

Fall 2014

The Artistic Eye and the Radiologist

By Mark Hom, Interventional Radiologist

Radiology is an intellectual pursuit, requiring thorough knowledge of pathophysiology, anatomy, physics, and technology. Radiologists must also develop visual talent to be successful at interpreting images. Mark Hom, a radiologist, medical illustrator, author, and digital artist, explains why radiologists need to develop their artistic eye.

With the tremendous technical advances in medical imaging and understanding the disease processes, it is easy to forget that the most basic and important quality of a good radiologist is observation. We teach our radiology residents to use logic, analysis, and language to interpret and convey radiological findings. These are left-brain functions that are relatively easy to teach and measure. However, some other skills that radiologists must develop are much harder to impart and quantify. Much of the radiologist's work involves visualization, conceptualization, and pattern recognition, which are right-brain functions. With multiplanar modalities, the number of images that radiologists must decipher has skyrocketed. This much visual information is really too much for the left side of the brain to handle. To make sense of it all, it helps to develop the more artistic right side of the brain.

As the child of an artist/art dealer father and a biochemist mother, I was fortunate to develop my artistic eye long before becoming a radiologist. We generally had two types of reading material lying around the house: issues of *Scientific American* and old master art catalogues. More than just being exposed to art, appreciating art rewired my brain and changed the way I approached learning. Whereas my classmates would try to memorize the details

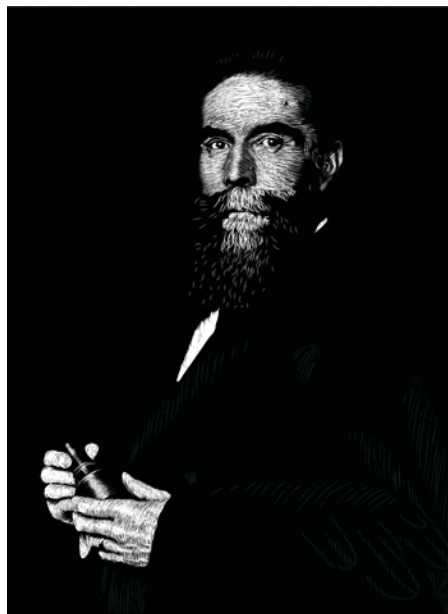


Fig. 1—Wilhelm Roentgen holding a cathode ray tube. Digital sketch by Mark Hom.

and have difficulty grasping the big picture, I would always try to visualize the big picture first; then the little details would simply fall into place. Be it history, shop class, organic chemistry, or physics problems, mental visualization was always the starting point. In my first year of medical school, I learned human anatomy by sketching the muscles and neural pathways in my notes, which worked wonderfully. I credit this visual method of learning anatomy with my success on the anatomy practical final exam, where I was the only medical student to score 100%. The professor noticed my ink sketches and, with a Dean's Grant and Holderness Fellowship, I illustrated the anatomy lab manual between my first and second years of medical school (sacrificing the last summer vacation of my entire career!). My early and

A Word from the Chair

by
Bruce L. McClennan



As the summer sun sets on our warm weather and vacation schedules, the pressures of the academic year seem to become more evident. Although for many of us the academic year starts in July with new residents, we cannot escape the back-to-school mentality that fall always brings.

The final American Board of Radiology (ABR) oral examination, a milestone for all of us and our careers, will be administered for the last time in November 2014. Those who still practice our precious discipline know—or should know—about ABR Maintenance of Certification, as well as the lexicon or “alphabet soup” of requirements that are part of our professional practices these days. More specifically, I refer to both training for the upcoming 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD) and the Centers for Medicare & Medicaid Services (CMS) Measure-Applicability Validation (MAV) reporting measures, which will ultimately lead to better billing and reimbursement for our practices. These and other practice-related issues make retirement or part-time practice most appealing.

As SRS members, we enjoy the luxury of learning through the *American Journal of Roentgenology* and our annual meeting, as well as the robust educational offerings on www.arrs.org—the ARRS website. ARRS.org provides many avenues for education, including Goldminer®, CME, and SAM offerings, in-person and virtual symposia, and the particulars of our annual meeting in Toronto next April.

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unwavering choice of medical specialty was radiology because it was so visual.

When scrolling through a high-resolution CT scan, it is not enough to expect the pathology to jump out at you. For the more subtle findings, one needs both a systematic approach to thoroughly examine each organ structure and an artistic eye to reveal subtle differences in symmetry, contrast, exposure, and patterns. In my older patient population, I estimate that a high-resolution body CT scan has as many findings as the age of the patient. To read a modern CT scan in a timely fashion, the radiologist needs to train the artistic right side of the brain.

Well into my radiology career, I came up with an idea to explain exercise and fitness under the umbrella of mitochondrial cell energy (a big-picture concept). I was extremely fortunate to be teamed with Greg LeMond (three-time Tour de France champion) and Elsevier (which contracted us to write two books—one version for athletes and the other for scientists). In addition to writing the scientific content, I was also tasked with illustrating the books with artwork that had to both meet Elsevier's high artistic standards and appear exclusively in one book or the other (i.e., not shared between the two books). Illustrating two books with traditional art would take too long, would make editorial corrections difficult, and would require starting from scratch for each version. The solution was digital art.

A digital interface allows the artist to draw either on a graphics tablet or directly on a touch-sensitive screen, using a stylus to create perfect lines, shapes, and digital brush strokes. Because the input is stored data, the artwork can be easily corrected or modified, greatly speeding up production time.

The portrait of Wilhelm Roentgen (Fig. 1) began as a practice sketch so I could develop hand-eye coordination with my new tablet and graphics software. I used only one simple line-drawing tool from the many dozens of digital art tools available. The Roentgen digital drawing is composed of many thousands of hand-drawn lines. Each line is vector data, whose shape, thickness, color, taper, and position can be edited. With traditional ink, one bad line or smear can ruin a drawing. With digital art, even huge mistakes are easily reversed. The



Fig. 2—Theodore Roosevelt, 26th president of the United States. Digital sketch by Mark Hom.

black-and-white technique in this sketch was inspired by Roentgen, himself, who performed most of his laboratory work in darkness as he discovered a new form of light. Thus, a portrait of Wilhelm Roentgen emerging from the darkness perfectly captured this duality of light and dark. I was also inspired by what I perceived as a lack of historical reference among my radiology residents—I was

Chair continued from page 1

I want to remind all of the spirit of congregation and collegiality that we enjoy within SRS activities and as ARRS members at our annual meeting. I hope many are making plans to attend our April 2015 meeting in Toronto.

Finally, I encourage all SRS members to contribute a story or vignette that may be of interest to SRS Notes readers either to me (bruce.mcclennan@yale.edu) or to Lissa Hurwitz (lhurwitz@arrs.org), who edits this publication.

disappointed to find that only a few of my residents recognized Roentgen from this portrait, whereas all of my radiology technologists recognized him immediately. Wilhelm Roentgen was, after all, the first “rad tech”—and he certainly knew how to handle x-ray machines and film cassettes.

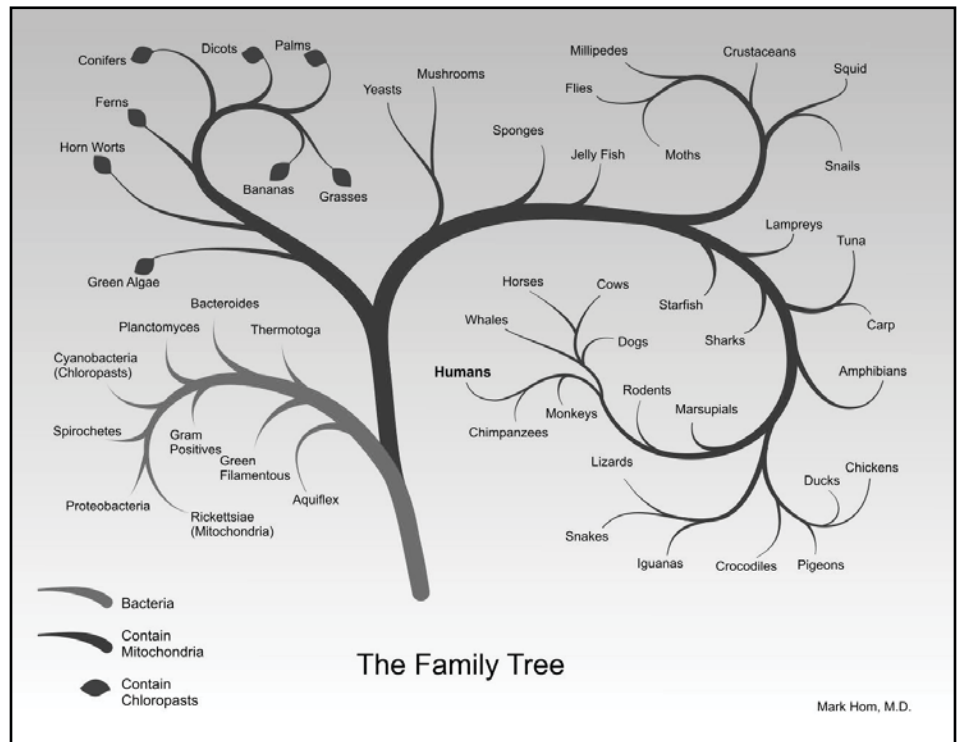


Fig. 3—Mitochondrial evolution diagram using vector graphics software. Digital image by Mark Hom.

While most artists draw areas of shadow and darkness, my technique allows the artist to draw areas of light. With delicate application of line thickness and curves, one can portray texture, mood, and emotion. The technique is especially effective in depicting historical figures, such as Teddy Roosevelt (Fig. 2), because the black-and-white woodcut effect is in keeping with older printing styles. Overdrawing the white lines results in loss of texture, just as a “whited-out” (or overexposed) chest radiograph has less information. With this art technique, less is definitely more. The secret is in knowing when to stop.

With fairly inexpensive digital art equipment and software, scientific journal authors can illustrate their own articles. The diagram of mitochondrial evolution (Fig. 3) uses layers that separate the illustration into various components,

any of which can be edited later. The faded background is a base layer, the branches and leaves (each editable) are the next layer, and the annotations are the top layer. When the layers are combined, the total effect is seamless. Each item can be changed on a whim without needing to start over.



Fig. 4—The Human Eye. Digital image by Mark Hom.

Digital art is not restricted to line drawings and diagrams. In *The Human Eye*

(Fig. 4), photorealism was achieved with consumer sketching software on a conventional tablet. To create the illustration, only a few virtual tools were needed: a color palette, an airbrush for the skin tones and lighting effects, a fine pencil tool for the iris muscle detail, and a “noisy” brush for the skin texture and gloppy mascara effect.

Suggested Reading:

LeMond G, Hom M. *The science of fitness: power, performance, and endurance*. Waltham, MA: Elsevier, (in press)

LeMond G, Hom M. *Mitochondrial fitness: the science of athletic energy*. Waltham, MA: Elsevier, (in press)

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It must be true – I read it on the Internet!

OCTOBER

- In Greek mythology, fall was supposed to be the time when Persephone rejoined Hades in the underworld.
- October has become famous as “Red October,” due to the Russian October Revolution of 1917, although in the modern Gregorian calendar, the revolution started in November.
- The last week in October is the only time of the year when all four major North American Sports league schedule games—the NBA generally starts in that last week, while the MLB postseason is just ending.

October is...

- Eat Country Ham Month
- International Drum Month
- Sarcastic Month (oh, really?)
- Seafood Month
- Apple Jack Month
- National Pizza Month
- National Stamp Collecting Month

NOVEMBER

- November starts on the same day of the week as February in common years. November ends on the same day of the week as August every year.
- It’s quite common for some males in Australia (especially in the city of Melbourne) and New Zealand to sport a moustache during November. The custom is known as Movember (Movember is a portmanteau of the words “Moustache” and “November”) and is a fundraising event for men’s health issues.

November is...

- Peanut Butter Lovers Month
- Real Jewelry Month
- Manatee Awareness Month
- National Pomegranate Month
- World Sponge Month
- Adopt A Senior Pet Month
- National Diabetes Awareness Month

DECEMBER

- December starts on the same day of the week as September every year. December ends on the same day of the week as April every year.
- December was originally the 10th month in the Roman calendar. The period of January and February didn’t really count as months, and the Roman calendar was based on a 304-day year, based on the approximate lunar month of 29.5 days.
- We celebrate Christmas on December 25th because in the fourth century, Pope Julius I announced that Christ’s official birthday would be December 25.

December is...

- National Bingo Month
- Write a Friend Month
- Read a New Book Month
- National Egg Nog Month
- National Write a Business Plan Month
- Tomato and Winter Squash Month
- Love Your Neighbor Month

Upcoming ARRS Annual Meetings

April 19–24, 2015

Toronto, ON, Canada
Metro Toronto Convention Centre

April 17–22, 2016

Los Angeles, CA
Los Angeles Convention Center

April 30–May 5, 2017

New Orleans, LA
Hyatt Regency New Orleans



THE ROENTGEN FUND®

Strengthening the foundation of radiology is critical; however, so too is ensuring that the trajectory of the entire discipline continues to trace an arc along a curve defined by innovation and unparalleled expertise. It's a curve that will ensure radiology continues to play a vital role in patient care—not just today, but well into the future.

We can achieve this goal, but only with your help.

We invite you to join your colleagues this year in making a tax-deductible gift to The Roentgen Fund, and help strengthen the foundation today and—more importantly—build a bridge to the profession of tomorrow.

Don't miss William Casarella's talk, "Interventional Radiology: From Curiosity to Mainstream."



SRS Committee 2014-15

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- M. Paul Capp
- William Casarella
- Jonathan Dehner
- William Thompson
- Robert Campbell
- Lee Rogers
- Kay Vydareny
- Terry Ovitt
- James Youker
- Erik Paulson
(Liaison to the Executive Council)

SRS Birthdays

We wish these SRS members a very happy birthday:

October

- 1 Norman Kronacher
- 4 James R. Custer
- 5 Peter R. Miller
- 7 Chein-Fang Yang
- 11 Andrew K. Poznanski
- 12 Robert E. Campbell, James E. Reinhardt
- 16 Richard J. R. Byrne
- 20 Joel E. Lichtenstein, William M. Thompson
- 22 David C. Levin
- 25 Ellen L. Wolf
- 29 Sarah G. Pope
- 31 Claremont F. Carter

- 17 Sung-Woo Lee, William J. Casarella
- 19 Albert Hale
- 20 Raymond Gagliardi
- 21 Jonathan Stolz, Anton Van Der Klis
- 26 Kay H. Vydareny
- 28 Richard S. Colvin

December

- 3 John Meehan, Stuart B. Paster
- 5 Harry J. Barr
- 6 Stephen F. Albert
- 9 Terrence C. Demos, James Whiting
- 10 Frank T. Daly, Jr.
- 11 William F. Lindsey
- 15 Barry H. Kart
- 17 Charles Walter Snyder, Rajeshwar K. Luther
- 26 Herbert F. Gramm
- 28 Paul J. Drury
- 29 Barbara L. Carter
- 30 John Harley

November

- 2 Michael A. Noon
- 4 Geoffrey A. Gardiner, Edward I. Miller
- 9 Yoshihiro Hiramatsu, Arnt A. Fishedick, Melvin L. Turner
- 10 Anthony P. Garritano
- 15 Rufus W. Head

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