Newsletter

Of the

New York Microscopical Society

1 Prospect Village Plaza
(66F Mt. Prospect Avenue)
Clifton, New Jersey 07013-1918
GPS: Latitude 40.8648N, Longitude 74.1540W

May 2014 **N.Y.M.S. (973) 470-8733** **Volume 8 (28) Number 5**

Meeting Announcement

2014 Spring Micro-mineral Workshop Sunday, May 25, 2014, 1pm to 5pm
NYMS Headquarters, Clifton, NJ

Minerals Under The Microscope
Explore this miniature world.

Bring your microscope or hand-lens, a suitable light-source and some micromineral specimens, mounted or unmounted. Bring some extra material to trade or give away. If you have a presentation, bring it along. If you have a camera for your scope, bring that, too. Also bring some of the gadgets you use for mounting micros and/or studying them.

***__Table space for 16 attendees__*: Contact Mel Pollinger asap to reserve a spot.**

Refreshments will be available. Those attending can have a tour of our facility and also see our member-accessible microscopy lab and library. For additional information please contact Mel Pollinger (pollingmel@optonline.net) or (201)791-9826, no later than noon on Saturday, May. 24th, or cell= (201) 314-1354 (meeting day only)

Peter Diaczuk awarding tokens of appreciation from NYMS to Speakers at Microscope Day

Save a Tree: Get The Extended Newsletter: By Email Only

Board of Managers

John Scott	nyconsnfdn@aol.com;	(646) 339-6566	June 2015	President
Angela Klaus	klausang@shu.edu;	(973) 761-1840	June 2015	Vice President, Program & Edu. Chair
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Andrew J. Winter	andrew.winter@co.middlesex.nj.us;	(732) 816-3793	June 2016	Board

For additional information contact the Editor: Mel Pollinger at (201) 791-9826, or pollingmel@optonline.net

Dues and Addresses
Please remember to mail in your Dues to:
Mary McCann,
Membership Chair
30 Spy Pond Parkway
Arlington, MA 02474

Junior (under age 18) $10 Annually
Regular $30
Student (age 18 or above) $20 Annually
Supporting $60 Annually
Corporate (includes one advertisement in NYMS News) $175 Annually
Life $300 (payable within the year)
To avoid missing notices:
Notify Mary McCann and Mel Pollinger if you have changed your address, phone or email.

Awards Given by the New York Microscopical Society

The New York microscopical Society takes great pleasure in recognizing and rewarding individuals who have contributed to either the activities of the society or to furthering microscopy. These awards are described in our website and in a pdf file for our email newsletter recipients. All members are eligible to nominate individuals for these various awards, and are encouraged to do so.
John A. Reffner, Awards Committee Chairperson

Awards Committee
Chair: John A. Reffner
Members
Jan Hinsch
Peter Diaczuk
Angela Klaus
John R. Reffner

Mel Pollinger, Editor
18-04 Hillery St.
Fair Lawn, NJ 07410-5207

To Order Your NYMS Lapel Pins
Send a check in the amount of $12.00 per pin to:
New York Microscopical Society
c/o Mel Pollinger, 18-04 Hillery Street, Fair Lawn, NJ 07410. To avoid shipping & handling charges, pins may be purchased directly at any NYMS meeting for $10.00.

The Mission of the New York Microscopical Society is the promotion of theoretical and applied microscopy and the promotion of education and interest in all phases of microscopy.

Alternate Meeting Notifications
Please note that due to time constraints in publishing, some meeting notices may be available by calling Mel Pollinger at 201-791-9826, or by visiting the NYMS website, or emailing: pollingmel@optonline.net

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Please remember to pay your dues

Buy and Read a Good Book on Microscopy.

Pre-Announcement for NYMS Summer 2014 Picnic

Where: At the home and Gardens of Jan and Wiebke Hinsch.

6 Willow St, Woodcliff Lake, NJ 07677
Home:201-573-9851
Cell: 201-574-6522

When: Sunday August 17, 2014

Noon to 5:00pm

Cost per person: $35.00

Details and Reservation Form in Summer (June) Newsletter

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Upcoming Events in 2014

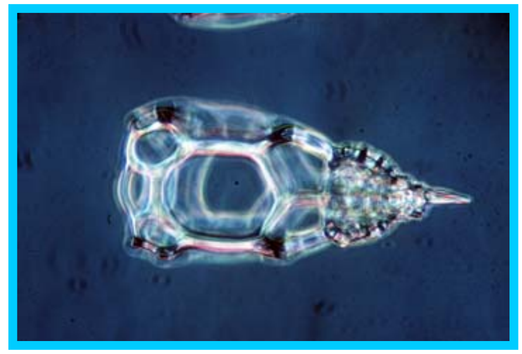
Dates, Times and Locations to be announced when confirmed:

- Summer Inter-Micro
- Summer pond-life collecting trip
- Summer Picnic August 17 th – to be posted in May
- Summer Forensic Course
- NYMS September Meeting lecture
- NYMS October Meeting lecture
- Fall Antique Slide Workshop at Clifton
- Fall Forensic Course
- Eastern Analytical Symposium (November meeting)
- NYMS Annual Banquet (December meeting)

Please note that our website is presently under repair.

From page 4

Radiolarian: Cycladophora goetheana, 83x, Image by Eric Gravé



The Radiolaria are protozoa of (diameter 0.1–0.2 mm) that produce intricate mineral skeletons, typically with a central capsule dividing the cell into the inner and outer portions of endoplasm and ectoplasm. They are found as zooplankton throughout the ocean, and their skeletal remains make up a large part of the cover of the ocean floor as siliceous ooze. Due to their rapid turn-over of species, they represent an important diagnostic fossil found from the Cambrian onwards. Some common radiolarian fossils include Actinomma, Heliosphaera and Hexadoridium.
Excerpted from Wikipedia, an online free encyclopedia

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Inter/Micro 2014 June 2 to 6
at McCrone Research Institute in Chicago
For more information, visit our website at:
www.mcri.org
Contact us at (312) 842-7100 or by email at:
intermicro@mcri.org

The deadline to submit abstracts has been extended and is now: April 30, 2014

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Salmagundi Meeting in April: NYMS President, John Scott commented on that meeting: ***The April 2014 Meeting of the Salmagundi club in NYC was reported to be a great success. Turnout was 60 or so. Nick Petraco was a tremendous hit and Ms. Loll did a good job. There was a video crew and we may eventually have some of that video for study at NYMS.***

Be A Volunteer – There's *Always* Something to do and see at NYMS.
If you wish to contribute some of your time to NYMS, please contact me at (201) 791-9826 or by email at pollingmel@optonline.net

Visitors Always Welcome to NYMS

Although most of our lecture meetings, workshops and classes are held in the NYMS Clifton facility on the last Sunday of the month, the building may be opened for special purposes at other times, by appointment only. For such an appointment, please contact Mel Pollinger by phone at (201) 791-9826, M-F noon to 9:30pm, or by email at pollingmel@optonline.net.

***From The Editor…* if you have email:** Getting the newsletter by email means you can receive an **extended pdf version** that cannot be sent by "snail mail." Even if you only continue your USPS delivery of the newsletter, NYMS needs your email address for reporting priority events and special news. Being able to contact you quickly by email means better communication between you & NYMS■■ Mel

Need to use a Microscope?

The various microscopes that are presently set up on the main floor of the New York Microscopical Society building in Clifton, N.J. are there for the use of its members.

Microscope Cleaning Kit

A complete set of tools and accessories to keep your microscope in optimum operating condition. The kit is put together by our Curator/Educational Chairman and available directly from NYMS for only $35.00 plus shipping & handling, or may be purchased at a meeting. Call or email Mel Pollinger for details (see page two for contact numbers).

Errata: Kevin E. Bennet's email address on page 3 of 4 in the April 2014 newsletter was incorrectly reported as kbennett@mayo.edu and should be kbennet@mayo.edu (only one "t")
(reported by Dan Slatkin)

Please note that our website is presently under repair.

Answer to Mystery Photo for April 2014

Radiolarian: Cycladophora goetheana, 83x, Image by Eric Grave

Correctly identified by Richard Howey, Mike Much and Martin Eber - see page 3

Mystery Photo for April 2014

Want to take a guess? Send it to me by email or call me: pollingmel@optonline.net, (201) 791-9826

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Additional Historical NYMS Supplements
Email Newsletter recipients will also be getting copies of NYMS Newsletter pdf back-Issues from 2007. Copies of older newsletters will be sent as I convert them.
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Attention NYMS Members

Got something to sell? Article to publish? Pictures for the newsletter? Looking to buy something? Want to use the library? Want to use a NYMS microscope?
For any of the above, contact the Editor, Mel Pollinger.

Supporting Member

NYMS Extended Newsletter Section May 2014

In This Section:

- **Stereo microscopes**
- **Microscope Day at JJay**
- **Picnic application**
- **Directions to Picnic**
- **For sale by Gregory Argentieri**
- **Noted scientist dies**
- **NYMS Items** for Sale
- **Membership Application**
- **Last page images**

Directions to NYMS Headquarters

One Prospect Village Plaza
(66F Mount Prospect Avenue)
Clifton, NJ 07013

GPS: Intersection of Colfax & Mt. Prospect:
Latitude 40.8656 N, Longitude 74.1531W,
GPS: Our building: Latitude 40.8648 N,
Longitude 74.1540 W

From George Washington Bridge:
Take Interstate Route 80 west to Exit 57A, Route 19 South. Take Route 19 to Broad Street and continue two lights to Van Houten Avenue. Turn Left. Go to second light, Mount Prospect Avenue and turn left. Building 66F is on the left side , one and a half blocks from Van Houton.

From Lincoln Tunnel:
Follow exit road to NJ route three west. Continue to Bloomfield Avenue exit. Turn right to Circle and go three quarters to Allwood Road West. Mount Prospect Avenue is a few blocks on the right (a small street) Turn right and go to first light (Van Houton) continue. Building 66F is on the left side , one and a half blocks from Van Houton.

From North:
Take Garden state Parkway South to Route 46 Clifton Exit. On 46 Make second exit to Van Houton Ave. Continue to third light Mount Prospect Avenue and turn left. Building 66F is on the left side , one and a half blocks from Van Houten.

From Route 46 coming from west:
Take Broad Street Exit in Clifton and follow Directions above from GW Bridge.

From route 46 coming from East: Take Paulson Avenue Exit in Clifton and follow to Second light, Clifton Ave turn right. Go to next light, Colfax, turn left, go three blocks and turn right on Mount Prospect Ave.. Building 66F is half block on right.

Public transportation from NY:
Take NJ Transit train from Penn Station to Secaucus Transfer Station. Change trains to Bergen Line to Clifton (call NJ Transit for schedules). From Clifton Station cross under tracks to first street and go left one block to Mount
Prospect Street, turn right and Building 66F is one half block on Right.

If you plan to come by bus or train, please copy the links below into your browser:
http://www.njtransit.com/sf/sf_servlet.srv?hdnPageAction=TripPlannerItineraryTo
http://www.njtransit.com/sf/sf_servlet.srv?hdnPageAction=BusSchedulesP2PTo
http://www.njtransit.com/sf/sf_servlet.srv?hdnPageAction=TrainTo

Stereomicroscopes: Part 1

Understanding Stereoscopic Vision and the Evolution of Stereoscopic Devices (5th Edition)

R. Jordan Kreindler (USA)

Figure 1. Some stereomicroscopes

Introduction

Although not as widely recognized as standard biological compound microscopes, stereomicroscopes are widely used.

Stereomicroscopes and Entertainment Media

In addition to their real world uses, some discussed in this paper, they are often seen in television shows and movies, particularly those containing elements of forensic science. For example, the American Optical (AO) Cycloptic® microscope with its unique appearance (discussed in more detail in the CMO section), and its distinctive Galilean (discussed later) drum markings has been used in several US TV shows. This includes, possibly the most popular TV drama series of its time, *CSI (Crime Scene Investigation)*, (2000 -), where it was used by Supervisor Dr. Gil Grissom, Ph.D. Olympus SZ series stereomicroscopes are seen on *CSI:NY (Crime Scene Investigation: New York)*, (2004 – 2013). On *Bones*, (2005 -), an Olympus SZX7 is used by one of the show's continuing characters, entomologist Dr. Jack Hodgins, Ph.D. On *Body of Proof*, (2011–2013), the American TV series that starred Dana Delaney as Dr. Megan Hunt, M.D., Dr. Hunt is seen using a stereomicroscope. Reference to the stereomicroscope is made in *Crossing Jordan*, (2001–2007), where the lead character is Dr. Jordan Cavanaugh, M.D., and in *Rizzoli & Isles* (2010 -), titled from its main characters Homicide Detective Jane Rizzoli and Chief Medical Examiner of the Commonwealth of Massachusetts Dr. Marua Isles, M.D.

A Leica MZ series stereomicroscope appears on the BBC's series *Sherlock* (2010 -). *Sherlock* is a modern dramatization of Sir Arthur Conan Doyle's famous detective, and a Leica stereomicroscope is often used by the title character, Sherlock Holmes. In this series the images, which appear to be seen through the Leica MZ series stereomicroscope, are often created using 'artistic license' and can be computer simulations or scanning electron microscope (SEM) photographs. A trinocular Zeiss Stemi stereomicroscope appears in the British TV series, *Rosemary & Thyme* (2003 - 2006), where it is used by named series co-star Rosemary Boxer.

It is likely camera distributors pay for product placement and display, as camera names are often prominently visible in movies and on TV. However, although they are relatively ubiquitous in forensic dramas, these rarely display the names of the stereomicroscopes used, and if they are present, the names and logos are often blurred or otherwise obscured.

Coverage and Balance

In this paper, I have tried to be comprehensive and balanced as regards the history of stereo vision, instruments, stereomicroscopes and stereomicroscopy. This coverage has depended upon:

(1) The help of technical staff still employed or retired from microscope manufacturers. However, some stereomicroscope manufacturers are no longer in business. For many of these companies, only limited information is now available. In addition, some makers merged with others, after these mergers some business contracts, manuals, instructions, and other information was "tossed out".

(2) Available printed resources e.g., manufacturer or reseller brochures, manuals, and books contemporary to the time many of these instruments were made, and more modern texts, journals, and on-line resources, are the sources I have relied upon where companies no longer exist or have merged, and manufacturer personnel are no longer available.

(3) Many fellow microscopists and microscopy enthusiasts were kind enough to share information about their instruments and stereomicroscopy, and this knowledge has helped make this paper more accurate and comprehensive. These individuals, where anonymity was not requested, are identified in the "Combined References and End Notes" section of the paper.

Background: The Compound Microscope

In this paper, the term "compound microscope" is restricted to mean a standard "non-stereoscopic" monocular or binocular microscope, although most stereomicroscopes are also compound microscopes

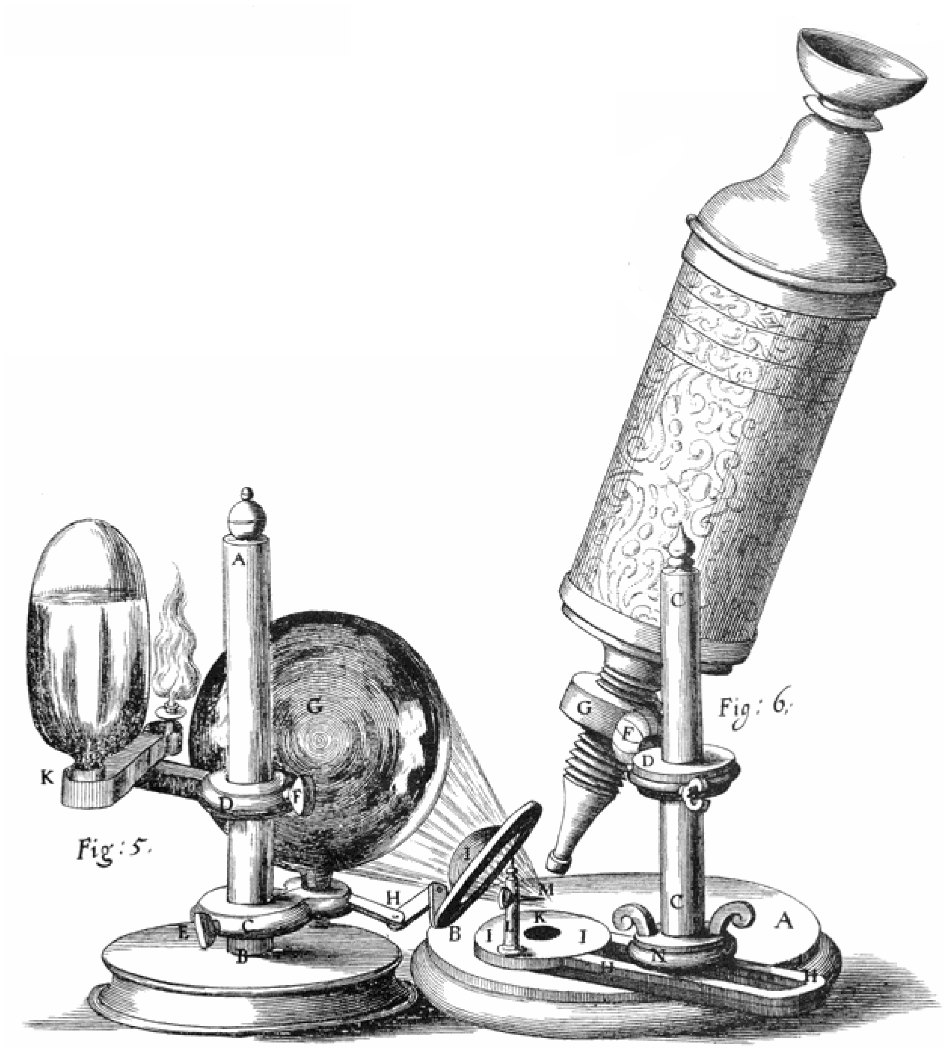


Figure 2. Robert Hooke Microscope c. 1665 used reflected rather than transmitted light

Most compound microscopes, metallurgical microscopes being an exception, use objectives designed for specimens mounted on slides and enclosed under cover slips. Objects are commonly flattened by cutting into thin sections, so they can be viewed with transmitted light. This light passes through the subject before it enters the objective. In contrast, stereomicroscopes view most objects using incident light. That is, light is reflected from an object before it enters the lens. Early compound microscopes were an exception. For example, Hooke's microscope of 1665 used reflected light, Fig. 2.

Figure 3. AO high N.A. 0.95 APO Objective

Later compound microscopes usually used transmitted light. For high-resolution imaging, it is critical to correct for coverslip thickness. In the recent past, top quality, and expensive, apochromatic (APO) lenses, e.g., Fig. 3, had correction collars. This allowed for the optical adjustments required on high quality, high numerical aperture lenses to account for variations in coverslip thickness. The Royal Microscopical Society (RMS) standardized coverslip thickness at 0.17mm (the current standard for No. 1.5 coverslips). This standardization significantly diminished the need for correction collars on objectives.

However, owing to coverslip manufacturing variations, high magnification, and high N.A. objectives can still benefit from the presence of correction collars, which can adjust for potential optical aberrations.

Many stereomicroscopes, and comparison microscopes (described in the section to follow), have dual objectives designed for viewing without cover slips. They are designed to view objects at relatively low magnifications, typically 10x - 40x. Some of the more expensive stereomicroscope use APO optics to reduce image degradation.

For most stereomicroscopes, working distance (the distance from the bottom of an objective to the in-focus area of an object) and depth of field are relatively large. Resolution and working distance typically have an inverse relationship. Stereomicroscopes provide microscopic views of the world without the need for complex object preparation. Because of their large field of view they can give us "in context" views of objects that would otherwise be impossible to obtain.

As M.C. Cooke said, " ... we may be permitted to recommend the novice always commence the examination with the lowest power of his microscope ... the greatest satisfaction will always be derived from a great practical use of low powers". Although this was said for compound microscopes, it is clearly applicable to stereomicroscopes.

The Comparison Microscope

In 1911 W. & H. Seibert marketed the first comparison microscope, designed by chemist W. Thörner for food quality control. This was followed shortly by comparison microscope models from other German makers, such as Leitz, and U.S. manufacturers (Mappes, 2005). Pictures of a Seibert comparison microscope can be seen on-line at the *Museum optischer Instrumente* (Mappes, 2005-2006).

Seibert's comparison microscope used two substage mirrors. Similar dual mirrors had already been used by Riddell (discussed later in this paper) c. 1853. (Author's note: dual mirrors can be found on some relatively modern stereomicroscopes, e.g., by British manufacturers Vickers, and Watson.

Figure 4. Bausch and Lomb Comparison microscope. c. 1929 front View

Although neither a stereo nor a standard compound microscope, the comparison microscope can be considered an intermediate instrument between the typical biological compound microscope and Greenough stereomicroscopes (Greenough's design is discussed in later).

Similar to a compound monocular microscope, a comparison microscope provides a single image of each object viewed.

Like the Greenough stereomicroscope, to be discussed later, it has two objectives. However, unlike either of these microscopes, it looks at two different objects at the same time. As its name implies, it is used to compare objects.

Figure 5. Bausch and Lomb Comparison microscope right-side view

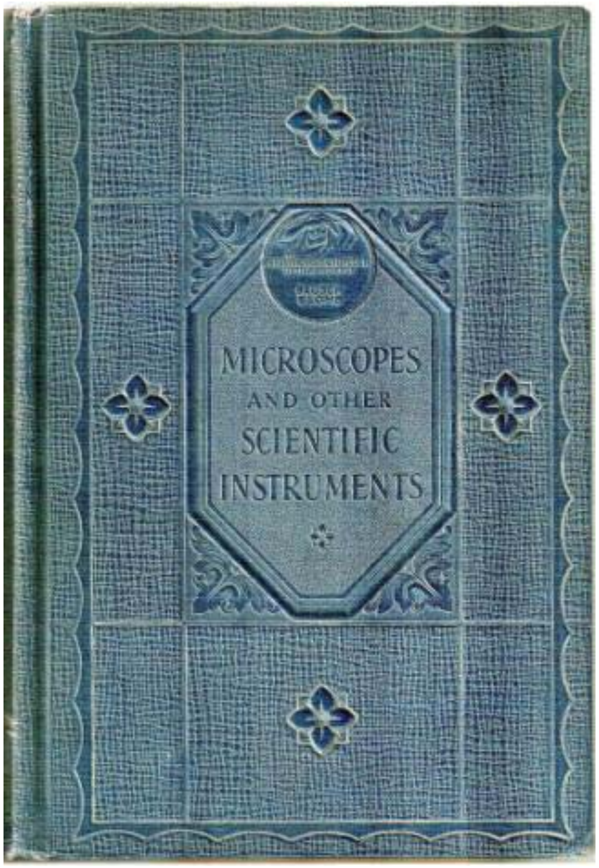


Figure 6. Bausch & Lomb's 1929 hardcover catalog

Perhaps this extract from Bausch & Lomb's (B&L's) 1929 *Microscopes and Other Scientific Instruments* book, Fig. 6, best describes this instrument.

> *The Comparison Microscope makes possible the comparison of any two objects that can be brought within its field, which are seen in juxtaposition through a single eyepiece. It is particularly useful to the technical expert who seeks to compare under the microscope substances, surfaces or colors. Affording, as it does, a means of accurate investigation and of ocular demonstration before courts or jury, it is of great assistance to the examiner of disputed or suspect documents.*
>
> *It is especially adapted for the examination of inks, colors, erasures, changes, interlineations, and overwriting, and for the comparison of disturbed and undisturbed paper surfaces, pen, and pencil points, the tint, texture, and condition of paper surfaces, the texture and quality of typewriter ribbons, written and printed characters, and type faces.*
>
> -- (Bausch and Lomb, 1929)

In 1929 the comparison microscope shown in Figs. 4 and 5, with 2x objectives and 10x Ramsden eyepieces sold for USD $80.00. Other paired objectives were available for $11 and $17 respectively.

Many modern examples of comparison microscopes are often purpose-built for specific functions. A modern example is shown, in Fig. 7.

The Yuken Hydraulics "Microscopic Inspection Device" (Hagan, 2011) is a comparison microscope used to measure "pollution" of hydraulic fluids. Hydraulic fluid samples are soaked up and dispersed by a membrane filter under one of the lenses. The contamination of the dispersed fluid is compared to a standard contamination disc placed under the other objective. This device has built in illumination useable with either an AC or DC power source. It can be used on the bench top of in the field. This is a relatively heavy instrument weighing about 10 pounds.

Figure 7. A Modern Comparison Microscope

History of the Stereomicroscope

One can be excused for believing that the first stereomicroscope was designed quite recently. This is true for the first practical instruments for scientific purposes. However, over three hundred years ago, the first "stereo" microscope, was designed by a monk in the Orders of Capuchin Friars Minor (O.F.M. Cap), also known as the Capuchin Franciscans, a Catholic Order deriving from the Franciscans.

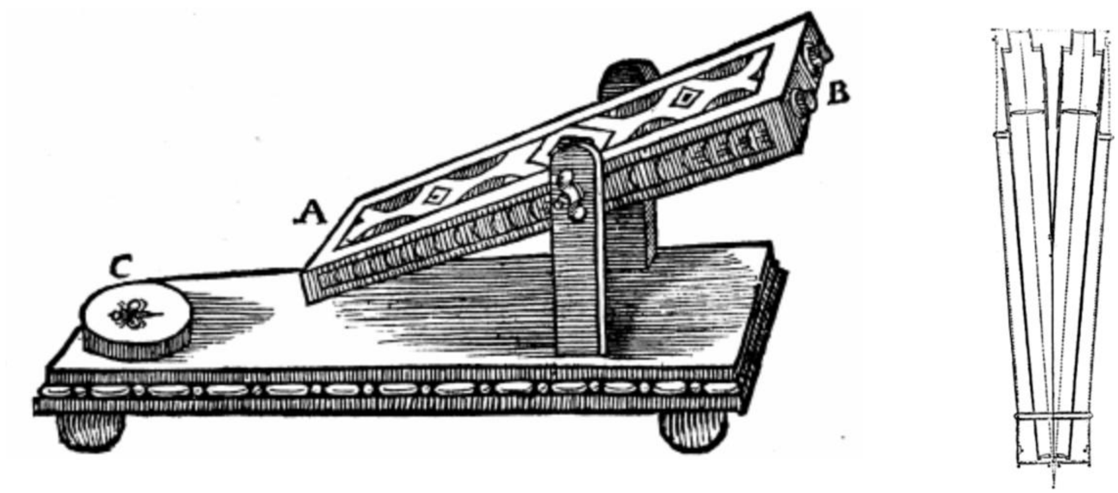


Figure 8. Père d'Orleans binocular microscope (pseudoscope) [Ref. Journal of the Society of Arts 1886]

Father (Père) Cherubin d'Orléans (Francois Lassere) designed his binocular "stereo" microscope, Fig. 8, c. 1670s, (Journal, Nov. 1886), (Cherbun, 1677). This microscope was constructed not only with dual eyepieces, but also with dual objectives, with the images to each eye reversed.

Stereo above is in quotes as this is a pseudoscopic rather than a true stereoscopic microscope (Wade, 1998), (Encyclopaedia Britannica, 1910). In a pseudoscope images appear inverted in the vertical direction, that is high points appear low and low points high. So that object points closest to the objective appear farther away and points farthest from the objective appear closer. Thus, a toothpick viewed through Père d'Orleans microscope would appear as a mold to make copies of the toothpick.

From Fig. 8, it is hard to get a sense of size. Thus, Fig. 9 is presented below. It includes a slightly later Anianus stereomicroscope built on the Père d'Orleans design. As this later version is shown in use, it gives us an appropriate sense of size.

Figure 9. Anianus microscope built on a Père d'Orleans design. Photo courtesy, and with permission of Thomas Serfling and Carl Zeiss Microscopy GmbH .

Normally right images go to the right eye and left images to the left eye to provide stereoscopic images. However, if the images sent to each eye are reversed this is no longer true. As Dr. Kurt Schwidefsky, former head of the Photogrammetry Department of Carl Zeiss Oberkochen, notes in his book (Schwidefksy, 1950), " ... if left and right images are exchanged the orthoscopic *[author: stereoscopic]* effect changes into a pseudoscopic one.

The same effect occurs if the two images seen are rotated by 180 degrees. This 180-degree image rotation is the typical case for both standard compound monocular and binocular microscopes. This can be easily seen by writing "abc" in very small letters, and looking at these letters under a standard compound microscope using the lowest magnification available. The original and its view through a compound microscope are shown below.

abc	Original text
ɔqɐ	As seen through a compound microscope

This reversal is always seen using a standard compound microscope. It is the reason when we move a slide right the image moves left, and when we move a slide downward the image moves upward. Compound microscope images are not seen in three dimensions, spatial orientation is usually unimportant, so this effect is not normally detrimental to subject investigations.

The instrument shown in Fig. 8 was not the only stereo microscope designed by Père d'Orléans. He also designed a stereo microscope made of two monocular-style microscopes and held in housing similar to a cylindrical Withering microscope. [Author aside: Dr. William Withering was famous for his use of the Foxglove plant extract, current day terminology digitalis, and its benefit to heart patients (Withering, 1765)]. Fig. 10 shows an example of the housing design of a cylindrical Withering simple monocular microscope.

As Wise, Ockenden, and Sartory (Wise, 1950) note, although the

> *... principles of stereoscopic vision were not fully understood at the time. Nevertheless, the remarkable fact remains that the author [Père d'Orleans], in his books, had expressly recommended systems giving erect images for the monocular compound microscope. Had he used [author: any of these] his ... instrument would have rendered [author: stereoscopic images].*
>
> -- (Wise, 1950)

D'Orleans' microscope was developed before the invention of achromatic microscope lenses, and at a time when simple single lens microscopes provided better images than their compound relatives.

Perhaps, because of the negative implications of this for serious scientific use, only modest development of the stereomicroscope took place over the next 150 years. The next major advance was achieved by Prof. Riddell in the U.S., c. 1850s, see below, who used prisms above the objective to divide the circle of rays coming from an objective into binocular eyepieces (Ferraglio, 2008).

However, that 1850s development would first require a greater understanding of 3D vision.

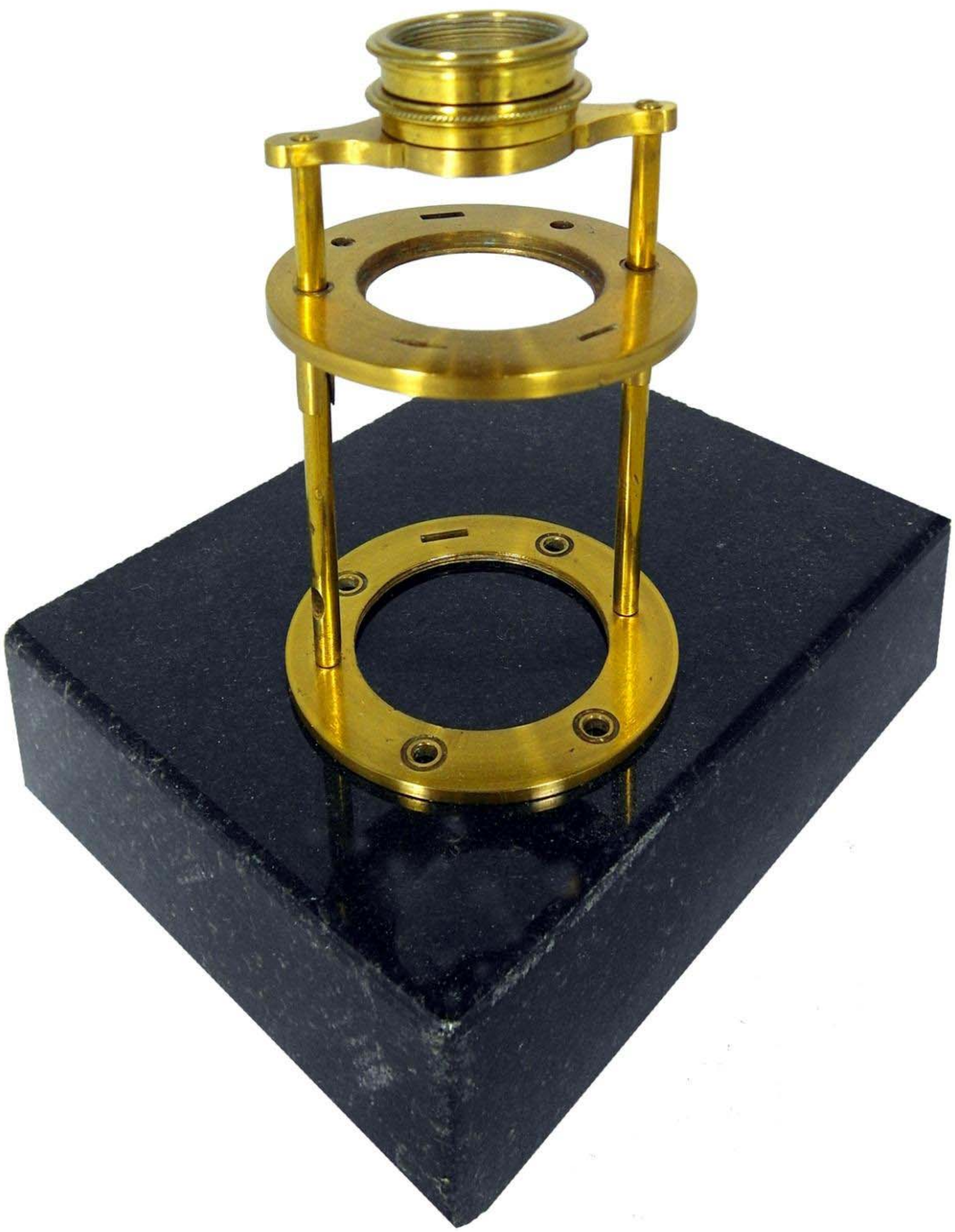


Figure 10. Cylindrical Withering microscope shown w/o accessories

Understanding Stereoscopic Vision:

Wheatstone, Brewster, and Follow-ons

As mentioned earlier, the first "stereo" microscopes were pseudoscopes, e.g., the microscope built by Cherubin d'Orleans, rather than true stereoscopic instruments. An understanding of optical principles gradually evolved. Initial work was done by the English scientist Sir Charles Wheatstone, who constructed his first stereoscope c. 1832 (Wing, 1996). He documented his findings in *Contributions to the Physiology of Vision,* (Wheatstone, 1838*).* Wheatstone is perhaps best known to electrical engineers for the Wheatstone bridge (which was not his invention), to communications engineers for his work on the telegraph, to muscians for his invention of the concertina, and to cryptographers for his Playfair cipher. He was, in the best Victorian tradition, a "man for all seasons". However, he is rarely identified for his invention of the stereoscope.

It is perhaps usual to think of the development of scientific devices as moving in a straight direction to instruments that are ever more capable and sophisticated. However, this is usually not the case. The design of scientific instruments is frequently influenced by external surrounding and public attitudes at the time of their development. That is development usually does not occur in a "straight line". The stereomicroscope definitely falls into this category. Its technology grew at a time of great public excitement, and relatively widespread distribution, of the "new" Brewster stereo viewer. This arose because of the Great 1851 Exhibition (see below). This stereo excitement was likely the stimulus, at least the environment, in which the Greenough stereomicroscope was developed (the Greenough stereomicroscope is discussed later).

The understanding of stereoscopic vision, and the subsequent history of stereo devices, derives from Wheatstone's work. This work was critically important for the development of the stereomicroscope. Wheatstone's basic "discovery" was that the images of an object seen close-up were different as compared to images seen at a distance. The closer an object was the greater the differences in the image as seen by each eye. Images seen at, what is for practical purposes, infinity were identical to both eyes and gave the same impression as if seen by a single eye.

While the stereo viewers, discussed here, may initially seem only marginally related to stereomicroscopes, they were the devices that brought significant public and scientific attention to the wonders of 3D vision. They were critical to the thinking, wonderment, and understanding about what was possible. They helped shape the development of the stereomicroscope. Without their existence and the excitement they generated, the development of the Greenough-style stereomicroscope, widely used today and discussed later in this paper, would likely have been significantly delayed.

Figure 11. Brewster-style stereoscope. Courtesy, and with permission of Rainer Maertin, www.photoarsenal.com

Wheatstone's original interest in stereoscopic vision related to the development of the stereoscope. Wheatstone's stereoscope was an enormous instrument, used on a desk.

However, his optical investigations were important for their understanding and explanation of 3D.

Wheatstone's stereoscope was first developed before the widespread use of chemical photography. Thus, it was necessary for him to commission artists to draw separate, slightly different, pictures that would be perceived as three dimensional, when seen simultaneously with each eye. His papers were a major factor for the evolution of the modern stereomicroscope.

Wheatstone's original stereoscopes used mirrors and were relatively large, heavy, cumbersome, and expensive. Fortunately, his designs were shortly modified, enabling stereoscopes to be produced at a lower cost, and used with relative ease. This redesign was initially done by Scottish Scientist Sir David Brewster c. 1849. Brewster's design would likely have been ignored, as had Wheatstone's, if he had not gone to Paris and met M. Dubosoq who immediately saw the advantages of Brewster's viewer and began manufacturing it.

Dubosoq quickly realized that photographs for Brewster's viewer should be taken at the general distance that the eyes were apart. (Pellerin, 2000). [Author's aside: The process of Louis-Jacques-Mandé Daguerre, see below, had just become available. The French government acquired the Daguerre process and in 1839 gave it as a gift, "free to the world". Daguerre is considered so important in France, that his is one of the less than one-hundred names inscribed on the Eiffel Tower].

Brewster documented his work c. 1840s in two technical papers. The second paper was presented to the Royal Society of Edinburgh in 1844 (Wing, 1996). Brewster, following on the work of Wheatstone, realized that the eyes are approximately 2-1/2" inches apart, so any dual images produced and then seen with that separation would produce stereo vision. In the course of his investigations, Sir David Brewster found the mirrored viewers of Wheatstone were difficult to build and use, so he developed stereo viewers of his own design. Wheatstone's and Brewster's stereoscopes, were devices for viewing two not quite identical images to produce a 3D view.

Brewster-style viewers were made from a variety of woods, from exotic burled and bird's eye maple, Fig. 11, to more traditional woods, Figs. 13 and 14. They were popular at the time of their original manufacture, and thus made in large quantities. Many of those made in the 19th and early 20th century are still commonly available for sale today, at relatively low prices. As a major contributor to the Encyclopaedia Britannica editions of 1842 and 1860, Brewster was able to document his work for a larger audience. However, it was Queen Victoria's and Prince Albert's interest in the Brewster stereoscope at the London Exhibition of 1851 [(Fox, 2003), (Blake, 1995)] held at Hyde Park, in the Crystal Palace Fig. 12. This combined with the rise of chemical photography, c. 1834-39 by William Henry Fox Talbot, in England and in c. 1839 by Louis-Jacques-Mandé Daguerre, in France, that generated widespread public awareness, interest, and acceptance of stereo viewers and stereo photography. Photographs made using the processes of Daguerre and Talbot are known respectively as daguerreotypes, and talbotypes or calotypes. It is likely that Talbot's techniques were developed before Daguerre's.

The London Exhibition was open almost six months, and it has been estimated that 33% of the British population attended. The Great Exhibition was a way for Britain to display their achievements, many scientific, to the rest of the world. Invitations were extended to other countries to participate. It was also a way for Prince Albert and Queen Victoria to highlight the progress that occurred under her rule. The Exhibition's longer name was the "Great Exhibition of Works of Industry of All Nations", and fifty nations participated. The Exhibition is alternately referred to as the "Crystal Palace Exhibition", the "Great Exhibition", or the "Exhibition of 1851". During this time Queen Victoria called Brewster's stereo viewer (Author's aside: The Brewster viewer was made by a Paris maker, mentioned below, under the guidance of Sir David) "a marvel of the highest order" (Dinkins, 2009-2). The Exhibition was, perhaps, the single most important event in the recognition and future progress of stereoscopic activity. [Author's aside, profits from the Great Exhibition were used, following Prince Albert's direction, to fund museums in England, including London's Natural History Museum. (Shuter, 2003)]

After the Great Exhibition, many versions of the stereoscope could be found in England and across the channel in France. In the US, Holmes later designed a less expensive stereo viewer in 1861, (see below). However, until the Holmes-Bates device's introduction in the US, stereo viewers of the Brewster type were made by manufacturers, primarily, in Europe and England.

Figure 12. Exterior view of the Crystal Palace used for the Great Exhibition of 1851, as shown on early English post card, after it was moved, flags of participating nations removed, and rebuilt somewhat enlarged at Sydenham, after 1854.

For example, the three Brewster-style viewers shown in, Fig. 13, were all made in France, by *Unis France, Stereoscopes Paris*.

On the left is a less common large viewer, with its back partially tilted to show a portion of its frosted glass rear window, approximate size: 140mm deep (with focusing extended away from the body) x 160mm wide x 105mm tall). In the middle of the Fig. is a more flexible stereoscope. It contains a mirror on the underside of the lid (raised slightly here) to reflect light into the viewer. It can be used to see opaque as well as transparent images. On the right is a less expensive 3D viewer, absent the capability to view opaque images. The knobs, seen on the right and left viewers, allow the eyepieces to be moved in or away from the body for focusing.

Fig. 14 shows a Brewster-style viewer, and one of the slides used with it. This viewer is designed exclusively for 10 cm x 4.5 cm glass slides, and does not have the capability to view opaque images.

It was also made by *Unis France*, who at the time was possibly the leading European maker of Brewster-style viewers.

Figure 13. Three Brewster-style stereo viewers

Figure 14. Brewster-style dedicated glass slide viewer, and a glass 3D slide

Fig. 15 shows a turn-of-the-century microscope-styled viewer developed by Moritz von Rohr of Zeiss, Germany. It was designed using concepts of Swedish ophthalmologist (and Nobel Prize winner, 1911) Allvar Gullstrand (Zeiss, 2006). The similarity in design of this viewer to a stereomicroscope is obvious.

Figure 15. Verant Magnifier, c. Late 19th century. Courtesy and with permission, Carl Zeiss AG, (Zeiss, 2006)

The Holmes-Bates Viewer

Dr. Oliver Wendell Holmes (USA) was a frequent contributor to the Atlantic Monthly (and father of the Associate Justice of the Supreme Court of the United States, whose life is documented in the 1950 movie *The Magnificent Yankee*). He was an ardent hobbyist and enthusiast for the then recently developed viewers and views yielding three-dimensional images. (Hankins & Silverman, 1995)

He felt there was a need for a less expensive and lighter version of a stereoscope than the Brewster models available at the time. He developed a prototype for a less expensive stereo viewer, deliberately left it unpatented, and showed it to a number of Massachusetts acquaintances. The viewers he designed were, as were most of its descendants, very low power simple binocular microscopes.

One of his acquaintances, a small-scale seller of photographic items and stereo view devices, was Joseph L. Bates, who had a Boston business. Fig. 16 shows Bates' added "inventions and improvements" to Holmes' stereo viewer. This figure is from the back of one of Bates' stereo view cards, and the picture of his Boston store is from the front of another. Mr. Bates was intrigued by Holmes' work. Bates' improvements included adding a sliding focusing mechanism with wire holder, see photo. From that joint work, the popular open, covered eye hood, stereo viewer was developed.

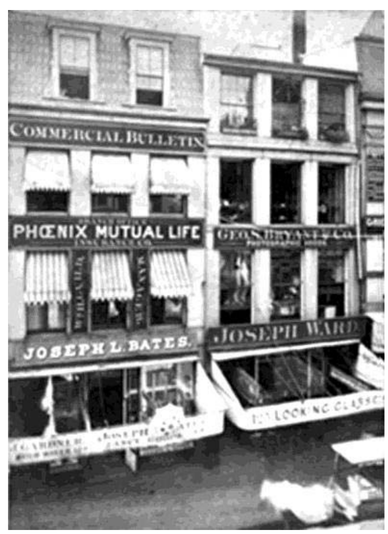


Figure 16. Bates' viewer and his Boston store from back and front of stereo view cards

After some modifications and simplifications, the Wheatstone, then Brewster stereoscopes evolved to become the Holmes-Bates parlor stereo viewers popular in the late 19th and early 20th century. This open stereo viewer, with wood or metal eye hood, is still often called a Holmes-Bates stereo viewer after its two developers. The newly designed viewers were made in large numbers, and were quite popular, possibly owing to their relatively low cost. This helped stereo viewing gain broad public acceptance (Waldsmith, 1991 and 2002).

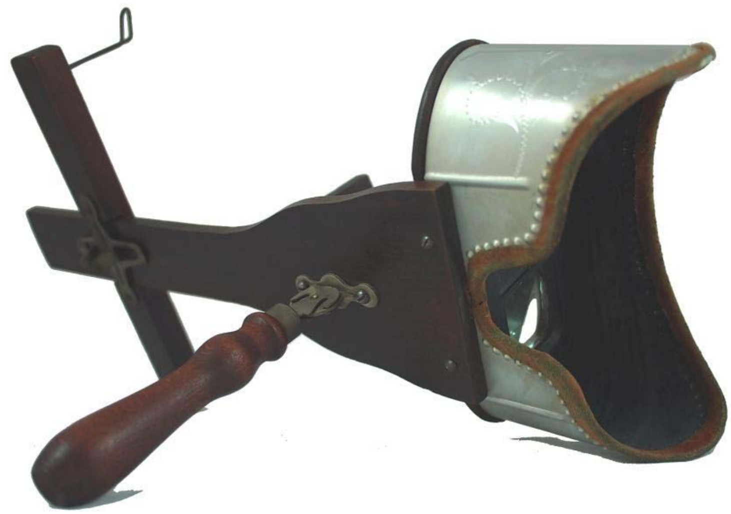
These viewers were made in both hand-held and table models, with the hand-held models being both less expensive and more popular. Fig. 17 shows a Walnut tabletop stereo viewer and a handheld stereo viewer, both were made by Bates. The topmost viewer holds a Bates stereo view card. Both viewers were made in the latter half of the 19th century.

Viewers sold by Bates can be identified by:

(1) a large bulbous handle to provide support when viewing, and simultaneously
(2) a Bates blind stamp, or
(3) a gilt border design with alternating icons between dual gilt bordering lines.

Figure 17. Bates (1) Walnut tabletop stereo viewer holding Bates stereo view and, (2) handheld stereo viewer

Second-hand Holmes-Bates viewers are still commonly seen for sale at relatively low prices. These viewers were popular in America for about 60 years, which explains their ubiquity.



Inexpensive stereoscopes made of wood and metal were common sights in middle and upper class households in the 20th century, their popularity gradually diminished with the rise of radio and movies.

Figure 18. 20th century (Holmes-Bates style) hand-held stereoscope. The "Monarch" model, Keystone, Meadville, PA.

The most widespread viewers and views, at the start of the 20th century, were those made by the USA's Keystone View Company of Pennsylvania. Other companies, e.g., Underwood and Underwood, and H.C. White, also produced these instruments in large quantities. However, by about 1905 Keystone was probably the world's largest provider of stereo viewers and views, and their aluminum and fabric hooded Monarch stereo viewers, Fig. 18, had the largest market share after about 1910.

Stereo viewers were in their time the primary devices that brought the distant world to local living rooms. They were the televisions and internet of their day. They allowed people to learn about the world in a way that was not possible with the two dimensional printed images in magazines. Waldsmith (Waldsmith, 1991 and 2002) provides a somewhat more extended discussion of the evolution of stereo viewers, and a detailed discussion of stereo views.

The Stereographoscope

The *graphoscope* (*infrequently spelled graphiscope*) started life as a simple low power microscope with a single large lens. It could be used to view photographs, printed text, hand writing, etc. in more detail. It was commonly made to collapse into a rectangular configuration. There are numerous examples of single lens graphoscopes made in France before the 1860s.

With the growing popularity of stereo viewers, Charles J. Rowsell of England decided to incorporate a stereo viewer with the earlier graphoscope, and he received a British patent in 1864. This combination of large lens simple microscope, i.e., graphoscope, combined with a stereo viewer eventually became known as a stereographoscope (stereo + graphoscope).

[Author's aside. There seem to be more examples of stereographoscopes that come to market from France, than anywhere else.]

Figure 19. Stereographoscope

The stereographoscope were the earliest examples of a simple, albeit very low power, monocular and binocular microscope combined in the same instrument. While Wenham's prism binocular microscope discussed below represents one of the earliest compound microscopes designed with this same capability, but for higher magnifications.

Fig. 19 shows a stereographoscope containing both the large lens, and a stereo viewer on the same front plate. Graphoscopes and stereographoscopes are still commonly available on the used market at prices similar to, or only slightly greater than, those of stereoscopic only viewers.

Although stereographoscopes may look substantial, they are typically relatively lightweight and delicate devices. They are usually inexpensively made, and easily damaged. As they do not have the eyeshade of the standard stereo viewer, they are not as easy to use, and often optically inferior. However, they were quite popular, as they display nicely, and many were made.

Some of the more expensive models were designed for impressive appearance and were built from specialty woods. They often had attractive engravings and added ornamentation. Fig. 20 shows a larger stereographoscope with engraved designs.

Figure 20. A slightly larger and more ornate stereographoscope

The terms graphoscope and stereographoscope were later used by various manufacturers, sometimes with only slight punctuation variations, e.g., grapho-scope, or stereo-graphoscope, for devices that differed considerably from the original stereographoscopes.

Figure 21. Stereo-graphoscope c. 1889

As one example, a unit identified as a stereo-graphoscope is shown in Fig. 21, It was patented in the US c. late 1880s. It is more similar to a conventional stereo viewer, as can be seen from the photograph, than the stereographoscopes discussed above. It main feature was the presence of brass mounted lenses that could be rotated to view non-stereo images.

Stereo viewers were the most ubiquitous simple stereo binocular microscopes ever made. As with the modern Greenough stereo compound microscope, see later in this paper, they view two slightly dissimilar images, which are then merged by the brain to form a 3D object.

The discussion of "Stereoscopic Vision and the Evolution of Stereoscopic Devices" is continued in Part 2.

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The author welcomes any suggestions for corrections or improvement. He can be reached at:

R. Jordan Kreindler: leona111rjk@gmail.com

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Please send any general comments to the NYMS Editor Mr. Mel Pollinger:
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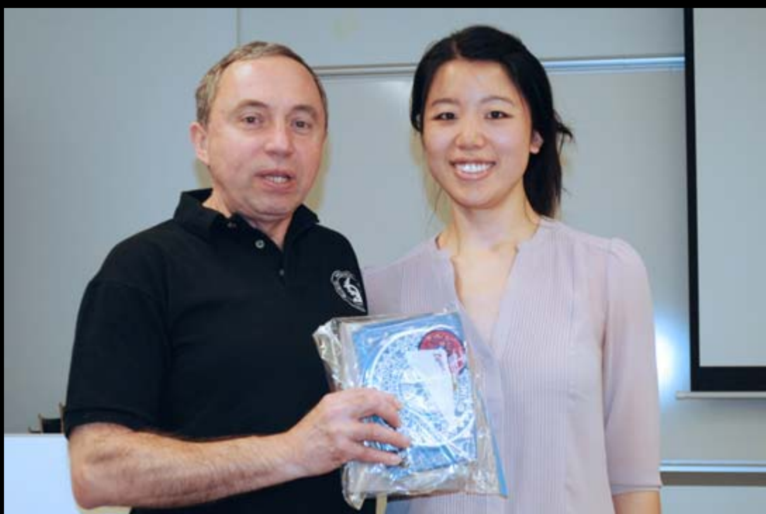
Microscope Day at John Jay

Sponsored by the New York Microscopical Society – 24 April 2014



Lisa Chen, Pete Diaczuk, John Scott

Microscope Day

Lisa Faber

Adam Hartley

Microscope Day

John A. Reffner

Laura Pritchard

Nicholas Petraco

Summer Picnic 2014

Where: At the home and Gardens of Jan and Wiebke Hinsch.

6 Willow St, Woodcliff Lake, NJ 07677
Home:201-573-9851
Cell: 201-574-6522

When: Sunday August 17, 2014

Noon to 5:00pm

Cost per person: $35.00

In case of rain, we will move the picnic indoors. In the event of sunshine, we will remain outdoors and have a wonderful time enjoying the gardens and some microscopically interesting subjects. Bring a camera, the flowers and various other plants are stupendous. There will be many things to enjoy.

Invitation Request Form for:
Summer Picnic hosted by Jan & Wiebke Hinsch
Sunday August 17, 2014, Noon to 5:00 pm

Cost $35.00 per person

NYMS Member Name:______________________________ bringing a guest?___Y/N

Phone (H)____________________________ Email (H)_______________________________

Complete this form and send with payment to:
NYMS Picnic, c/o Mel Pollinger, 18-04 Hillery Street, Fair Lawn, NJ 07410-5207

Please respond by August 10, 2014

Directions to The Home of Jan & Wiebke Hinsch

Jan and Wiebke Hinsch, 6 Willow St, Woodcliff Lake, NJ 07677
201-573-9851, cell phone: **201-574-6522**

Coming from NYC via G. Washington Bridge:
Follow Rt 80/95 and make sure to stay on 80w when 95 branches off south. Go to exit 62 (Saddlebrook/Garden State Pkwy) and follow signs to GS Pkwy north. Take exit 168 to Washington/Hohokus. At the end of the ramp turn right on Washington Avenue and proceed to the first traffic light and turn left onto Pascack Rd. Pass through one traffic light and one blinking light. Soon you will see a church on the right (as a landmark) that looks like an upside-down mushroom. Pass it and go through a downhill right curve. At the bottom you have the Woodcliff Lake reservoir on your right. And here the second little street branching off to the left is Willow St with a willow on the corner. Ours is the first house on the right.
Total distance from exit 168 to our house ca. 2.0 miles

Coming from Tappan Zee Bridge:
Follow 87/287 west to exit 14a which is the entrance to the Garden State Pkwy south. Go to first exit (Schoolhouse Rd) and at the end of the ramp turn left into Spring Valley Rd. Take it through two traffic lights and all the way to the end (T) and turn left onto Fremont Rd. Go about ½ mile to the end (T) and turn right into Pascack Rd. After crossing a traffic light you soon see the Woodcliff Lake reservoir on your left. Third street on the right is Willow St. We are the first house on the right.

Coming from South on Garden State Parkway:
Going North on the Garden State Parkway take exit 168 to Washington/Hohokus. At the end of the ramp turn right on Washington Avenue and proceed to the first traffic light and turn left onto Pascack Rd. Pass through one traffic light and one blinking light. Soon you will see a church on the right (as a landmark) that looks like an upside-down mushroom. Pass it and go through a downhill right curve. At the bottom you have the Woodcliff Lake reservoir on your right. And here the second little street branching off to the left is Willow St with a willow on the corner. Ours is the first house on the right.
Total distance from exit 168 to our house ca. 2.0 miles
We don't have air/con but shady places to relax. Please, dress appropriately. For questions email:
wihinsch@optonline.net

Here are directions for public transportation:
At Port Authority bus terminal take the bus # 11A from platform 220.
The bus runs every hour, 10:15; 11:15; 12:15…
The ride is about 55 to 60 minutes to Hillsdale RR-station (maybe little less on Sundays!). From there you have to call us:
201-573-9851 or cell: **201-574-6522** to be picked up. It's a short ride, but too long to walk. At the little light blue railroad building is a public phone.
The ride is half price for seniors if you get a booklet of blue Reduced Fare Coupons issued by NJ Transit (free!) at the information booth inside the terminal. The tickets can be purchased in the bus ~$3.60 one way.

Can't wait to have you here!
Wiebke and Jan

Gregory Argentieri
Trying to find a good home for:
A Gossen/ Leica Microsix-L exposure meter and a
Bausch and Lomb Dynazoom Trinocular Photographic Microscope

Gossen/ Leica MICROSIX-L
Exposure Meter
Description
Gossen/ Leica Microsix-L exposure meter for photo microphotography
THIS LIGHTMETER IS FULLY TESTED AND IN EXCELLENT COSMETIC CONDITION
FOR USE WITH MICROSCOPES-
Gossen Microsix-L exposure meter
The Gossen Microsix-L exposure meter is a meter specially designed to be used with a microscope. The special attachment containing the measuring element is mounted on a microscope and with a connector plugged into the meter. The Microsix-L is made for Ernst Leitz (Wetzlar) and looks very close to the regular Lunasix except that the scale are reversed and the knob on the right side of the Lunasix is removed. The Microsix-L is sold in the world of microscopes as the Leitz Microsix-L. Microsix-L has been designed especially for photomicrography, however, it can also be used for all other photographic purposes.
While the Microsix-L is a highly sensitive exposure meter designed especially for photomicrography. However it can also be used for all other photographic purposes. Its large measuring range accommodates any exposure times likely to be required in photomicrography from instantaneous shutter speeds to long time exposures (e.g. weakly fluorescing specimens).
The measuring eye accepts an angle of 30 degrees which is comparable with that of popular camera lenses e.g. 90 mm for the 35mm format. The microsix-L is simply mounted and clamped onto the microscope like a camera attachment. Only a few manipulations are required for exposure measurements the user reads the measurement off the scale of the exposure meter to determine the correct exposure time within a few seconds. The meter has two measuring ranges for high to medium and for medium to low light intensities. Exposure range is from 1/4000 sec to 8 hours. Suitable for all photomicrographic apparatus.

Operation:

Set the ASA speed of the chosen film or digital equivalent and place the measuring head against one of the measuring sites. e.g. through the eyepiece, camera port, on ground glass screen of the bellows camera, or on an empty eyepiece tube for example. The pointer reads a value. Set this value on the yellow scale on the meter, the correct exposure time appears on the time scale opposite the calibration value. The exposure meter comes in its own plastic container. Instrument comes with a user’s guide.

Asking $250 or best offer

Bausch and Lomb Dynazoom Trinocular Photographic Microscope

This is a Vintage collectable in excellent condition that can still be used as a working or serious hobbyist microscope. This microscope is in good working and good cosmetic condition. I used this microscope to photograph protozoans in collage and in my early NYMS days. Since then it has been locked in my cabinet collecting dust.

The Dynazoom contains a power changer knob engraved in 0.1x intervals from 1 - 2 magnification Permitting changing magnification continuously from 1x to 2x without changing eyepieces. The microscope body can rotate a full 360 degrees in a stand of permanently fixed height. Focusing is with a clutch protected movable stage on ball bearing slides. Coaxial coarse and fine adjustment knobs are on both sides of the instrument. One of the fine adjustment knobs is graduated in microns. The x-y Axis mechanical stage is capable of holding a 2x3inch slide.

• Objectives include standard achromat 3.5x (0.09 N.A.), 10x (0.25 N.A.), 45x (0.85 N.A.), 97X (1.30 N.A.)and 100x Oil (1.25 N.A.).

• Two (2) 10x WF-22 eyepieces. • X-Y axis Mechanical stage can accommodate 2x3inch slides. • Power Changer knob for variable 1-2x magnification without changing objective. • Prism control knob • Abbe 1.30 N.A. Bright field Condenser with an auxiliary lens and slide in lens assembly that can accept 31.5 mm glass filters or darkfield stop. • High intensity illuminator with field iris. • Power transformer has five click positions to control intensity. • Additional Optilume light source with blue glass filter included.

Key Features:

- Dynazoom Trinocular Microscope with X-Y Mechanical Stage
- Ability to attach a variety of microscope cameras or digital imagers
- Five Standard Achromat Objectives, 3.5X, 10X, 45X, 97X, 100X (oil) with 1-2X variable magnification
- One pair of wide field eyepieces: WF10X
- Prism control (switch between camera and eyepiece)
- Variable Power knob for 1-2X Magnification, sort of like an optivar
- Camera Port
- Adjustable interpupillary distance eyepiece
- Adjustable ocular diopter
- Coaxial coarse and fine focus adjustment
- Focusing knobs are on both sides
- X-Y Mechanical stage
- N.A 1.30 Abbe Condenser with iris diaphragm & filters
- Auxiliary Lens with slide in lens assembly
- Rack and pinion adjustment condenser
- Variable High Intensity illuminator with field iris
- Illuminator power transformer
- extra optilume light source with blue glass filter A lens hood for photography through the eye piece.

Photo microphotography attachments:

- Nikon 35mm camera body adapter with tube
- Canon 35mm camera body adapter with tube
- Canon Lens hood for through eyepiece photography
- 4X5 Camera System
- Polaroid 4x5 land film holder
- Two 4X5 sheet film holders
- One 35MM camera back for 4x5 camera system
- 4X5 Matte view screen
- Dust Cover
- Operators Manual with catalog part numbers

All items are working and sold as is.

Local Pickup, or can bring to NYMS in Clifton. Items are located in Vernon, NJ. Asking $500 or best offer.

Contact:

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973-764-1875 Hm Prefer email contact if possible


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BAUSCH & LOMB
TURN OFF LIGHT
OFF 1 2 3 4 5
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John F. MacDonald, PhD, FRSC

John Ferguson MacDonald was the quintessential Canadian scientist. A visionary and an insightful researcher who transformed the field of neuroscience, John was a man whose humility, generosity, and deeply rooted respect for all transcended his outstanding scientific achievements. John died April 22, 2014.

John was born in Vancouver, British Columbia where he spent most of his formative years. He received his undergraduate education at the University of British Columbia and completed a PhD degree in the University's Department of Physiology in 1975 under the supervision of Tony Pearson. After a postdoctoral stint with Glen Cottrell at the University of St. Andrews, John moved to the laboratory of Kris Krnjevic at McGill University. He also trained in the neurophysiology laboratory of Jeff Barker at the National Institute of Neurological and Communicative Disorders and Stroke (now the National Institute of Neurological Disorders and Stroke) in Bethesda, Maryland. John was recruited back to Canada in 1979 when he opened his own lab in what was then the Playfair Neuroscience Unit at the Toronto Western Hospital. John took up his first appointment at the University of Toronto, as an Assistant Professor in the Department of Pharmacology. He was promoted to Full Professor in 1991 in the Departments of Pharmacology and of Physiology. He successfully served as the Chair of the Department of Physiology from 2001-2008. Having shown not only outstanding scientific acumen but also great skill in administering academics, which is no mean feat, John was coaxed to London, Ontario to take the leadership of the Robarts Research Institute where he remained until retiring in 2013.

During his postdoctoral work, John developed a deep interest in chemical neurotransmitters in the brain. When he formed his own lab, he decided to focus his studies on the actions of excitatory amino acids such as glutamate, a decision that proved to be a turning point in cellular neuroscience. Although with his typical humility John often quipped that he made the decision to study excitatory amino acids because 'no one else was doing this', the move was nonetheless prescient as John discovered the voltage-dependence of a specific class of receptors in the mammalian central nervous system. These receptors (eventually termed NMDA receptors) were later found to be required for long-term synaptic modifications thought to underlie some forms of learning. By virtue of their voltage-dependence, NMDA receptors act as molecular coincidence detectors, a characteristic which, as depicted in virtually every textbook of neuroscience, allows a neuron to 'learn' to associate its firing activity with incoming synaptic signals.

Over the ensuing decades, John made many additional important contributions in the broad field of ion channels where he focused on their regulation by cell signaling pathways. He discovered the regulation of glutamate receptors by phosphorylation and postsynaptic scaffolding proteins. John also made major contributions that included the identification of nonselective cation channels in neuronal injury and the regulation of dopamine receptors by growth factor receptors. John published more than 200 scientific articles, many in top-tier journals, including Science, Nature, and Cell. His work was consistently supported by grants from the Canadian Institutes of Health Research, the Heart and Stroke Foundation of Canada, and the Natural Sciences and Engineering Research Council of Canada. His research contributions were recognized by his election to the Royal Society of Canada and to the Canadian Academy of Health Sciences. John's research has broad implications for understanding the cellular basis of stroke, pain, and neuronal injury. He was a co-founding member of NoNO Inc, a biotechnology company that is developing new therapies for stroke and pain. His contributions to the field of neuroscience have been extraordinary.

In addition to his scientific achievements, John has mentored a generation of neuroscientists. More than 50 postdoctoral fellows and graduate students who trained with him are now working in various laboratories around the world. Through John, these trainees learned sound scientific principles, openness to new theories, experimental rigour, and the importance of collegial collaboration. His open-mindedness also provided fertile ground for highly productive collaborations with clinician-scientists. John empowered all his collaborators, as well as his trainees, to see beyond the ordinary and to boldly challenge dogma and the status quo. Through his discoveries, his collaborators and his trainees John's stellar scientific impact will endure long into the future.

Even more important than his science was his family – John was an outstanding husband and father. He and Lidia had a relationship of love, respect and humour which was the envy of all who know them. He loved his daughter Kathy and son Jamie, unconditionally. He was extremely proud of Kathy's exceptional talent as an animator and her deep love for her family. His son Jamie was also his pride and joy; he is a talented musician, extremely successful MBA graduate and a profoundly loving son.

John MacDonald was an outstanding scientist and colleague, a loving husband and father, and a dear friend. His passion for life, his warmth, his dry wit and his charm are greatly missed.

The Department of Physiology at the University of Toronto has created the Dr. John F. MacDonald Fund, in honour of our friend and colleague. This fund will be used to enhance the educational experience of Neuroscience trainees in the Department of Physiology. Through this fund, we will ensure that Dr. MacDonald's legacy continues to inspire future leaders in Neuroscience. We welcome any contributions to this fund. Dr. John F. MacDonald Memorial Fund (http://donate.utoronto.ca/give/show/101)

Online condolences: **http://www.rskane.ca/ (http://www.rskane.ca/)**

to top

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Item #	Size	Member Price	List Price
MT-003	Small Microscope or Stereo	$18.00	$20.00
MT-004	Lab Microscope or Large Stereo	$23.00	$25.00
MT-005	Large Lab Scope	$28.00	$30.00
MT-009	Large Lab Scope with Camera	$31.00	$33.00
MT-010	Universal Scope with Camera	$36.00	$40.00
MT-012	X-large Scope	$45.00	$50.00

N.Y.M.S. Microscopes

185	Monocular Dissecting Microscope	$85.00	$99.00
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Other Items

NYMS Glossary of Microscopical Terms	$20.00
NYMS Patch	$5.00
Microscope Cleaning Kit	$35.00
NYMS Lapel Pin	$10.00

Model 131: Tungsten

Model 131-FLU: Fluorescent

Model 185: 20x

Model 125-LED Cordless

New York Microscopical Society

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I hereby apply for membership in the New York Microscopical Society.

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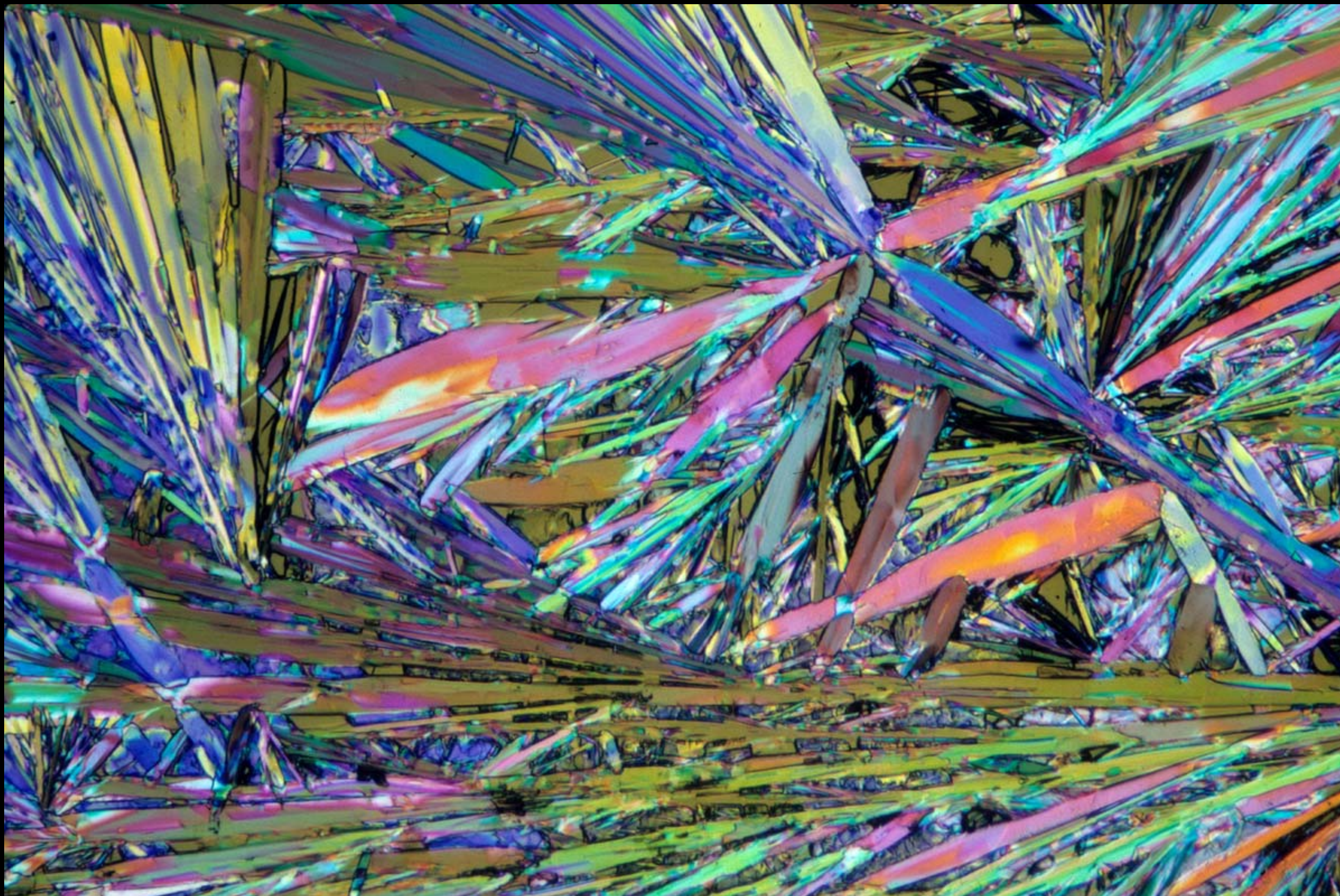

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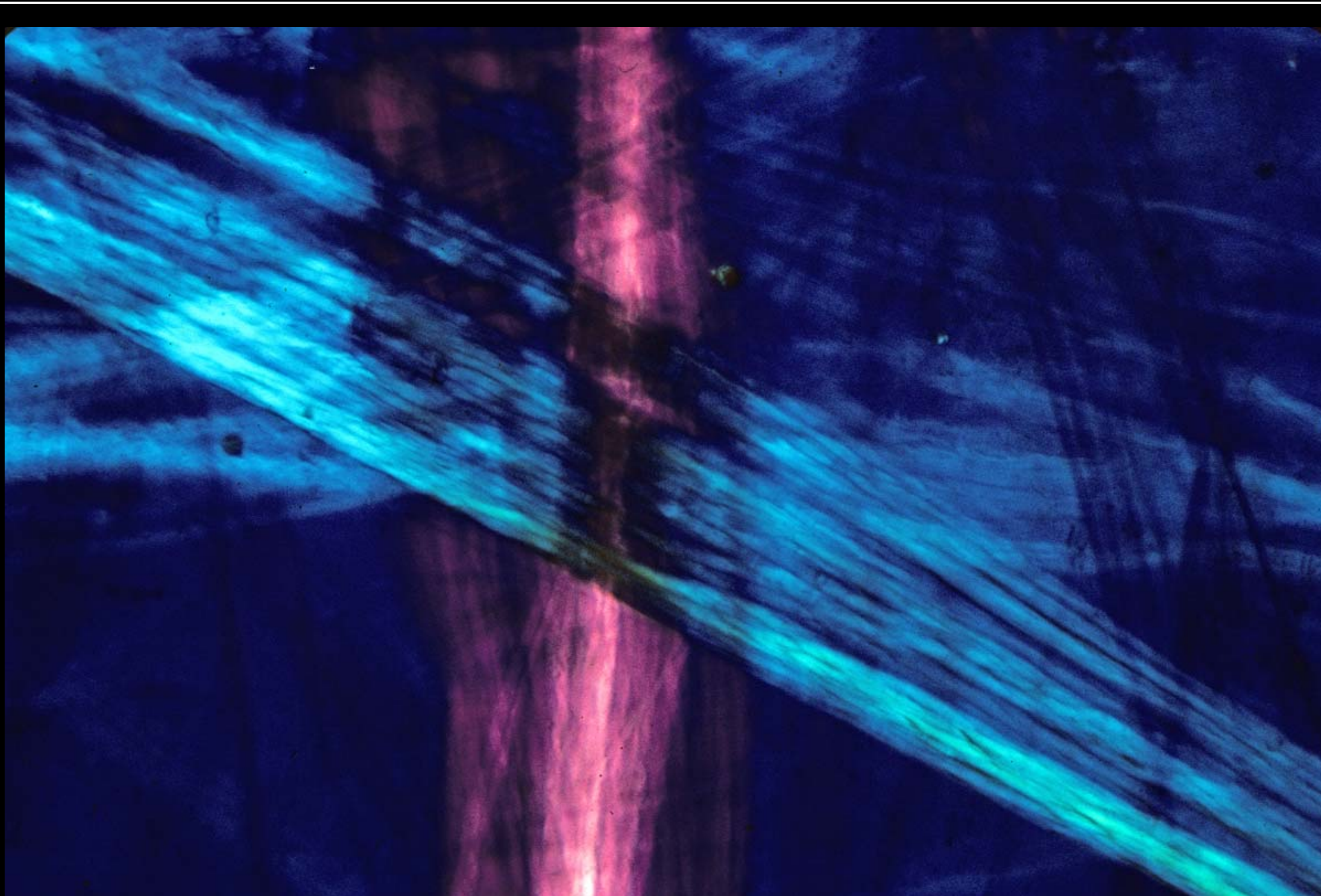

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