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Selected 20th Century Scientists and Their Microscopes

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INTRODUCTION

Photographs of 20th century scientists are plentiful, but there are few images that show these researchers with their instruments, and still fewer of those who use the microscope for their investigations into nature. Coming across several of these images during the past years, the author was moved to compile them and write a biographical sketch of each scientist, with a note about their depicted instruments. The photographs vary greatly in quality in the published sources, and only one of the photographs shown here gives credit to the author. The originals were photographed with a Nikon F 35 mm camera using a Nikkor Micro 55 mm lens and Kodak Elite Chrome 400 ASA film.

SANTIAGO RAMÓN Y CAJAL

Santiago Ramón y Cajal (1852-1943), a Spaniard who is the greatest of neurohistologists, is shown in his laboratory around 1892, working with his favorite Zeiss microscope. He was responsible for unequivocally establishing the cell theory for nervous tissue using some of the earliest Zeiss apochromat objectives, which became available in 1886. Cajal, who was prolific and indefatigable, worked until his last years and is credited with 288 papers, monographs, review articles, books and manuals. His classic book *Histology of the Nervous System* (1) went through several editions, and was, at long last, translated into English just recently (2). His studies on the regeneration of the nervous system (3) and on the organization of the cere-

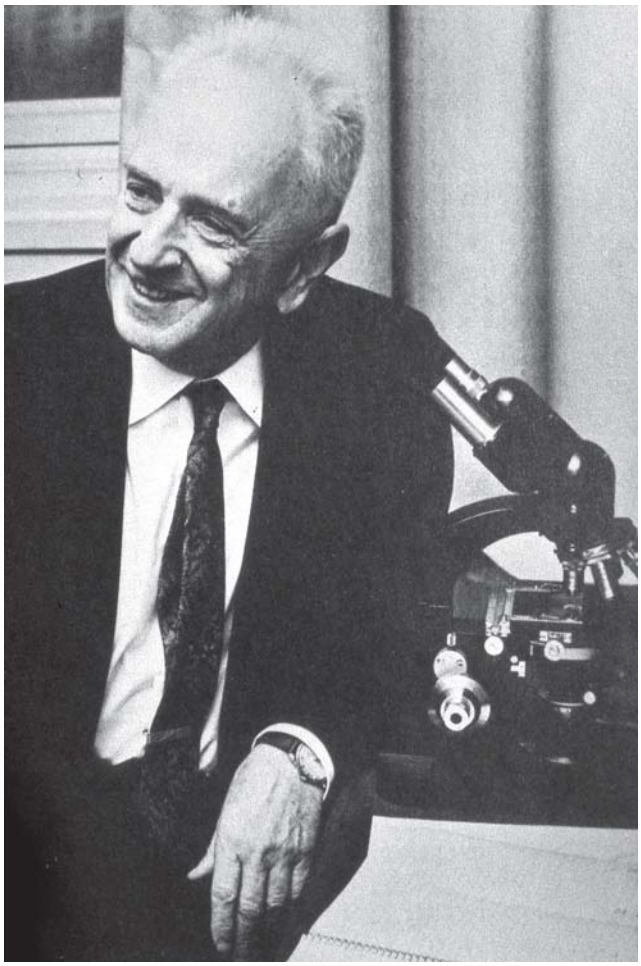
From *Recollections of My Life* (Ref. 6).

Santiago Ramón y Cajal (1852-1934) is shown in 1892 at the Universidad de Madrid with his Zeiss microscope.

*Santa Fe, NM, 87505-4599

From *Evolution, Genetics and Man* (Ref. 15).

Thomas Hunt Morgan (1866-1945) is shown in 1920 at Columbia University with his Bausch & Lomb microscope.



From *Evolution* (Ref. 27).

Theodosius Dobzhansky (1900-1975) is shown in 1973 at the University of California at Davis with his Zeiss L microscope.

bral cortex (4) are of immense interest. He also wrote a delightful autobiography (5) that has been translated into English (6). He shared the Nobel Prize in Physiology and Medicine in 1906 with his intellectual counterpart, Camilo Golgi of Italy, who adamantly held the notion of a "reticularist"—as opposed to Cajal's "neuronist"—microscopic structure of the nervous parenchyma, in which everything is connected and there are no discrete anatomical or physiological cellular units existing as ultimate individual entities.

THOMAS HUNT MORGAN

Thomas Hunt Morgan (1866-1945), an American embryologist and geneticist who won the Nobel Prize in 1933, is shown in his laboratory at Columbia University about 1920. At first, he was unconvinced of a strict association between specific character traits and specific chromosomes, and read in the work of Theodore Boveri and Walter Sutton only a "parallel behaviour," during cell division and fertilization of chromosomes and Mendelian traits (7). Morgan's research paper of 1910 (8) is extraordinary in many ways, because in no other work does one see the struggle the author is undergoing in arriving at an inevitable conclusion that contradicts his previous beliefs. Throughout the paper, he avoids even using the word "chromosome," and he establishes that the traits for sex and white eye color are "combined" but avoids calling them physically linked. He refutes his own distrust and establishes the chromosomal theory of inheritance by demonstrating that one specific character corresponds to the behavior of one specific "factor" (later shown to be a chromosome visible under the microscope). Morgan was soon

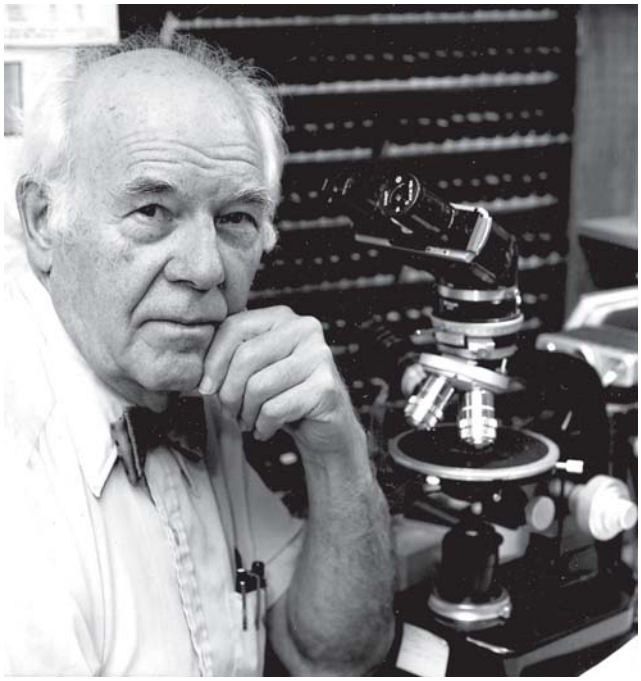
converted, becoming a staunch advocate for ascribing to chromosomes their genetic role through his further work and that of his students, particularly Walter Sutton (1877-1916), who demonstrated the morphological individuality and the continuity of chromosomes (9); A.H. Sturtevant (1891-1970), who provided the first chromosomal map (10); and Calvin Bridges (1889-1938), who proved without a doubt the chromosomal theory of inheritance with the aid of the microscope in his genetic analyses (11). Morgan always used Bausch & Lomb microscopes, which were excellent instruments. The company was bought in 1987, and soon stopped manufacturing high quality instruments when it became part of Leica Microsystems (12).

THEODOSIUS DOBZHANSKY

Russian-born Theodosius Dobzhansky (1900-1975) is affable next to his Zeiss L microscope. A population geneticist, he demonstrated unambiguously the action of natural selection as a critical evolutionary force. He had worked with Thomas Hunt Morgan at Columbia University, and also held appointments at the California Institute of Technology (Cal Tech), Rockefeller University (New York) and the University of California at Davis. His landmark work (13) complemented Ernst Mayr's book on evolutionary mechanisms for speciation (14). Dobzhansky also wrote an accessible book on evolution and genetics (15). Much of his work on the fruit fly *Drosophila melanogaster* was done with Zeiss microscopes, including the instrument shown in the photograph.

WALTER C. McCRONE

Walter C. McCrone (1916-2002), a chemist-turned-microscopist, founded McCrone Research Institute, a not-for-profit organization devoted to the teaching and research of microscopy, and McCrone Associates Inc., a firm consulting on all aspects of particle identification, both based in Chicago. McCrone became publisher of *The Microscope* journal in 1962 and also started Microscope Publications in Chicago, which published 52 monographs covering all aspects of microscopical science (including volumes 16 and 17 by Robert B. McLaughlin; see separate entry) and other books. In the photo, taken around 1996, McCrone sits by his Nikon polarizing microscope. He used the Nikon for some of the analytical work on the Shroud of Turin, which he found to be a painting, and the Vinland Map, which he declared to be a fake. He determined the age of the Shroud to be from the 14th century (16)—a decade before several laboratories using highly sophisticated radiocarbon methods (17) confirmed his findings. His personal struggles with the issue, as well as his unbeatable courage, are related in his engaging book, *Judgement Day for the Turin Shroud* (18). McCrone is the author of textbooks on asbestos identification (19), polarized light microscopy (with John Delly) (20), an indispensable atlas on particle identification for industry (21), and numerous articles. In 2000, the American Chemical Society awarded him its highest honor, the Award in Analytical Chemistry, for his work on the Shroud. He also received honorary doctorates, as well as numerous awards and honors from microscopical societies worldwide.

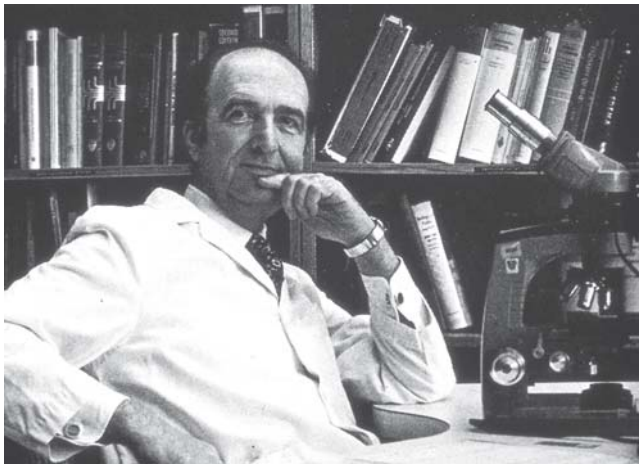


From *Judgement Day for the Turin Shroud* (Ref. 18).

Walter C. McCrone (1916-2002) in 1996 sits with his Nikon polarizing microscope, which he used for his analytical research on the Shroud of Turin and the Vinland Map.

GUIDO MAJNO

Guido Majno (1922-2010) was born in Milan. He became an attending pathologist at Harvard, and later, at the University of Massachusetts at Worcester. The photograph shows him by his American Optical Microstar 110 microscope. In addition to being a pathologist of great renown, who investigated fundamental mechanisms in inflammation and blood cell migra-



From *The Healing Hand* (Ref. 23).

Guido Majno (1922-2010) in 1974 at the University of Massachusetts at Worcester with his American Optical Microstar 110.

tion into tissues, Majno used old microscopes to document what previous microscopists and pathologists actually saw (22) and wrote a fascinating book on the history of wounds and wound healing (23). The microscope in the photograph, taken in 1974, marks the heyday of American microscopical science. The AO Microstar was produced until 1985. AO sold out a year later to Cambridge Instruments, and like Bausch & Lomb, became part of the Leica group (12).

ROBERT B. MCLAUGHLIN

Robert B. McLaughlin (b. 1922) was an electrical engineer, who took up microscopy as his hobby after an early retirement. The photograph shows him in 2000 with his Zeiss Standard 16. He contributed many articles on diatoms for *Microscopy* and *The Journal of the Quekett Microscopical Club* from 1972 to 1979. For 20 years, beginning in 1985, he wrote essays on diatoms and microscopy in his column for *The Microscope*. When he retired as Assistant Chief of the Electronics Engineering Branch of the Federal Aviation Administration in Anchorage, Alaska, McLaughlin moved to Santa Fe, New Mexico, and continued to publish on diatomacea. He also wrote two books that are better known for their excellence in *The Microscope Series* (24). He is a member of the Quekett Microscopical Club, New York Microscopical Society and Postal Microscopical Society, and is a fellow of the Royal Microscopical Society. He uses Zeiss microscopes and accessories exclusively, and tutors aspiring microscopists (including the author) at his home. The progressive deterioration of vision in

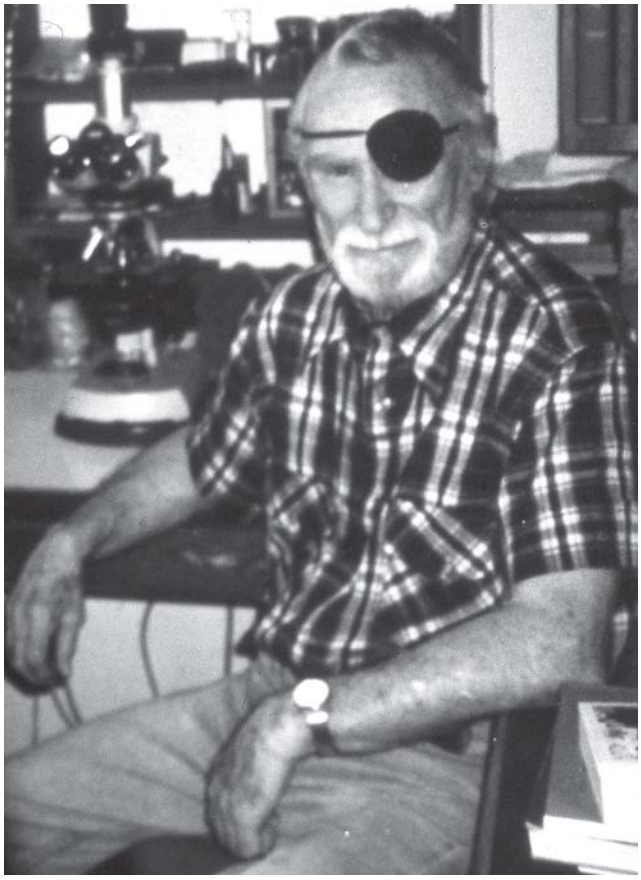


Photo by Jorge H. Aigla

Robert B. McLaughlin in (b. 1922) is shown in 2000 at home with his Zeiss Standard 16 microscope in the background.

his one good eye has forced him to abandon microscopy, and he is currently studying higher mathematics. He purchased his Zeiss Standard 16 in 1982, before Zeiss introduced infinity corrected optics in 1986. These optics were subsequently added to all Zeiss microscopes by the early 1990s.

EPILOGUE

The photographs in this article are more than pictures of men and objects. They reveal human character and the products of human learning and inventiveness. The images vary not only by the microscopes they portray, but also by the the person's experience and personality, at times revealing his temperament (25). If, as asserted, to collect photographs is to collect the world (26), these images capture something of our sensibilities for various places and epochs. Photographs of people may well instruct and also widen

and change our ideas of what is worth looking at, and of what we have a right to expect to see.

ACKNOWLEDGMENTS

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