.

Fig. 15. repreſents a very ſingular minute

nute water animalcule, as it is ſeen before the microſcope. It may be called the globe animal, as its form ſeems exactly globular, having no appearance of either head, tail, or fins. It moves in all directions, forwards or backwards, up or down, either rolling over and over like a bowl, ſpinning horizontally like a top, or gliding along ſmoothly, without turning itſelf at all. Sometimes its motions are ſlow, at other times very ſwift; and, when it pleaſes, it can turn round, as it were upon an axis, very nimbly, without removing out of its place. Its whole body is tranſparent, except where the circular black ſpots are ſhewn in the picture; of which ſpots ſome had ſix or ſeven, ſome one, two, three, four, or five, and others none at all. Theſe probably are its eggs or young ones. The ſurface of the whole body appeared in ſome as if all over dotted with little points, and in others as if granulated like ſhagreen; but their more general appearance was, as if beſet thinly round with ſhort moveable hairs or briſtles; and it is not improbable all their motions may be produced by ſome ſuch inſtruments, performing the office of fins.

POND LIFE - HOW DID YOU DO?

The little snail and its egg mass are readily recognizable, as are the attached ciliates *Stentor* (g) and *Vorticella* (d,e) in fig. 1.. Also readily recognizable is the cladoceran crustacean *Daphnia*, with the rotifer hitching a ride on its back (fig. 2). Detail is good enough to see two developing young within its brood pouch; that he was aware of the phenomenon of viviparity in these animals is evident from his extended discussion. Figures 3 - 10 represent colonial fresh water bryozoans (*Plumularia* ?). Figure 11, shown only in "profile," is unrecognizable, as the description is not particularly helpful. Figure 12 appears to be a polychaete annelid (a "bristleworm", which may have been too active for him to accurately depict the head), while 13 and 14 represent nauplii (larval copepod crustaceans). Figure 15 represents the colonial flagellate *Volvox*.

INTERNET RESOURCES

Needing some more help identifying freshwater organisms? In preparation for the Pond Life Meeting on 15th May 2002, I summarize two very relevant Internet sites , worthy of further exploration ...
Leonie Fedel (Editor)

Microscopy UK: Pond Life Identification Kit

See: http://www.microscopy-uk.org.uk/pond/

This simple guide to small and microscopic pond life is part of the Microscopy UK website highlighted in the February 2002 Journal. The guide is laid out in a clear tabular form, listing the key features of each major organism type and providing a sample drawing. Ongoing links are provided to aid more specific identification.

The site also includes simple tips on how to collect microscopic pond life and provides links to the extensive Micscape resources.

Also visit Microscopy UK's smallest page on the web: http://www.microscopy-uk.org.uk/mag/wimsmall/smal1.html which portrays some of the most common microscopic organisms that live in a drop of fresh pond water.

Molecular Expressions: Digital Video Gallery

See: http://micro.magnet.fsu.edu/moviegallery/pondscum.html

This website is brought to you by the Optical Microscopy Division of the National High Magnetic Field Laboratory, a joint venture of The Florida State University, the University of Florida, and the Los Alamos National Laboratory. This site provides an extensive collection of still images and videos of various pondlife as seen under the microscope. Included are protozoa, rotifers, platyhelminths, arachnids, crustaceans and algae to name a few.

You will need RealPlayer installed to download and view the videos. You may download the basic RealPlayer software package or the upgrade version, RealPlayer Plus, by clicking on the Real.com button link on this site.

A real treasure of a site for those of you with fast internet connections capable of viewing streaming video.

Also worthy of note, is the gallery section of the site which hosts some amazing photos of the molecular structures of other animals and materials. Check out the Beershots and Cocktail Collection or the Chipshots and Silcon Zoo!

Ernst Abbe

by Alan de Haas, drawing by John de Haas

In 1861, at the age of 21, Abbe received his doctorate from the University of Goettingen by submitting a thesis on thermodynamics. In 1866 Ernst Abbe was made research director of the Zeiss optical works. He had laid the foundation for the mathematical and practical constraints of apochromatic optics in 1868. By 1878 he was appointed professor of mathematics and physics. The next year Abbe was made the director of the astronomical observatory of Jena. (one has the feeling that this was another of that strange group of individuals who needs only an hour of sleep each night).

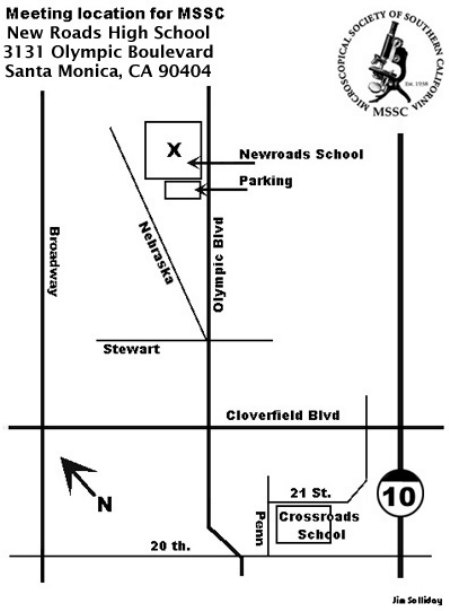
Abbe's work did not stop at defining illumination constraints - the Abbe condenser - and the math behind the reduction of astigmatism and coma - the sine condition - the theory of microscope image formation et cetera; Abbe was far ahead of his time in plant management and employee relations. It was Abbe who started paid sick leave, paid vacations and (I am sure much to the disgruntlement of other employers) the eight-hour workday.

(Sadly, Prof. Abbe's death in 1905 was hastened by extensive reliance on the narcotic sleeping medicinals of the time. Overseeing the Zeiss Works was a job with extensive stress.)

MSSC Meeting Announcement

7:00pm 17th April 2002

at New Roads School



This month we are pleased to have Edward Tarvyd as our speaker. Ed has served as a Biology Professor at Santa Monica College for many years and came to be in the enviable position of being very popular with the students. He has a stellar reputation as a dynamic speaker.

He will be giving a talk and slide presentation about Charles Darwin, the man, his personal history, and how he became the person he was for the rest of his life. This will be about the early years and what may have motivated his desire to explore a complex living world. All of this at a time when Natural History came to the forefront in scientific thought.

For those of you who like to eat dinner we will be meeting at the usual Coco's restaurant at about 5:30pm (near Ocean and Bundy, Santa Monica).

I look forward to seeing all of you there.

Jim Solliday (MSSC President).

Saturday Workshop Announcement

9:00am 6th April 2002

At the home of Izzy Lieberman

3300 Corinth Avenue
Los Angeles CA 90066
310-391-6076

This Saturday we are meeting at Izzy Leiberman's and activities will start at 9:00 AM. This is a chance for good friends and fellow microscopists to talk about out favorite subject... You are invited to bring any manner of items related to microscopy to share it with the fellowship. If you have something you would like to sell, please feel free to bring it and set it up at the sales table. For those interested or having early Spencer microscopes we will have a short topic focused on the beginning of the Spencer Lens Company. All are encouraged to participate and join in the fun..

Lunch after the workshop will be at the local Coco's. If you have any questions please send me a message. I look forward to seeing all of you at the workshop...

Jim Solliday (MSSC President).

Practical Workshop Announcement - Mounting Rock Crystals

9:30-12:00am 20th Apr 2002 at New Roads School

Pete Teti is organizing a program of practical workshops to be held the third Saturday of every month. This is the second in this series of workshops. John de Haas will be teaching the practical technique of mounting rock crystals. John will provide most of the crystal minerals and mounting boxes, but do bring your own samples if you have some. Please bring along a stereo microscope and illuminator if you have these available. Space for these workshops is limited so enrollment will be on a first come, first-served basis. Contact Pete for further details and to sign up for this or future workshops, tel: (323) 660-9259 or email: tetip@earthlink.net.

This and all future practical workshops will be held at New Roads School. The Society has permission to use one of the classrooms and has been allotted a number of cabinets for the storage of microscopes and supplies. The Society will be storing its slide collection in these cabinets and making them available for the members on a monthly basis. At one time we had a number of very nice compound and stereo microscopes in the cabinet when it was at the LA County Museum. I understand these instruments are still in the hands of members unknown and if possible should be returned to Pete Teti for inclusion in the new cabinet. We are also looking for donations of instruments that are sufficient in quality to be used by our workshop participants and the students of the New Roads School. If you have an extra compound and most important, a stereoscope and would like to have it put to good use please contact Pete Teti.

Introducing the Museum of Jurassic Technology

We were very glad to welcome Lori Matsumoto from the Museum of Jurrassic Technology as a new MSSC member at the MSSC meeting in March 2002. Lori introduced herself and the work of the Museum. She briefly described the museum's current exhibits which included one on sculptures that fit within the eye of a needle.

She then spoke about two forthcoming exhibitions planned by the Museum on micro-worlds; the first on Henry Dalton's work, the second on Stanhope technology. She asked members for any background information they could provide on these two subjects. Any members wanting to help should contact Lori Matsumoto at lorimjt@yahoo.com.

Opposite I reproduce a letter received from the Museum's Director, David Wilson.

Sincerely,
Leonie Fedel (Editor)

Letter from David Wilson (Museum Director)

The Museum of Jurassic Technology
9341 Venice Blvd.
Culver City, CA 90232
Tel: (310) 836-6131
website: www.mjt.org

The Museum of Jurassic Technology in Culver City is a small institution inspired greatly by 17th and 18th Century collection and display traditions. In keeping with these earlier traditions, the MJT's exhibitions present evidence of eclectic and far-reaching fields of interest including natural history, the history of art, the history of science and ethnography.

Among the many areas of interest presented, the visitor to the MJT will find evidence of a long-standing submission to "present to a broader public evidence of human artistry and ingenuity on the microscopic scale." To date, the Museum's efforts in this endeavor have included research and presentation in the realms of microscopic sculpture and micro-machines.

In the past century there have been three major practitioners of microscopic sculpture - all of whom were from the confines of the former Soviet Union.

In 1990 and again in 1995 the MJT was honored to present the works of the Armenian micro-artist, Hagop Sandaldjian. The Museum currently displays a small sampling of Sandaldjian's work in conjunction with a biographical slide presentation.

This summer the Museum will open a small theater, the inaugural presentation of which will be a 35-minute motion picture entitled "Levsha - The Tale Of A Cross-eyed Lefty From Tula And The Steel Flea" which relates the time honored Russian tale of an disheveled, illiterate gunsmith with extraordinary micro-sculpture abilities. This presentation also profiles the life and work of Nikolai Syadristy, a living master of microminiature art residing in Kiev, Ukraine.

In the realm of science and engineering, in 1993 the Museum presented an exhibition of micro-machines including such achievements as motors half the diameter of a human hair with springs and gear trains to match, micro-neuroprobes and the working tips of atomic force microscopes.

In the coming months continuing its investigation into micro-worlds, The MJT will present a small exhibition of the works of Henry Dalton, a 19th Century microscopist who artfully crafted micro-mosaics from scales of butterfly wings and diatoms. Later in the year, as the second exhibition in the series, the Museum anticipates opening an exhibition of 19th micro-photographs and the Stanhope popularizations of that technology.

We at the MJT have just recently discovered the excellent efforts of the MSSC and are hopeful and enthusiastic about the prospects for cordial co-operations in coming days.

For more information, contact
Lori Matsumoto
email: lorimjt@yahoo.com.

Editor's Note.

A special thank you to Nirvan Mullick for allowing us to use his cartoons from the February meeting in this and future Journals.

I will shortly be producing a Journal detailing the Society's activities in 2001. This will be one journal for the whole year without articles, but will contain all the workshop notes and photos from 2001.

As usual I still require articles, photos, new member profiles, notifications of forthcoming events and website summaries for inclusion in future journals. Please send any material to me at:

Leonie Fedel
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Los Angeles CA 90034
(310) 839-9881
mssc@attbi.com

The preferred route is via email, with text and graphics as attachments. Text in the following formats: plain/rich text format/word documents graphics in the form of jpgs. If you need any help in converting information to these formats, please contact me, I'd be happy to help.

We are also happy to include advertisements within the Journal either from individual members wanting to sell an item to other members, or from companies wishing to promote their products and services to the MSSC membership. If you wish to place such an advert, please contact our Treasurer, Dave Hirsch for further details and charges.

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Sincerely,
Leonie Fedel
(Editor)