Academic/Education Portfolio

Norman J. Barker MS, MA, RBP
Associate Professor of Pathology & Art as Applied to Medicine
Director of Pathology Photography & Graphics Arts Laboratory
Division of Informatics
Johns Hopkins University, School of Medicine

October 2013
# Table of Contents

## 1. Introduction

### Book Projects

2–3......................Ancient Microworlds, Book, Poster

4–6......................Seaweeds: Wonders of the Ocean Realm, Poster, Book, Page Spreads

7–8......................Faces of Ancient Arabia, Poster, Plate Samples

9–10.....................Paleobotanical Splendor, Book Cover & Page Spreads

11–14...................Hidden Beauty: Exploring the Aesthetics of Medical Science, Poster, Book, Page Spreads

15–16...................Photographing the Osprey, Journal Article

17–18...................Patent Medicine: Selling the Cure, Cover, Page Spreads

19......................Dr. Peter Burger, Diagnostic Neuropathology

20......................Peabody Library Project

21......................Evergreen Museum & Library Project

### Video & iPad Apps

22–23....................Halsted, Poster, DVD Case

24......................The Johns Hopkins Atlas of Pancreatic Pathology

25......................The Johns Hopkins Atlas of Pancreatic Cytology

### Teaching

26–27....................Graduate Student Course Work, Art as Applied to Medicine

28–29....................Pathology Photography Trainee Work
The foregoing pages are samples from books, exhibits and teaching projects created and published by Norman Barker. This work illustrates the scientific image as an intersection between art and science. These images are examples from projects where the scientific image has been taken a step further. The additional steps include identification and publication of the image, communicating information to both the scientist and the student in a way that is both visually interesting and meaningful is critical. In this way, photography and design provide an important bridge between the worlds of art and science and it is to this work that I have dedicated my career as a biomedical photographer, designer and teacher.
ANCIENT MICROWORLDS

GIRAUD FOSTER & NORMAN BARKER

ANCIENT MICROWORLDS

GIRAUD FOSTER
NORMAN BARKER

ANCIENT MICROWORLDS

FRANCIS M. HUBER
CURATOR IN PALYBOTANY
SMITHSONIAN INSTITUTION

ANCIENT MICROWORLDS, THE BOOK: Coauthored with Graud Foster this body of work lies at the interface of science and fine art, photographing beautiful fossils from around the world in color with varying degrees of magnification. In the book there are seventy-eight images included with complete scientific names and explanation of morphology. Custom & Limited Editions Publisher, 2000
ANCIENT MICROWORLDS, THE EXHIBIT: Ancient Microworlds was shown at more than 40 natural history museums and science centers in the United States, Europe and Asia over a period of ten years. It has been seen by more than one-million museum visitors. I designed this poster for the exhibition at the American Museum of Natural History. www.ancientmicroworld.com
Seaweeds: Wonders of the Ocean Realm
November 1, 2006 - April 30, 2007

Photographs by
Norman Barker
&
Giraud Foster

The Charleston Museum
America's First Museum

Seaweeds: Wonders of the Ocean Realm: I designed this poster for The Charleston Museum. It was awarded with "Best of Show" at the national salon at the BioCommunications Association meeting in Portland, Oregon, 2005. www.bca.org/gallery/biointerimages2005.html
Seaweed: Wonders of the Ocean Realm

This collaborative book and museum exhibit trace the historical connection of pressed plant specimens and the first book to be published using photographs by Anna Atkins in 1842. The catalog also describes seaweed morphology and specimen geographic location. Man & Lion Press 2007. The book was awarded a Citation of Merit in the graphics media periodicals division at the BCA meeting in Tucson, AZ. www.bca.org/gallery/bioimages2013awards.html
Faces of Ancient Arabia

The Giraud and Carolyn Foster Collection of South Arabian Art

The Walters Art Museum
July 20 - September 7, 2008

Faces of Ancient Arabia: This book and museum exhibit documents the largest collection of Ancient Southern Arabian Sculpture in private hands. The sculptures were donated to the Walters Art Museum, my role as picture editor and photographer included all of the studio photography for the exhibition catalog and work with the designer to produce the book. The Walters Art Museum, 2008
PALEOBOTANICAL SPLENDOR: This book is a celebration of the beautiful ancient plant life that has been preserved in stone. Macro and micro photographic techniques were used to highlight the functioning of the plant structure. Simply stated, paleobotany is the study of fossil plants. One of the extraordinary aspects of this scientific discipline is that it can provide a historic perspective on how plants function, from the earliest stages to full maturity. Man & Lion Press 2011, www.bca.org/gallery/bioimages2008.html
Hidden Beauty: Exploring the Aesthetics of Medical Science: This award-winning book is a collaborative project by a scientist and artist. It asks the reader to consider the aesthetics of human disease, a dynamically powerful force of nature that acts without regard to race, religion, or culture. Here more than sixty medical science professionals present visually stunning patterns of different diseases affecting various areas of the human anatomy. Captured with a variety of imaging technology ranging from spectral karyotyping to scanning electron microscopy. Schiffer Books, April 2013. The book was awarded the BioCommunications Associations 2013 Medical Education Award. www.bca.org/gallery/biomages2013awards.html  www.hiddenbeautyinmedicine.com
Coronal section through the head

Through the ages, art and anatomy have always had a close relationship. For example, during the Renaissance, artists and anatomists were often the same person. From their own dissections and drawings came huge contributions to our understanding of medical science and the human body. One of the most famous drawings illustrating this point is that of the great anatomist/physician Andreas Vesalius on the title page of his classic book, De Humanis Corporis Fabrica, published in 1543. One of the most influential books on human anatomy for several hundred years, the book plate shown of Vesalius performing dissection with a crowd of interested spectators observing the great anatomist as he points out the salient features from the open belly of a female corpse.

There has always been a fascination looking into what's inside the human body. The first Dutch anatomy theatre was at the University of Leiden. For a nominal charge the public could view the dissection of a human corpse. The Latin text Anatomia or "Know Thyself" was added to the surgical theater's walls and became the codex for dissection of the human body and the advancement of anatomical knowledge. In modern times, people are fascinated to watch live operations in high definition on The Discovery Channel from the comfort of their couch.

The controversial modern German anatomist Gunther Von Hagens patented the process of plastination that enables museum visitors to view the human body in unprecedented detail. His exhibition entitled "Body Worlds" has been exhibited at science and natural history museums around the world. Intricately detailed anatomical patterns have been amenable to get close-up views of the inner workings of the human body. The Visible Human Project by The National Library of Medicine is another marvel of modern anatomy. The initial aim of the project was to create complete digital image datasets of male and female cadavers using high-resolution photography as well as MRI and CT. The whole catalog of data is available on the Internet. Regardless of these high-tech approaches the basic method for medical degrees remains the one-on-one dissection of a cadaver to learn human anatomy.

The image at right illustrates the anatomy of the human head in an equally thick section.

The modern microscope

In 184, Dutchman Anton van Leeuwenhoek made a startling discovery that changed the world. His observations through his simple microscope started the discipline of microbiology. Despite all the changes in more than three hundred years of microscopes, the principle is still being used. It was the first time that life forms were seen by naked eye. The microscope plays a central role in so many scientific endeavors. In the majority of biological research there are three types of microscopes in use today. The light microscope, the transmission electron microscope and the scanning electron microscope (SEM). To properly examine a specimen, three basic steps are necessary: a) prepare the sample and mount it onto a slide; b) examine the sample with a microscope; and c) analyze the results. The recent development of new technology, such as the scanning electron microscope (SEM), has revolutionized the way we examine the world at the microscopic level. The SEM is used to examine small samples, such as cells or metal samples. The beam of electrons is directed at the sample and interacts with the surface. The resulting images are recorded and analyzed to provide detailed information about the sample's surface.

incident light (reflected off the surface) is used to view opaque subjects like computer chips or fragments of metal, but the light microscope offers the only way for the less obvious cracks or cracks in the sample to be seen. In practice, the light microscope has a resolution limit of approximately one thousandth of a millimeter (μm). At the highest magnifications around 4000X we can see structures such as bacteria but they are so small their structure cannot be seen at all.

The transmission electron microscope has a resolution limit of 0.001 μm. This is more than one hundred thousand times smaller than the human eye can see. This instrument can be used to look at the DNA inside a bacterium with great clarity. This very complicated microscope does not use light to form an image but electrons in a vacuum chamber that bombard the specimen at a very fast speed with a very fine layer of platinum or gold to make the specimen electron conductive. Much higher magnifications can be achieved so that we can actually study the human eye in which the lenses closest to the actual size.

The scanning electron microscope doesn't have the high-resolution power of the TEM, instead of looking into cells and atomic structure, the SEM is used to observe surfaces, such as a human fiber (hair) or metal fatigue. A low beam of electrons projected in a vacuum scans the surface of the subject. As these secondary electrons reflect off the specimen detector collects them and they can be viewed on a television screen since no light is used to form the image, great depth of focus can be achieved that can resolve a parasite on top of the hair. Images produced with the electron microscope are always monochromatic or black and white but the actual color of a particular specimen is not always evident. The color added has no relation to the real color of a particular specimen but the color is added generally for aesthetic effect and can help distinguish regions of interest in the specimen.
Paraffin blocks

“Let’s see what the pathology shows!”

Many patients have heard this phrase after a biopsy or surgical procedure, but what exactly does it mean? Anatomic Pathology is a specialty within the medical field that deals with the study of disease in tissues, cells or fluids. Pathologists are medical doctors, and are often referred to as the “doctor’s doctor” because they play a consultant role by interpreting the findings in lesions, tissue specimens or body fluids that help the clinician understand his/her patient’s disease and how to treat it. But how does an anatomic pathologist do this work? When a piece of tissue is taken from a patient, the pathologist fixes the specimen using a chemical called formalin, and then dehydrates the tissue by incubating it in ethanol and alcohol. Once this occurs, the dehydrated tissue can be permeated with hot wax creating a paraffin-embedded version of the tissue. This is important to do because the paraffin acts as a support that allows histotechnologists to cut very thin sections of the tissue.

These thin sections (the width of a human hair) are mounted on glass slides and stained so that the pathologist can examine the tissue sections under a microscope (for example, see Histological Stains in the Chapter Abdomen). The image at right is an example of several different paraffin blocks created from different tissue specimens from different patients. Depending on the pathologist working in the lab that day, this particularly busy histology lab has used different colored plastic holders (known as “cassettes”) to keep track of each pathologist’s specimens while they are being fixed and paraffin-embedded.
HIDDEN BEAUTY
EXPLORING THE AESTHETICS OF MEDICAL SCIENCE
NORMAN BARKER & CHRISTINE Iacobuzio-Donahue

A COLLABORATIVE EXHIBITION & BOOK
THE MUTTER MUSEUM
OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA

HIDDEN BEAUTY: THE EXHIBIT: Sixty large images from the book will be going on a museum tour, 1st stop, The Mütter Museum.
www.hiddenbeautyinmedicine.com
This paper *Photographing the osprey in the Chesapeake Bay Region*, documents nesting behavior with remote controlled cameras in the nest, it was recognized with the gold award for the best paper published in The Journal of Biological Photography, Vol 60 No.2 April 1992.
Images from the project, *Photographing the osprey in the Chesapeake Bay Region*. The Journal of Biological Photography, Vol 60 No.2 April 1992
Lydia Pinkham's Vegetable Compound

Lydia Pinkham is probably the best known female manufacturer of patent medicines. She grew up in a Quaker family and taught school after marriage. Lydia Pinkham was very active in a number of social and political causes including abolition, women's rights, and temperance, as well as movements such as phrenology and Swedishborgianism. She made herbal remedies for personal and familial use for many years, principally a concoction thought to have been derived from modifying a herbal recipe contained in the King's American Dispensatory. The original Vegetable Compound contained about 15% ethanol and the following herbs: Unicorn Root, Life Root, Black Cohosh, Measuring Flour, and Brown Sugar.

In 1873, a financial crisis left her husband bankrupt and in 1875 she began to sell her Vegetable Compound for $1 a bottle, advertised her product as a woman's medicine with claims such as “only a woman can understand a woman problem.” She encouraged women to write in for medical advice and usually recommended Lydia Pinkham's Vegetable Compound along with exercise, good diet, and cleanliness. Her medicine also was recommended for arthritis by the advertising promise of “a lady in every bottle.” Lydia Pinkham realized that many women of the time had little understanding of the laws of life and published a free booklet on the female reproductive system from puberty through child birth and menopause.

Overall, a small but significant proportion of patent medicines were produced by women. In Baltimore, 44.5% (176) of patent medicine companies from 1880 to 1930 were owned by women.

**Patent Medicine: Selling the Cure:** I coauthored this book that explores the history of the medical trade card at the turn of the century. Patent Medicines play an important role in the history of medicine and were extensively used in the late 1800’s and early 1900’s. We show how patent medicine manufacturers used images to communicate notions of health and disease and how these images demonstrate several recurrent motifs: slaying the beast of disease, the doctrine of signatures, the sick patient, literal illustrations of medicinal effect, gender appeals and utilization of new scientific wonders. Each motif conveyed ideas on health and disease to the public, and their examination provides insight into the history of medicine. Man & Lion Press, October, 2013
Surgical Pathology of the Nervous System and Its Coverings: Peter Burger MD, This is one of more than twenty atlas projects that I have provided images for. I was the contributing photographer for this project that contains more than 1,500 photomicrographs and gross specimens. This book is a seminal work in neuropathology and in the 4th edition.
GEORGE PEABODY LIBRARY: I photographed and designed this poster that won an award of excellence from the national salon at the BioCommunications Association. It also won the Royal Society of Chemistry, RSC Science in the Library Competition. The image appeared on the cover of the 2012 RSC catalog. This was done as a personal project and along with the poster I made a special limited edition portfolio of 50,16x20 archival prints in a clamshell box that were presented to and are in the permanent collection of The Sheridan Libraries of Johns Hopkins University. Photographs from the project have been published in several magazines including, Travel and Leisure. September, 2009 www.bca.org/gallery/bioimages2009.html
EVERGREEN MUSEUM & LIBRARY: I photographed and designed this poster which was given to the board of trustees members and sold in the museum gift shop. The poster was awarded a Citation of Merit in the graphics media poster division at the BCA meeting in Phoenix AZ. www.bca.org/gallery/bioimages2011awards.html
HALSTED

THE TRUE STORY OF THE MOST IMPORTANT AND INNOVATIVE SURGEON AMERICA EVER PRODUCED

Produced by Ralph K. Hruban, M.D. & Norman Barker
Director - Alan Wu
Sound - Jen Christoferson
Original Music - Paul Schiltz
Selected piano music performed by Galina/Ragimzade
Special thanks to John L. Cameron, M.D.

Made possible by a generous grant from the Blum-Klevler Foundation

HALSTED: I co-produced this award winning 55 min PBS documentary with Dr. Ralph Hruban. The documentary was aired on more than 50 Public Broadcasting Stations around the country. This documentary tells the fascinating story of the first Chief of Surgery at Johns Hopkins and the remarkable contributions he made to surgery and medical education. April 2012

website: halstedthedocumentary.org
HALSTED

This is the true story of the most important and innovative surgeon America ever produced. The successful, daring and inventive William Stewart Halsted pioneered the use of local anesthesia, but at a terrible personal price - in the process of revolutionizing surgery he became addicted to cocaine and was institutionalized. His friend and colleague William Welch gave Halsted a second chance at the newly established Johns Hopkins Hospital, where Halsted went on to become the first Chairman of Surgery. This story follows a man who rose to prominence, plummeted into addiction, and then rose again, like a phoenix, to become one of the most influential physicians of the 20th Century.

Produced by Ralph Hruban, M.D. & Norman Barker
Director - Alan W.L.
Sound - Jon Christensen
Original Music - Paul Schiltz
Selected piano music performed by Galina Ragimzade
Special thanks to John L. Cameron, M.D.
© 2012. This DVD is for promotional purposes only and Not for Sale.

HALSTED: Produced by Ralph Hruban & Norman Barker, 55 min High-Definition PBS Documentary, DVD & BlueRay
It won the Biocommunications Associations 2012 Medical Education Award. It was also recognized with a Bronze Award from the Media Festival at the 2012 national meeting of the Health & Science Communication Assoc. www.bca.org/gallery/bioimages2012awards.html
The Johns Hopkins Atlas of Pancreatic Pathology: I was the photographer for this iPad application, the first of its kind. The application contains 1,400 photographs and 26 medical illustrations. The app won the Dr. Frank Netter Award for the advancement of education and research in visual communication for the health sciences. In the last year it has been downloaded more than 14,000 times. i Tune Store, 2012
The Johns Hopkins Atlas of Pancreatic Cytopathology: Based on the success of our first iPad application we made a second educational app. I was again the photographer for this app and provided more than 700 high resolution images. iTune Store, 2013
Graduate Student Work: I love to teach and these are some examples of my student’s work from the first year course in BioMedical Photography and Digital Imaging in the Department of Art as Applied to Medicine. Over the last 20 years I have taught more than 100 graduate students and have always used several different assignments so the students get hands-on practice for many of the situations they will come across when out in the real world. Many specialty areas are practiced, such as macro to portraiture to making a photographic scientific illustration. Lighting and creating high quality photographs for publication is stressed.
Pathology Photography Training Program: These examples of work from photographers who have trained under me. Their photography is used for many different purposes in the institution. All of the photography we do meets the mission of Johns Hopkins Medicine... Teaching, Research and Patient Care. Over my 32 year career at Hopkins I have trained more than 75 Biomedical photographers and a few have gone on to run biomedical communications departments at other institutions, Mark Teske, Univ of MD, Jay VanRensselear, JHU Homewood, Rick Dewitt, Memorial Sloan-Kettering, Ben Ehrman, Sinai Hospital.
Pathology Photography Training Program: These examples of work are from my photographers who cover a wide variety of assignments for the institution.