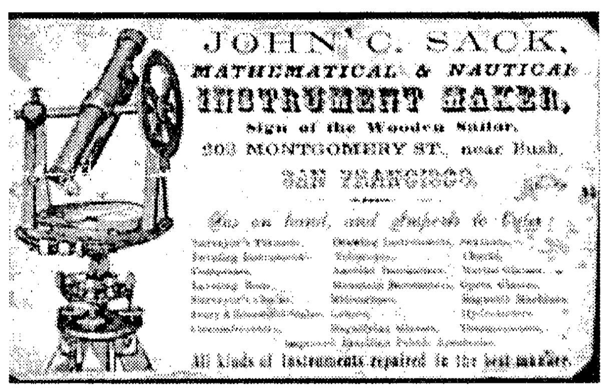
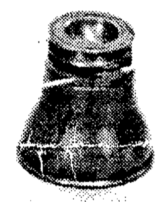
Bulletin of
THE MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA
Volume 1 Number 2 October 1996

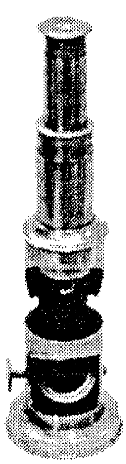
Some Microscopes Used By Pioneer Californians

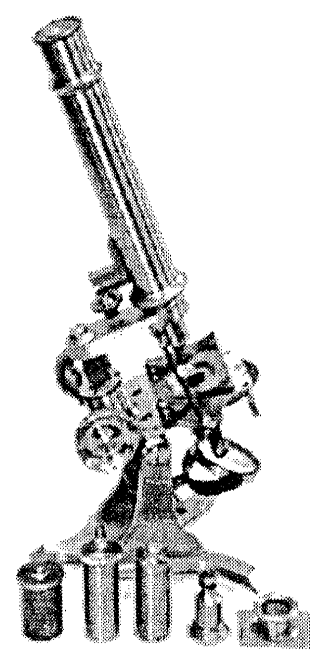
by Stuart L. Warter





With the fabled discovery of gold at Sutter's Mill, there began a wave of immigration into California which hastened its development into a populous state. Early immigrants of the period became known as "Forty-niners," after the date that marks the beginning of the "gold rush." Two such men are connected by a microscope of somewhat later origin.





The microscope, (Fig. 1) on the next page, is a compound monocular instrument of somewhat unusual design. It stands 8 1/2 inches tall when completely closed, and is all brass with a cast iron claw foot coated with a brassy metallic paintlike finish. The arm is a thick double curved brass strap, which bears a short bar-limb on a hinge. Below the bar limb is attached another thick brass strap which serves as a tailpiece bearing a rectangular stage and substage mirror. The body is housed in a sleeve on the bar-limb,

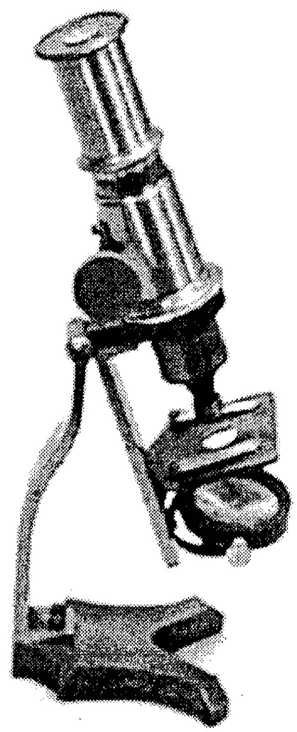


Fig. 1 Microscope owned by Dr. J.E. Kunkler

and focuses by rack and pinion driven by a single knurled wheel. There is a tapering nosepiece with a three part divisible "button" lens. It packs compactly into a nicely finished mahogany chest that measures 9 3/4 x 3 1/4 x 3 inches, and is almost certainly of French origin.

Pasted inside the lid there is a most interesting, and perhaps somewhat anachronistic, trade card (Fig. 2) which reads as follows:

JOHN C. SACK,
MATHEMATICAL AND NAUTICAL
INSTRUMENT MAKER.
SIGN OF THE WOODEN SAILOR,
203 MONTGOMERY ST, near Bush,
SAN FRANCISCO.
Has on hand, and Imports to Order

Surveyor's Transits	Drawing Instruments	Sextants
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Compasses	Aneroid Barometers	Marine Glasses
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Improved Brazilian Pebble Spectacles

All kinds of Instruments repaired in the best manner

MSSC BULLETIN

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Fig. 2 John C. Sack Trade Card

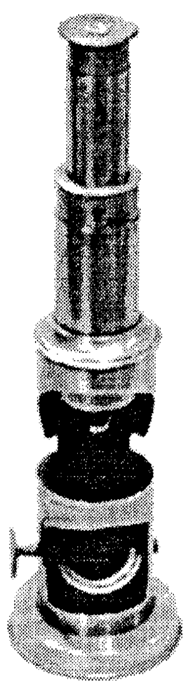

Fig 3. Drum Microscope with
John C. Sack Trade Card

Impressed in the wood alongside the trade card is an oval stamp, 3/4 inch long, containing the words JOHN C. SACK/ OPTICIAN/ 203/ MONTGOMERY, with the upper and lower lines conforming to the curvature of the outline of the punch. Also written in ink in the lid, with an obviously flexible pen (possibly a quill), is the script signiture "Dr.J.E.Kunkler." There is also the inked impression of a stamp of the same name, probably added later.

An identical box, with the same trade card inside, contains a cylindrical 9 1/2 inch drum microscope (Fig.3) of the type made in and exported from France in large numbers during the last half of the past century. There is no owner's name inside.Also in a cabinet with the Sack trade card is a Ross type Society of Arts pattern microscope (Fig. 4) with short lever fine focus, lever stage, and French button lenses, along with a table of powers written in French. Identical instruments to the last are illustrated in Billings' figs. 110 (retailed in England) and 429 (unsigned), and dated 1870. No provenance has been established for the last two instruments.

Sack's name appears in a list of passengers on the steamer "Tennessee," which arrived in San Francisco from Panama on November 6, 1852, and he appears in

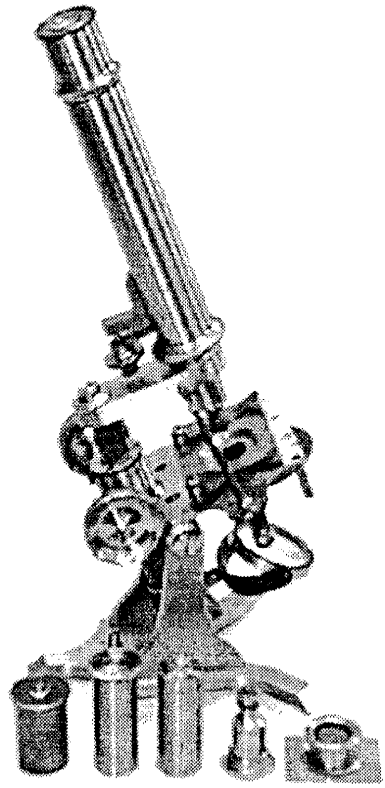

Fig 4. Ross Type Society of Arts Pattern Microscope

the 1860 Census. In 1880 he was listed as an optician at 18 Market St.

In 1880 J.E. Kunkler was listed as a physician at 574 Kearny. His name appears in an 1890 listing of living California pioneers arriving in 1849.

Another microscope of interest was used by a physician practicing in a historic gold mining settlement. It was purchased from an antique dealer who had obtained the correspondence and other personal effects of a Dr. Ernest Stratton, who had practiced in Chinese Camp, near Sonora, in the Sierra Nevadas, East of San Francisco, from the 1860's to about 1920. Among his belongings in a trunk, were his saddlebags, and inside a pouch therein was a simple brass screw-barrel type of microscope, 2 inches high, (Fig. 5) The body of this little instrument is bellshaped, like a barrel of one of the common French-made opera glasses of the nineteenth century. Its bottom is enclosed, with only a small hole to admit light when the instrument is held up to the eye against the light. As found, and still in place, inserted into a slot beneath the simple lens in the eyepiece, and held by a brass leaf spring, was a glass slide with an uncovered air-dried blood smear.

The fact that Dr. Kunkler was careful to have placed his name in the box of his microscope at least twice, suggests that this may have served as a portable instrument that he carried with him on "house calls," and the presence of Stratton's instrument in the saddlebags speaks for itself. Although the importation of instruments to a place so distant as California undoubtably added to their cost, it should not be assumed that instruments of the types described here were the only ones available. The San Francisco Microscopical Society was established in the 1870's; a large Beck microscope owned by that society survived the earthquake and fire that destroyed so much of San Francisco's early heritage, and other, better quality instruments assuredly were in existence and in possession of at least some of its members. The long list of instruments available to Sack indicates that importation of a wide variety of items was possible.

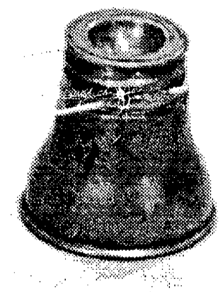

Fig. 5 Microscope Owned by Dr. Ernest Stratton

SIAM

Scanning Interferometric Apertureless Microscope

A 500X Magnification Boost for Light Microscopes

Tech Note 62 George G. Vitt Jr.

During the Workshop of 11 May 1996, Gaylord Moss, our Holography expert, first described to us a new and startling IBM development in light microscopy. Since it opens an important new direction in the technology of light microscopy, it is described below, verbatim, as fully as currently available information allows. (1)

YORKTOWN HEIGHTS, NY. - Scientists at IBM Corp.'s research center have developed a system that can improve the magnifying power of visible light microscopes to the point where they may be able to resolve objects as small as genes, or determine the spectra of individual atoms.

Visible light interacts with atoms to produce characteristic spectra, but until now it has not been possible to use light microscopes to examine individual atoms or their spectra. It is because light microscopes can only magnify objects that are larger than visible light wavelengths (2).

Electron microscopes are able to magnify objects that light microscopes cannot by scanning the sample with a beam of electrons, which have much shorted wavelengths than visible light. Atomic force microscopes create magnified images of a sample by interpreting the deflection pattern made when the sample's atoms interact with atoms in the ultra sharp tip of a flexible recording arm. (3) Neither of these microscopes, however, can provide spectral information about the sample.

The Scanning Interferometric Apertureless Microscope (SIAM), developed by Kumar Wickramasinghe and colleagues at IBM, can be used to identify and image objects 1/500 the size of the smallest objects that can be seen by conventional light microscopes.

In the SIAM system, a laser and lenses are located beneath a 100 micron thick glass slide, or microplate, holding the sample. The lenses focus the laser light into the smallest spot possible, roughly 1/3 of a micron in diameter, through the glass onto a very thin slice (4) of the sample. Low power (mw) HeNe and dye lasers that can be tuned through the visible spectrum are used. A silicon probe tip, sharpened by etching to 1-nm thickness, is mounted on a scanner above the sample. The scanner vibrates the probe tip toward and away from the sample at about 200,000 times/sec.

The vibrating tip backscatters light within the laser spot after it passes through the sample. This scattered light retraces its path through the sample and lenses, and is combined with a reference laser beam of unscattered light to produce an interference pattern, which is examined with a highly sensitive interferometer to measure the phase shift between the reference beam and the scattered light. This information is then sent to a computer that interprets the data to reveal chemical composition and create the image of the sample, pixel-by-pixel.

One potential use of the SIAM system is examining antibody and cell membrane interactions. Current techniques, that fluorescently tag antibodies to locate them on an antigen's surface, can resolve the stained tissue to about 0.5 microns (500-nm). Using the SIAM system,"you can scan through a sample and see where fluorescence labeled antibodies are, to within a nanometer or so," said Wickramasinghe. The system could also be used to look at and map patterns of genes on chromosomes or see the molecular structure of viruses or bacteria.

The researchers are currently using a microscope and the SIAM system to examine individual atoms. Wickramasinghe said that this team hopes to be the first to record the spectra of a single atom. (5)

Notes:

(1) Biophotonics News, May 1996; from Gaylord Moss.

(2) This statement is not exactly correct. With good optics, one can resolve to half the wavelength of green light, i.e., down to about 225 nm.

(3) The Atomic Force Microscope was described in:
TECH NOTE 2 of May 1990;
TECH NOTE 35 of Sept 1994.

(4) Presumably, the sample is cut with an ultra-microtome, using a glass blade - or, perhaps an ultrasonically vibrated microtome blade, undoubtedly at resonance, as recently announced by Leica Inc.

(5) Not bad !!!

WORKSHOP of the Microscopical Society of Southern California

Saturday, 5 October 1996 **Location: Steve Craig's Lab** **23 Persons Attended**

by George G. Vitt, Jr.

1. Peter Barnett, the Program Chairman of the San Francisco Microscopical Society (SFMS) had sent an e-mail message to our Editor, Gaylord Moss, congratulating him and the Society on the recent fine Bulletin and on the Renaissance of our Society. He said that he had also come to observe how we conducted our Workshop, and gave praise to Steve Craig, our Workshop Chairman. He then gave us a report on the planned project for his Society, i.e., the making by SFMS members of reproductions of the classic type of Antony van Leeuwenhoek microscope.

2. Barry Sobel, MD was introduced as a relatively new member, who brought a tour-de-force goody which he exhibited (see below)!

3. Steve Craig suggested that we start our regular meetings at the Crossroads School at 7:30PM, the first speaker starting at 8:00PM, with the doors being open at 7:00PM, as usual. This would allow the meeting to conclude earlier than under the old schedule, thus easing the late transportation hours especially for members living some distance away.

4. George Vitt congratulated Gaylord Moss on the fine job he did on our Bulletin, and there was a resounding round of applause. He then mentioned congratulatory messages received by e-mail; showed two examples of microslide labels he had made for MSSC, in the same formats recommended by the venerable Douglas Richardson, member of PMS. These labels will be shown at the next meeting. George then showed a c.1992 Reichert-Jung portable refractometer and asked for members' opinions as to the job it was designed to do, having a RI range scale of 1.3330 - 1.3730, and also a 'Salinity %' scale from 0-160. Who has some ideas? Unfortunately, Reichert has not responded to his inquiry.

5. Richard Jefts distributed to each member a set of his microlabels foe opaque specimens, the fabrication of which he described in the September Bulletin.

6. Izzy Lieberman described how he and Steve Craig and Tom McCormick had been working on the cleaning of the SEM at the Crossroads School. They dis-assembled the electron-beam column, brought the pieces to Steve's lab where they were cleaned, placed in plastic bags and brought back to the school. They need volunteers to help in this work. No experience is necessary, since this is strictly a 'cleaning job' - not much different from dish-washing! The 1st and 2nd vacuum pumps are the next to be cleaned. The next 'cleaning day' has been scheduled for Saturday, 2 November 1996, after the Workshop. Terry James, Pete Teti, George Vitt, and Izzy Lieberman volunteered. However, more volunteers will be needed as the job proceeds.

7. Norman Blitch, our former Curator and Librarian who had compiled a complete listing of our property, said that about 10 books in our library, which are especially valuable, would lose their value if stamped by the Crossroads School library. He urged that they be kept separate. Norman stated that the recent Bulletin was, unequivocally, the best that had ever been published by our Society. Norm then displayed and described his magnificent, cased, c.1893 WATSON "H" microscope which is in absolutely pristine condition, as new! It must be seen to be fully appreciated! Of special importance is the unique leather handle for its case. It is a perfect replica of the original (which was in shreds) and had been specially made, of brand new leather, some years ago by our late member of many amazing talents, Ed Lipps. Norm also showed a tiny, 4" tall, Furnace microscope, probably copied from a Nachet, whose base fits into a dovetail cut into the top of its mahogany case. He also showed the book *Microscopium* by Maria Rosenbaum, Leyden 1956, which features 19th century microscopes. Norman also showed color photos (from a periodical) of some microscopes in the Billings Collection.

8. Dave Hirsch displayed an illuminator with an integral large 3X magnifier that he had made of 'junk parts'. Dave exhibited a *Beck Universal mic.* c.1870-80, which he called a 'maverick' since it had been entirely nickel plated! The cased instrument contained many accessories, including a Camera Lucida.

9. Terry James brought his 6-year old grandson for the second time! Keep it up, Terry.

10. Jim Solliday brought a microphotograph, which he had gotten from member James Fidiam, which showed Antony van Leeuwenhoek looking through a microscope. Jim set this up under a mic. for all to see. He then displayed and described a replica van Leeuwenhoek microscope that had been made in the 1950s by Silde & Kuhne Co., San Francisco. At that time they made scientific instruments and sold Zeiss equipment. The replica mic. was made of chemically blackened brass and has up-down and focus screw adjustments and a ground spherical lens. For observing water-borne specimens, a glass capillary tube is filled and placed on an L-shaped wire which holds the capillary tube in front of the objective. Other methods of specimen holding are: a pin for impalement; a pin with a head which, when inverted, is used for hanging drop observation. Jim recounted the 20 silver mics.

which van Leewenhoeck had given to the Royal Society, but which were all destroyed in a fire some 150 years later.

11. Stuart Warter recounted Philip Carpenter of the early 1800s who had a factory in Birmingham to make microscopes for the trade. In 1826 he moved to Regent Street, London and set up a public retail house of various optical instruments - for the purpose of popularizing the microscope. This shop was called *"MICROCOSM"*. It was here that he set up a solar mic. and projected on a wall a 20-foot long image of a flea! This certainly brought in customers! The mahogany cased Carpenter mic. that Stuart displayed is very much like the *Carpenter's Improved Opaque & Transparent Microscope*, made prior to 1826, and was an attempt for a portable mic. It has a large diameter body tube, a circular brass base, a stage for ivory slides and a substage mirror. He showed the book *Collecting Microscopes* by G. Turner, Published some years ago by Christies.

12. Ken Gregory has done it again! On a recent vacation trip to Seattle, WA he literally vacuumcleaned, in his usual fashion, practically all the antique malls of their good microscopes. Ken brought a Fuess polarizing mic., a Zeiss 'jughandle' c.1910, with round stage, cased; another Zeiss wide body-tube 'jughandle' c.1915-20, cased, with oblique illumination rack and pinion adjustment on the substage condenser, and a rotatable and x-y stage. All of these were in superb condition. We hope that Ken will provide us with a good writeup on these microscopes.

13. Leo Milan made a video of our Sept. workshop and he described the photographic opportunities on his recent trip to Alaska.

14. Jim Clark recently returned from Indiana on an Ortholux safari. He displayed a Leitz *Combination Research Microscope*, c.1928, in very fine condition. The mic., still being made in 1938, features an extremely sturdy and heavy cast foot, inclined binocular head, apochromats in a turret, and a rotating x-y stage. An unusual feature is the micrometer adjustment of the substage condenser and a rack-pinion for decentering it to obtain oblique illumination. It is a well designed and very practical instrument. Jim's father was an early Leica fan, using the rare Mod.A, and Jim is now looking for a Leitz Micro-Ibso. Jim suggested that everyone should get the book *Notes on Modern Microscope Makers* by Bracegirdle, available from fellow member Rick Blankenhorn.

15. Tom McCormick brought 35mm cine film on which he had recorded a variety of different types of sound tracks. Each attendee received a length of this film for examination of the interesting sound tracks under the microscope. It contains 20 channels of audio and is a master film for printing dupes in Dolby, Sony, etc. There is also digital data between sprocket holes. Tom is an expert in sound recording technologies for the Hollywood movie industry, and for many years has been running a most successful high-tech business in this field. Tom still has a few VHS video tapes on Klaus Kemp's superlative arranged diatom and butterfly scale art-microslides - at only $8 for a 45-minute tape.

16. Gaylord Moss, our editor, announced that he needs inputs for the next bulletin: feature articles, inputs for the want/sell column , letters, technical tips, anything of interest.

17. Fred Hantsch discussed how John Jenkins of the San Bernardino Museum of Natural History has published much material on microfossils and did much work on the processing of nodules to obtain insect fossil material. Such fossils are quite rare and are preserved in silica, celestite, or calcite. Extraction is either with formic acid or dilute Hcl. Similar material had also been found by Leakey in Africa, and is also found in the Mojave desert and the Calico CA area. The museum has material on water and terrestrial insects. Fred, who is an experienced hand in mineralogy and micromounting, was urged to write a description of his micro-mineral preparation and mounting techniques for our bulletin.

18. Larry Albright displayed a Photometric Microscope made by EG&G Gamma Instruments Corp., San Diego, CA. The well constructed unit features a reverse-mounted photographic lens, a graticule graduated in mils (?) of object space, and a removable eyepiece which, probably, could be substituted by an apertures photomultiplier tube for low light measurement. Larry estimates a magnification of 60X at a working distance of 1.5".

19. Gary Legel brought, as freebies, many 35mm film plastic canisters with beautiful tiny sea shells which his brother had collected on the shores of a small island just off the coast of Ft.Myers, FL, where he resides. Gary had some photo items and a Wild-Heerbrugg x-y stage for sale.

20. Barry Sobel topped off the Workshop with an amazing and extremely rare French microscope c.1830. The 6-inch long all-brass mic. is cased in a lined black morocco case with snap-secured cover. Both the microscope and the inner lid of the case are marked *"SOLEIL"*. The body tube and stage are supported by a square cross-sectioned brass pillar. The stage with its two spring clips is movable on this pillar, focusing being achieved by a spring-held column. There are three combinations of interlocking/combined objectives for obtaining different magnifications. Barry has very thoroughly researched this instrument, both here and in France, and the combined opinion is that it is one of a kind!! Observing such an instrument is always a memorable experience, and we trust that Barry will provide our bulletin with a writeup of this unique piece.

JOHN BENJAMIN DANCER

1812-1887

by Roy Winsby

J. B. Dancer, the celebrated Manchester optician and instrument maker, was born in London, the son of Josiah Dancer, also an optician and manufacturer of metosophical and nautical instruments. Josiah and his family moved from London to Liverpool in 1817. J.B. took over his father's business in 1835 but moved to Manchester from Liverpool in 1841 when he was aged 29 and with a Mr. Abraham set up the business of Abraham & Dancer at 13 Cross Street, Manchester. With some capable assistants, he designed and made his own instruments and optical equipment. Abraham left the partnership after four years and returned to his home city of Liverpool. Dancer was an orthodox optician, supplying spectacles, as well as being an inventor and instrument maker of outstanding ability. At a young age he had acquired the art of grinding microscope and other types of lenses. During his lifetime he made substantial contributions to microscopy, photography and science.

Achromatic lenses were greatly improved by Lister in 1824, following which microscopes with achromatic objectives were produced by such manufacturers as Andrew Ross, James Smith and Powell & Lealand, though they were very expensive. When Dancer moved to Manchester in 1841 he was surprised to find that there were only two achromatic microscopes in the city. He began to produce them more cheaply, and supplied achromatic microscopes to prominent scientists like Dr. John Dalton, Dr. J.P. Joule, Joseph Sidebotham, Dr.W.B.Carpenter, and a host of others to replace the Culpeper and other simple type microscopes they had been using.

In 1839, when he was still at Liverpool, Dancer pioneered the system he first used, the Daguerreotype process. This was not satisfactory as the photographs were on an opaque background and consequently the quality of the enlarged microphotograph under the microscope was poor and could not be viewed with magnifications exceeding 20X. In 1851 Frederick Scott Archer of Manchester introduced the collodion process which involved a very fine grain image on glass with a sensitized covering of collodion. This process, by which images in very fine detail could be recorded, was used by Dancer to start producing vastly improved microphotograph slides, and the skill he developed enabled him to make micrometer scales and graticules.

For his microphotographs Dancer photographed well known paintings of landscapes, portraits, etc. down to about 1mm square, the novelty being that a microscope should be used to see them in larger size. After he commenced making them the idea caught the public interest and several firms set up to produce and market microphotograph slides in large numbers. It wasn't long before rings and other jewelry became fashionable with the microphotograph mounted beneath a small magnifying lens. Pencils were also produced with a small lens over a picture at the end. These are now called Stanhopes.

Dancer sold some 500 microphotograph slides, many of which were of well known paintings in art galleries. Particularly popular were slides of members of the Victorian Royal Family, of Emperor Napoleon, and of an 1858 20£ banknote. These old slides generally bore on their label the initials of their maker, J.B.D. for John Benjamin Dancer, J.S. or J.H.S. for Joseph Herbert Sidebotham, and H.W. for Herbert Watkins. Some old microphotograph slides bear the initials E.W.H. It is believed that they represent W. Hislop although this is not known for certain. If you have an old microphotograph slide bearing the initials J.B.D., J.S., H.W. or E.W.H., take care of it, as such slides are now collector's items.

During the early 1900's microphotographs became regarded as a money making novelty, and the public soon tired of the novelty. Many scientific men regarded the whole concept as frivolous. Henry Garnett of Flatters & Garnett is on record as having said to the Manchester Literary & Philosophical Society in 1928 "the fashion for microphotographs had largely died out". This, however, was at the very time when micro photography for business purposes was in its infancy and is in fact very much in use today to fulfill modern requirements. Whole volumes of books, manuscripts and documents all over the world have been micro photographed to save storage space. Old census returns, old probate records, etc. available for public inspection at the various local Records Offices are all on microfilm. Anyone who has visited a Records Office to inspect old records will be familiar with putting a roll of microfilm on the viewing machine. Though these 35mm reels are hardly "micro" compared to the work that Dancer initiated, they are nevertheless a direct result of his work.

To quote Mr. L.L.Ardern, then Librarian of the Manchester College of Technology, writing about Dancer in 1956, "The librarian looks to Dancer's invention to help control the problem of library growth caused by the immense output of recorded information." During the Franco-Prussian war in the 1870's when Paris was besieged by the Germans, the French sent messages on microfilm by carrier pigeon over the German lines. By the time of the 1939-1945 war, fine grain film had been improved to such an extent that it enabled photographs of documents to be reduced even further so as to be capable of being hidden under a typewriter size full stop, and these became known as a micro-dot.

By the mid 1800's the magic lantern had been invented but illumination was by oil lamp, very inefficient except in small rooms. Dancer greatly improved the illumination but all the items depicted on the slides for the magic lantern were hand drawn and painted and the magic lantern was looked upon as a toy. A few years were to pass before Dancer made the first photographic positives as lantern slides, and the magic lantern then got better recognition for the useful aid it proved to be.

Those who holiday in Spain may have seen the large spectacular coloured fountain in Barcelona, or its twin on the promenade at Salou, which operate to their main effectiveness when darkness falls. Many jets of brightly coloured water shoot up in the air, being replaced by other jets reaching different heights, all lit from below by lights constantly changing colours and controlled by an electrical keyboard which was invented by Dancer in the 1850's.
He gave many lectures and produced various scientific papers. One of his inventions was the stereoscopic camera, a wood camera with brass fittings and with two lenses set with their centres approx. 3" apart, which he invented in 1853 and perfected in 1856. Christies sold one of these at auction in 1977 for 21,000. His other accomplishments were wide ranging and, to mention only a few, included improvements in the construction of Daniell liquid type batteries, the spring make and break contact used in electrical apparatus, the electromagnet magnet, electric shock machine, experiments with ozone gas, the photographic micrometer, instruments for measuring the accuracy of rifle barrels, astronomical, meteorological, surveying and other instruments for many leading scientists including his friend Dr.J.P.Joule, whose name was given to the joule, the standard international unit of energy. Look on a Kelloggs' Corn flakes packet and you will see "Energy 1650 kJ" (kilojoules).

In 1870, when he was only 58 years of age, he started to suffer from the eye disease Glaucoma and his eyesight began to fail. In the following few years he had three eye operations but they did not help him very much and by 1878 he had to give up his business activities because of ill health and poor vision. He lived another nine years until he was aged 75 and it was a most cruel turn of fate that decreed that so active and gifted a man as J.B. Dancer should spend his last years blind and in comparative obscurity.
Dancer had taught his two daughters, Eleanor Elizabeth and Catherine, the process of making microphotographs and they took over the running of the business, trading under the name of E.E.Dancer & Co. for some 25 years until 1900 when the entire stock and the process of producing quality microphotographs were sold to a Mr. Richard Surer, a London microscope dealer.

About 1885 Dancer dictated his autobiography to his 16 year old granddaughter, Eliza Beth, who wrote out the dictated autobiography in a school exercise book, devoid of any punctuation and with very few headings. For over 70 years the manuscript was never published and whilst there was a record of it having been made, in microscopical and photographic societies it had been thought that it had been lost over the years. It was only by a very remote chance that the manuscript came to light in 1958 because of the Manchester Microscopical Society displaying exhibits of Dancer microphotographs, slides and instruments at one of the Society's public exhibitions. The exhibition was mentioned on the radio and was heard by Miss E.C. Wilkie, the daughter of Elizabeth. Miss Wilkie attended the exhibition being held in honour of her great-grandfather, and she mentioned that she had the original manuscript. With her assistance, one of the Society's members, Mr.W.Browning, arranged for the manuscript to be published by the Manchester Literary and Philosophical Society in Vol.107 of their Manchester Memoirs (unaltered except for the addition of punctuation and subheadings.

Note: This article was written by Roy Winsby and was published in the newsletter of The Manchester Microscopical Society - Newsletter 15. It has been reproduced here through the kind permission of Roy Winsby.

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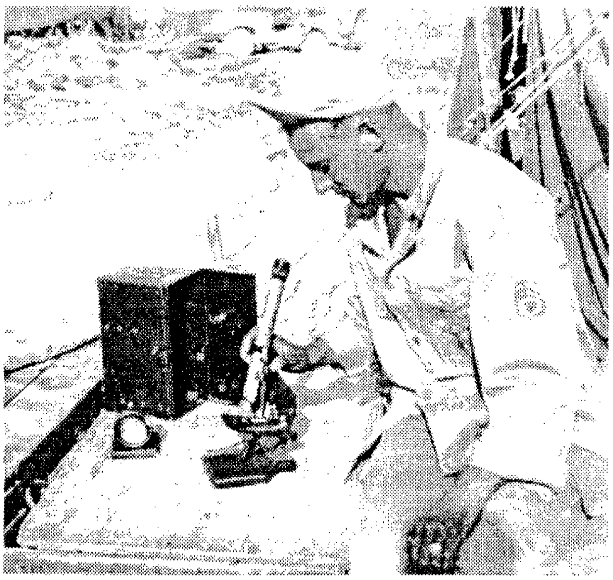
THE OKINAWAN MICROSCOPE

By David L. Hirsch



Yonabaru Airfield, Okinawa
April 1945
Headquarters Battery
420th Field Artillery Group

S/Sgt. David L. Hirsch with his microscope built "on-site".. Note the case made from an ammo box and the illuminator made from a taillight.

Our Battalion was watching a Lana Turner movie that evening when another 'Flash Red" sounded. The whole island reverberated with air bursts, small arms fire and lots of yelling, but no enemy aircraft appeared. Suddenly, a swelling roar rose from thousands of throats - "THE WAR IS OVER!".

At the time, I was attached to the 420th Field Artillery Group, a part of General Joseph W. Stillwell's' 24th Corps which was preparing for Operation Olympic; the invasion of Japan. One morning, soon after the nuclear 'events' at Hiroshima and Nagasaki changed the course of history, there came the throbbing sound of aircraft engines overhead. This time, it wasn't "Washing Machine Charley", so called because the twin engines of that aircraft were often out of synchronization. Three white painted Japanese Betty bombers flew in tight formation over our air strip, escorted by US Army Air Corps fighters. The bombers were on an historic mission; carrying Japanese dignitaries who would soon participate in the surrender ceremonies aboard the battleship, USS Missouri, in Tokyo Bay on September 2, 1945.

I hastened to complete my assigned duties that morning because awaiting me was my Labor of Love; a nearly completed compound monocular microscope, an instrument akin to an opto-mechanical Frankenstein monster. The microscope was assembled from carcasses of defunct American and Japanese military hardware; instruments of war united at last in peaceful juxtaposition - the one and only "Okinawan Microscope!" This bonafide "war baby" was conceived several months earlier on the island of Saipan in the Marianas on a day which I will long remember.

The cane field was dense and uncut. The wind blowing in my direction still carried the faint but unmistakable odor of decaying flesh. Men, friend and foe alike, had died in that field not many weeks before and bodies, either whole or dismembered lay hidden where mortar fire or bursts from small arms had terminated their young lives.

When I heard Natures Call, discretion elicited the search for privacy which the cane field would provide. I cautiously ventured into the field and was overcome with fright. Lying nearby were the scattered remains of a Japanese officer. The same mortar round that killed him also destroyed a fine pair of Zeiss prism binoculars which he was carrying.

I managed to salvage a single eyepiece, the only part of the binoculars remaining intact. Later on, in our bivouac area, I made a crude optical bench and arranged the Zeiss eyepiece along with other lenses until I found a grouping of lenses which yielded a magnified, reversed and inverted image; the embryo of a compound monocular microscope!

Truly, a daunting task lay ahead! I was faced with many obstacles which, to me, became challenges. My open air "instrument shop" and the makeshift tools would surely have taxed the skills and patience of most experienced craftsman. Possessing but a rudimentary knowledge of optical theory, I had to work experimentally to ascertain focal distances, inter-lens spacings and other factors necessary to define magnification, tube lengths and many other configurations. Conditions such as spherical and chromatic aberration were foreign to me at this time. In spite of all pitfalls and shortcomings, the microscope, primitive though it might be, began to take shape.

What form would the instrument assume? I had no pictures, nomenclature or models to serve as references. Instead, there was a vague recollection of a Spencer microscope which I had used a few years earlier in my high school biology class. Armed with this meager knowledge and a determination to build the instrument, coupled with an ingrained trait modestly referred to as "Yankee Ingenuity" (known during the war years as "G.I. Ingenuity") I was now ready to launch the project. Several nights hence, as the plaintive notes of "Taps" faded away and the encampment was cloaked in silence, I lay on my cot in the darkness, mentally sketching out the microscope and its' component parts. Gradually, the design of the instrument fell into place and fabrication proceeded as the components were amassed through scrounging.

Sometimes, work on the microscope was postponed to take care of the business at hand, including periods of active combat when the Battalion island-hopped from Saipan and Tinian to Leyte and finally to Okinawa. These incursions brought the war closer to the islands of Japan and gave me the opportunity to gather materials along the way. Brass tubing was available on board our transport, an LST (Landing Ship, Tank); a floating bomb when fully laden with artillery, prime movers, projectiles, powder, fuses and personnel. A Navy Machinists' Mate cut and fitted the microscope body and draw tubes (at a cost of a pint of Kentucky bourbon reserved for such exigencies). Parts from smashed radios and aircraft supplied material for other portions of the microscope.

The case was fashioned from a Cal .50 ammo can, and a parking light, powered by a storage battery, became the illuminator. I sometimes wonder if the Motor Pool officer is still trying to account for that battery.

A few months before I was rotated back to the States, finishing touches were put on the microscope. The instrument provided magnifications from 50X to 100X with a sliding coarse adjustment and a fine adjustment controlled by a threaded shaft. It was easy to operate and provided many fellow artillery men and me with an introduction into the microscopic world of flora and fauna existing in the Southwest Pacific.

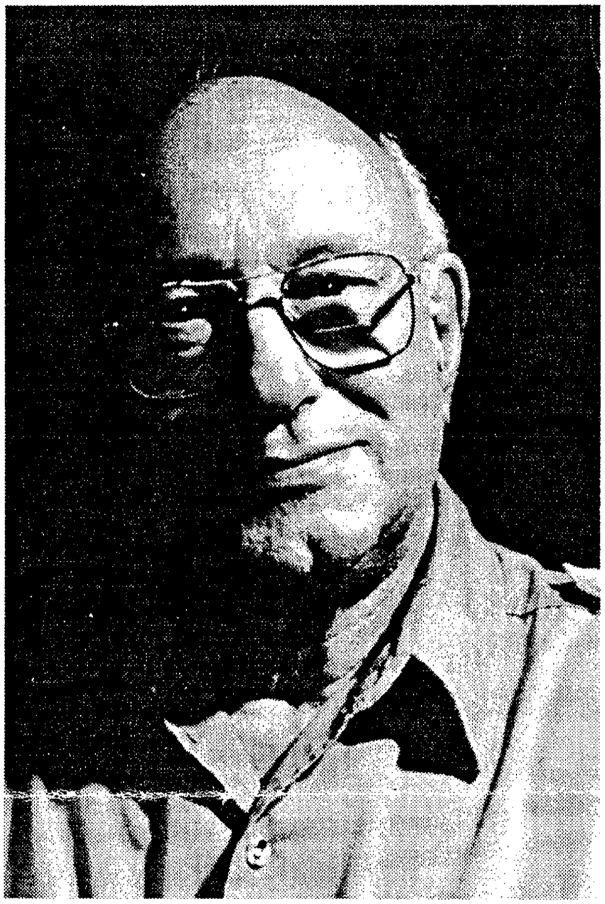
Before shipping out, I crated the microscope and sent it as a gift to the younger brother of my "pro tempore" girlfriend. The fortunes of war and peace being what they are; I did not marry that girl. Almost five decades have passed and I have forgotten about the girl - but not about that microscope.

Today, among my collection of old scientific instruments is a framed photo of an informally attired GI and his "Okinawan Microscope." War does not always edict death and destruction. Sergeant York and Audy Murphy had their moments of glory; I had mine.

DLH

MEMBER PROFILE

David L. Hirsch



David L. Hirsch

The time: Midwinter, at the end of the Great Depression. The place: My uncle's pawn shop on the West Side of Chicago. A young man came into the shop, carrying a heavy mahogany box. He placed it on the counter and removed a pristine Zeiss Jena monocular microscope. The fellow said he was a medical student down on his luck, and had to sell his most precious possession; that fine microscope. Uncle was a soft touch, especially in these hard times. He paid the man fifty dollars for the Zeiss microscope.

The story didn't have a happy ending, because by law, Unc had to report the sale to the police, who later informed him that the microscope had been stolen from the Rush Medical College. The Rush College authorities praised my uncle for being an upstanding citizen, but they refused to reimburse his fifty bucks.

This story comes to mind more than a half century later, because to a nine year old kid at the time, it was love at first sight, where microscopes were concerned. By way of consolation, I went to the toy department of the local Sears Roebuck store, and purchased a microscope 'compendium', with the trade name of "Microset", for a dollar. In addition to the Full 20 power microscope having a die cast foot and a fixed mirror, the set contained flimsy forceps, a probe made of a needle stuck into a thin dowel rod, a few ragged edged slides, and a leaflet on microscopy.

I read the leaflet which described the "Miracles of the Microscopical World", along with things to look at. My mom gasped with amazement when she saw the cubical shapes of table salt crystals. She reacted differently when I showed her the Anguillulae Acetis (vinegar eels) which had set up housekeeping in her vinegar cruet. That was the last time we had vinegar among our condiments.

My high school years were spent at Crane Technical High School In Chicago. I learned lots of interesting things about materials and how they could be worked, served as Feature Editor of the school newspaper, did some cross country running, set up a small chem lab and dark room in a closet at home. I spent a lot of time in my makeshift home lab before I discovered girls. I made stink bombs by bubbling hydrogen sulfide through water, and smoke bombs by encasing celluloid (an ancient plastic made of nitrocellulose and camphor) in newspaper and igniting the celluloid. I will not discuss the explosive devices which my fellow "revolutionaries" and I made from potassium chlorate and other substances.

High school ended as fast as it began. June, 1939 found me, along with about 500 other boys, getting our diplomas. It was prophetic and a portent of things to come, when our class held its graduation ceremony at the 132nd Infantry Regiment Armory.

My interest in microscopy, particularly the collection of instruments, was renewed when I entered high school. My first important acquisition was a circa 1910 Bausch and Lomb compound monocular, double objective microscope. I traded my uncle's World War I gas mask and steel helmet for the microscope with some kid in the neighborhood who was into the jingoistic thing.

In Junior College, my career objectives had not yet been determined, but I joined with some of my Pre-Med buddies and became a member of the Medical Club. That's how we got to witness post mortems and various operations. That's also the time when I decided to become an engineer. For reasons best known to a psychologist, my interest in things technical turned to Ordnance. I spent some time at the University of Michigan School of Engineering studying Ordnance Materiel, then took on an assignment with the Detroit Ordnance District. The job was short lived, because history was about to be made at a place called Pearl Harbor.

My 'collection' of one Bausch and Lomb microscope went into storage during my years in the service. Although I enlisted in the US Army Air Corps, I ended up in the Headquarters Battery of the 420th Field Artillery Group - as an aircraft mechanic! Go figure. Prior to what was to be my last military assignment, I had undergone intensive training with the 76th Infantry Division at Camp McCoy, Wisconsin, for "operations in snow and extreme cold". A few weeks after this training, I found myself among thousands of other first echelon troops fighting Dengue fever and our designated enemy of that period in the Southwest Pacific Theater of Operations. I had the opportunity to study Doppler's Effect first hand on several occasions. Although I couldn't write the equation at the time, I learned to duck when the sound of the approaching projectile increased in pitch.

The opportunity to get back into the microscopy milieu came about in a rather unusual way. When the Saipan campaign was winding down in the Marianas, I came across a pair of what were once a fine pair of Zeiss binoculars which, like their former owner, a Japanese officer lying nearby, was well fragmented by a mortar burst. Even in their sorry state, the binoculars yielded several intact lens elements. These, along with various scraps that might be useful in building a microscope, were fashioned into a hand made compound monocular microscope, but more about that in the preceding article.

At war's end, I joined the hundreds of thousands of ex-dogfaces in the transition back to the life of a civilian. In due time, after 5 years of night classes and day school at Illinois Institute of Technology, I completed my Mechanical Engineering education. Upon graduation, I taught a course in Manufacturing Technology at the same institution. Along the way, I acquired a spouse, raised a family, bought a house, got a dog, and resumed the collecting and researching of scientific instruments.

In the late fifties, Mildred and I decided to trade the cold winters and the grime of Chicago for the summer-like winters and the smog of Southern California. The Los Angeles area abounded in so called smokeless industries dealing in electronics, aerospace stuff, and an assortment of "war toys". At the time, all types of engineers were in demand and there was no difficulty in finding work. My forte became microelectronic packaging, in the area of solid state devices.

Given the time and opportunity to pursue my interests in microscopy and historical technology, I sought out related clubs and societies. To my great fortune, I was looking through the McBain microscope catalog, when a 19th century brass microscope shown on the cover prompted me to call McBain. I spoke to Bill Sokol, the late, eminent microscopical savant, who invited me to attend the meeting of the now defunct Los Angeles Microscopical Society. You knew me as your friendly Treasurer, a position which I am again filling in our newly organized MICROSCOPICAL SOCIETY OF SOUTHERN CALIFORNIA.

Leeuwenhoek's Microscopes

Larry:

Nice talking with you this afternoon. To recap, yes I would be pleased to be included in your newsletter. Also, it sounds like fun to do a workshop thing with you folks. Here is a post I sent out some time ago to a few news groups:

For some time now I have been studying Antony Leeuwenhoek's microscopes and building prototypes, and have finally settled on a design that I would like to offer to the public.
They are made of thin beaten brass, about 47mm tall by 25mm wide, with the lens captured between two such sheets. The subject is placed on a metal pin, adjusted with screws, to change the focus and position. One of the adjusting screws protrudes down from the body and also serves as a handle. These microscopes look very much like the one in the museum at Utrecht (circa ~1690). They have a lens made of a 2mm dia. glass ball and have a power of about 180X, with surprisingly good resolution. If you want plans, e-mail me or send SASE (two stamps) + $1.00(for photocopying).

I am also offering to sell these microscopes for $85.00 for students and k-12 educators and $100.00 to others.

I am presently working up a workshop for the San Francisco microscopical society, our deal is $100 plus $50 per microscope. I suppose that this is negotiable, depending on fun factors, quantities, and such. In general, I am very open to the idea, even enthusiastic. How many 'scopes do you think we will be making, this would probably impact my choice of month.

phone: (510) 548-2048
snail mail: Alan Shinn
2429 McGee
Berkeley, CA 94703
Al Shinn alshinn@sirius.com

Anyone want a workshop making
Leeuwenhoek's microscopes?

(Contact Larry Albright) 310-399-0865
or < albrite@Plasma-Art.com>

In memoriam FRITS ZERNIKE 1888-1966

The Development of the Phasecontrast Technique for Microscopy

by R. BECK, Giessen

Until the discovery of the phase contrast microscope by the Dutch Physicist and Nobel prize winner *Frits Zernike* (Fig.1), histological staining methods were mainly used as contrasting techniques for transparent microscope specimens. In addition to that, darkfield illumination for the study of unstained objects was known and had been originally presented in a compound microscope by the English microscope designer Francis Wenham (1824-1908) (Fig.2), after the Dutch Antonie van Leewenhoeck (1632-1723), (Fig.3), had experienced that method more than 100 years before. Furthermore, the so-called oblique illumination (Fig.4) was of great importance for providing visual contrast in transparent or translucent objects.

Both of these methods, oblique illumination in particular, displayed certain shortcomings when being applied. With darkfield illumination, only those details of the object could be perceived which diffracted into the objective the hollow cone of incident light incident upon the specimen plane - other structures are not visible here (Fig.5). With oblique illumination, due to the great reduction of the illuminating aperture, there is a loss in resolving power of the microscope (Fig.6).

Living objects, such as cells and micro-organisms, are killed by many of the histological stains which are a must for the microscopy of all specimens having no optical opacity. Their examination in the living state had only been possible by the above mentioned methods and, in some cases, by staining. Suddenly, this all changed in the early 1950s with the introduction of the phase contrast microscope, invented by Frits Zernike in 1932. He happened to invent the phase contrast technique in connection with the macroscopic test on a phase grating which had to be built into an apparatus for spectra-analytical investigation. It had been due to his vision that this technique, even in its early experimental stage, had been transferred to microscopy. In spite of the enormous difficulties of the first attempt (because the importance of a phase contrast microscope was underestimated by the optical industry at that time), it is to Zernike's credit that, besides being the inventor, he could not rest until instruments having this technique were offered to scientists throughout the world by many of the microscope manufacturers.

Frits Zernike, whose Christian name was actually Frederik, was born on 16 July 1888 (the day this is being written!) in Amsterdam. Both his parents were teachers. The young Frits grew up in these intellectual Amsterdam circles together with his sister Elizabeth (1891), who became a well known Dutch writer of poems and novels. In his youth, Zernike already showed great versatility and an interest in scientific problems.

After finishing school in 1905, he started to study chemistry in the University of Amsterdam. Besides this, he attended lectures on mathematics, physics, astronomy and mineralogy. Presenting the very best result in response to a scientific competition, launched by the university of Groningen in 1906, about the problems concerning the theory of probabilities, the young student proved his intelligence. He took his Doctor's degree in 1912 on the *"Theory of Critical Opalescence in Gases"*.

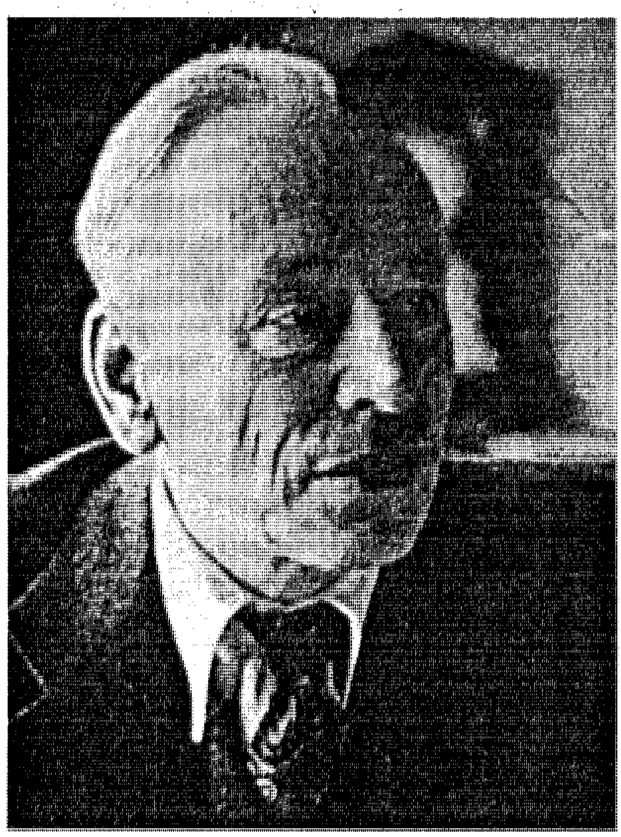


Fig. 1: Frits Zernike, inventor of the phase contrast method and winner of the Nobel Prize for physics.

Fig. 2: Antoni van Leeuwenhoek
He was the first to apply an oblique illumination to a dark background realizing a darkfield illumination in order to contrast objects having no visible absorption.

Fig. 3: Francis Wenham, a designer with Andrew Ross in London. He was the inventor of the first darkfield condensor based on a cardioid system, the original type of darkfield equipment of today.

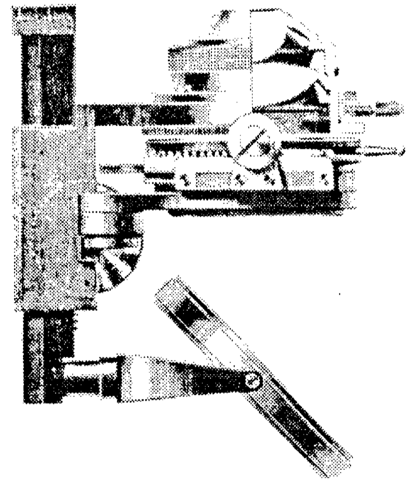


Fig. 4: Device for oblique illumination. The closed aperture diaphragm could be driven off the optical axis continuously by means of a rack-and-pinion.

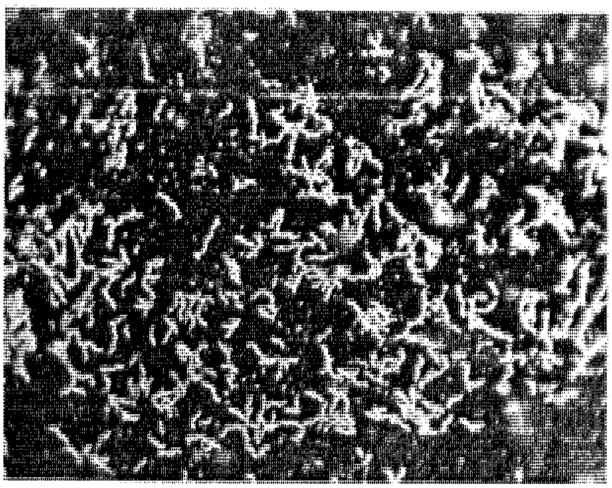


Fig. 5: Darkfield illumination.
Specimen: Bacillus typhosus, Magnification: X 800:
Instrument: Leitz Camera Microscope PANPHOT, 1934.

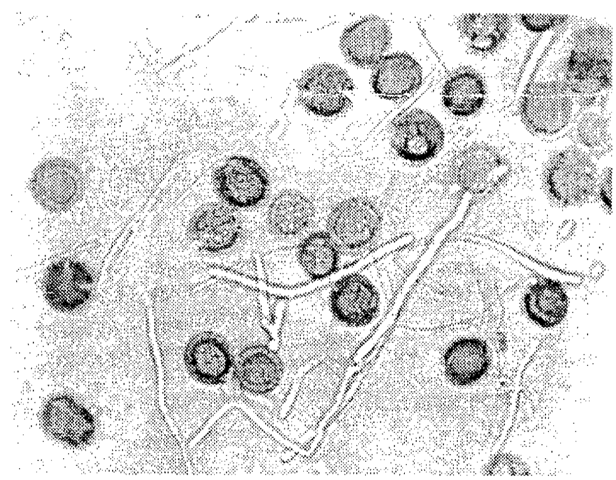


Fig. 6: Oblique illumination.
Specimen: Tilletia tritici. Magnification: X 430:
Instrument: Leitz Camera Microscope PANPHOT, 1937.

In 1913, the Dutch astronomer Jacobus Cornelius Kapteyn (1851-1922) became aware of the young and highly talented Zernike and made him join the University of Groningen. There, Zernike worked until 1915 as Kapteyn's assistant scientist. He also got into contact with L.S. Ornstein, who was lector in theoretical physics there. When the latter received a call to the University of Utrecht in 1915, Zernike went with him and took over the lectorship in mathematical physics and in theoretical mechanics. In April 1920, when he was 32 years old, the University of Groningen called him for professorship in theoretical physics, which he occupied until his retirement on pension in 1958. The summit of Zernike's career certainly was his nomination as *rector magnificus* of the University of Groningen in the years 1938 to 1939.

Zernike's invention of the phase contrast microscope was, as many discoveries in physics, due to chance: at the occasion of testing a diffraction grating positioned inside a concave mirror through a telescope he, as already mentioned above, detected an interference phenomenon, which was caused by the occurrence of phase differences. With these findings as a basis, Zernike developed the phase contrast technique for microscopes which, in its first layout, was planned to have an aperture diaphragm like a straightlined strip - and a corresponding (conjugate) phase retardation strip in the back focal plane of the objective.

"By this, the microscope image however showed a halo at the object structures, because the strip image of an object detail had been spread, by means of diffraction, in one direction only - i.e., perpendicular to the strip. This made tiny bright dots in the image appear as if being short line segments. To avoid this, I soon inserted annular strips (stops) which caused a scattering of the halo in all directions, whereby it became much weaker and quite insignificant indeed", Zernike explained in his Nobel lecture in 1953.

Not only did he evolve the theory of the phase contrast microscope, but he also designed the first model of this new instrument. The *"Technique for increase of contrast within non-completely stained microscopic specimens"* was applied for patent by Zernike in 1932 in Germany.

But in the beginning, unfortunately, the new phase contrast microscope was not recognized by the users as well as by the manufacturers of microscopes. For a long time Zernike was not able to convince the manufacturers of optical instruments of the need to produce the phase contrast microscope. When he demonstrated the prototype of his microscope to Carl Zeiss at Jena in 1932, he was not successful. The same disinterest was in evidence when he got in touch with Ernst Leitz of Wetzlar in the mid-thirties. He again had another set-back when he presented his paper on *"A New Method of Microscope Observation"* as a summary of his experiments and theoretical conclusions at a congress at Wageningen, The Netherlands, in 1933: after the presentation, not a single question was asked and very soon the technique again fell into oblivion.

Although Carl Zeiss of Jena had acquired Zernike's invention by contract in 1935, Zernike carried on further experiments on phase contrast in co-operation with the firm Nederlandse Optieken Instrumentenfabriek, with Dr. C.E. Bleeker at Utrecht.

In 1936, due to Zernike's application of 26 April 1932, the Deutsche Reichspatent No. 636,168 was granted to Carl Zeiss Jena for *"An Arrangement to Elucidate Optical Images".* The introduction of the phase contrast microscope into the market was then considered hampered by the outbreak of WWII in 1939. It took Zeiss until 1941 to at least come out with phase contrast objectives and accessories. In 1944 Zernike, together with Dr.C.E. Bleeker of Utrecht, produced microscope objectives for achromatic phase contrast. Here, phase plates had been mounted into the objectives to achieve a phase shift of 90° for two colors of the visible spectrum. Until 1945 Carl Zeiss Jena was the only manufacturer of phase contrast microscopes. After the war, others followed, such as Zeiss-Winkel at Gottingen, American Optical Company, and Cooke, Troughton & Simms, Ltd. At this point, Zernike's invention was given proper attention and appreciation among all experts! On behalf of the Royal Microscopical Society, the phase contrast technique was recommended emphatically by C.R.Burch.

In the first years after the war Zernike, in cooperation with Bleeker, tried to advance the method of phase contrast microscopy on his own, with the aim of bringing to conclusion the overdue progress in development delayed by Zeiss Jena. However, very soon it became clear that nothing but teamwork with a qualified partner would be successful. Therefore, the Optical Works of Ernst Leitz at Wetzlar, which had been spared by the impact of war, were consulted and a first meeting was held on 30 October 1950 at Zernike's home at Groningen. A provisional cooperative effort was set up between Zernike and the firms Bleeker and Leitz, in order to exchange experience and to improve the phase contrast device that had been developed by Bleeker in the meantime.

To be concluded in the next issue.

This article is from the Leitz Publication:

SCIENTIFIC AND TECHNICAL INFORMATION
Vol IX, No. 5, pp 185-190. June 1989

Courtesy of Peter Fisher and George Vitt

WANT LIST

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

Alignment Telescope for Phase Contrast
Thomas Porter
7812 Yarmouth Ave
Reseda, CA 91335
818-343-1359

FOR SALE OR TRADE

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

Gary Legal
1306 Sheppard Street
Fullerton, CA 92631

MATERIAL EXCHANGE

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

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

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

Sand from Rincon Hill in Ventura offered by Ed Jones. Ed contributed the sand that was used in the latest Craig workshop to study cleaning techniques. Ed has more of this uncleaned sand from Rincon that he offers to anyone who was not at the workshop, but who would like to try the cleaning technique. See page 8 in the October 1996 issue of this bulletin for a description of the material.

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

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

Thomas J. McCormick
5925 Bonsall Drive
Malibu, California 90265

OCTOBER MEETING

The next meeting will be on Wednesday, October 16 at the Crossroads School at 1714 21st Street in Santa Monica.

NEW EARLIER MEETING TIME

The doors will open at 7 PM and the meeting will start at 7:30. The members who have expressed the wish to get home earlier, can now get on the road at 10:30 rather than 11.

Another change, featured talks will now start at 7:45, with, as a courtesy to the speakers, any lengthly Society business conducted after the speaker finishes.

There are a number of issues to be decided at this meeting.

First, is the contest and vote to decide:

1. The name of the Bulletin.
2. The Logo for the Bulletin.
3. The Logo for the Society itself.

Bring your ideas for all the above.
We can pin up all the rough sketches of logos or, if you have a transparency, we can use the projector.

In addition to the decisions on name and logos, there are some issues on the handling of dues and finances about which all members should be informed and have a chance to express their opinions.

In view of the unknown and possibly lengthly time these issues may take, as well as the discussion and viewing of the usual splendid old and new microscopical acquisitions that everyone is encouraged to bring, there is no scheduled outside speaker. However, if time permits, Jim Solliday will show some of his incredibly beautiful slides.

NOVEMBER MEETING

MEETING EXTRAORDINAIRE

Mr. Klaus Kemp of Somerset, England, is unquestionably the world's greatest maker of arranged diatom and butterfly scale microslides. Both his technique and his artistic ability place him in a class of his own. Mr. Kemp has consented to show us his techniques for creating these seemingly impossible works of art. We will have video camera projection onto monitors, to view his micro-manipulations. This meeting on November 20 is one of those events that come once in a lifetime. Don't miss it.

Editor's Notes

We need input for future bulletins. Please send short or long articles dealing with microscopy. Illustrations add a lot. Sketches, photographs or 35 mm slides can all be easily scanned into the computer.

Short notes are fine also. Even one sentence giving a tip or source of material can be included in a "Letters" section.

Regarding dues, a number of members have held off on their dues for this year during the uncertainty of the society's transition period. If you would like to renew your membership and continue to receive the bulletin, please send your check made out to:

David L. Hirsch

Dave continues as the treasurer of our Society. Make the check to him personally, Do not make a check out to LAMS, which as was previously stated, "is no more".
Send it to Dave's address :

David L. Hirsch
11815 Indianapolis Street
Los Angeles, CA 90066-2046

Dues are $30 yearly for regular members and $20 for corresponding.

Many thanks to those who e-mailed or wrote expressing their support for our reorganized society and bulletin.

Gaylord E. Moss