

MODERN HUMAN ANATOMY
LIST OF DRAFT FIGURES AND VIDEOS

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Initial Figure View of bottom sole from an **Adidas Feet You Wear** concept advertisement/promotional material.

Figure 1A Identical bare footprints of always barefoot European and Solomon Island native from **James**, Clifford S. (1939). Footprints and feet of natives of the Solomon Islands. In the *Lancet*: 2: 1390-1393.

Figure 1B Different bare footprints of shoe-wearing European and barefoot Solomon Island native from **James**, Clifford S. (1939) above.

Figure 2A&B Figure 2B is Elevated shoe heel elevating the wearer's foot heel and thereby plantarflexing the ankle joint, based on Figure 290 of the classic 1918 Edition of Henry *Gray's Anatomy of the Human Body*, available online at www.Bartleby.com/107/. Fig. 2A is from unknown web source.

Figure 3A-C The ankle joint and subtalar ankle joint of the foot, based on Figures 268 and 271 of the 1918 Edition of *Gray's Anatomy*.

Figure 4A&B Based on Figure 290 of the 1918 Edition of *Gray's Anatomy* and adapted from Hicks, J.H. (1961) The three weight-bearing mechanisms of the foot. In: Evans, F.G., ed. *Biomechanical*

Studies of the Musculo-Skeletal System. Springfield, IL: Charles C. Thomas. From Kelikian, Armen (2011). *Sarafian's Anatomy of the Foot and Ankle*, page 620. Philadelphia: Wolters Kluwer.

Figure 5A Based on Figures 16 and 20, pages 61 and 67, from Sgarlato, T. E. (Ed.) (1971). *A Compendium of Podiatric Biomechanics*. San Francisco: California College of Podiatric Medicine.

Figure 5B Figures 1 and 2 of Gustav Rubin (1971). Tibial Rotation. *Bulletin of Prosthetic Research*. Spring, 1971.

Figure 6A&B Comparison between barefoot and heeled shoe of the path of the ankle joint (talar trochlear) when rotated externally to the outside by shoe heel-induced supination of the subtalar joint, based on Figures 244 and 258 of the 1918 Edition of *Gray's Anatomy*.

Figure 7 Figure 3.2 based on Plate 18 Man Running, Frame 10 side view, from Muybridge, Eadweard (1887). *The Human Figure in Motion*. New York: Dover Publications, Inc. (1955).

Figure 8A Perspective view of body weight forces during running on the lower leg tilted to the outside, based on a part of a figure from *De dissectione partium corporis humani libri tres* by Charles Estienne. Paris, 1545.

Figure 8B Simple graph of the force vectors of Fig. 8A.

Figure 8A1 Based on Figure 8.5 of *The Running Shoe Book* by Peter Cavanagh (1980). Mountain View, CA: Anderson World, Inc.

Figure 8C Knee Moment Frontal Plane & Transverse Plane Graphs from Figure 4 of Steffen Willwacher et al. (2016). The free moment in running and its relation to joint loading and injury risk. In *Footwear Science* Vol. 8, No. 1, 1-11. Winner of the Nike Award for Athletic Footwear Research presented at the XIIth Footwear Biomechanics Symposium in Liverpool, UK 2015.

Figure 8D Figure 9, page 1850, from Stefanyshyn, Darren J. et al. (2006). Knee Angular Impulse as a Predictor of Patellofemoral Pain in Runners. In *The American Journal of Sports Medicine* 34: 11: 1844-1851.

Figure 8E Figure 2, page 481, from Mundermann, Dyrby, Chris O., and Andriacchi, Thomas P. (2008). A comparison of measuring mechanical axis alignment using three-dimensional position capture with skin markers and radiographic measurements in patients with bilateral medial compartment knee osteoarthritis. In *The Knee*. 15:480-485.

Figure 9A&B Comparative views of the European and Australian Aborigine tibial plateaus (lower surface of the knee joint) from W. Quarry Wood (1920). The Tibia of the Australian Aborigine. In the *Journal of Anatomy* Vol. LIV: Parts II & III (January and April): 232-257, Figure 1 on page 235.

Figure 9C Top views of tibial plateaus (middle photos) from India from Figure 2, page 139, from Kate, B. R. & Robert, S. L. (1965). Some observations on the upper end of the tibia in squatters. In the *Journal of Anatomy*, Lond. 99: 1: 137-141.

Figure 9D View of ancient Roman tibial plateau from *Roman Catacomb Mystery*, NOVA PBS (air date 2/5/14).

Figure 9E A typical modern tibial plateau of right knee showing asymmetrical and malformed meniscus cartilage on the left, forward of the knee, based on Figure 349 of the 1918 Edition of *Gray's Anatomy*.

Figure 10A&B Comparative upper surfaces of the talus (ankle joint) of an Egyptian and a European, Figure 61, page 114, of Jones, Frederic Wood (1949). *Structure and Function as Seen in the Foot*. London: Bailliere, Tindall and Cox.

Figure 10C Cone-shaped trochlear surface of modern ankle joint, modified from a upper view of the talus in the 1918 Edition of *Gray's Anatomy*.

Figure 11A Basic misalignment of lower extremity joints, showing the right and left knee joints of right and left legs rotated unnaturally to outside by elevated shoe heels/subtalar joint interaction, away from the direction of forward locomotion indicated by the pelvis, as seen in a horizontal plane view, modified from upper views of the foot, tibial plateau, and pelvis in the 1918 Edition of *Gray's Anatomy*.

Figure 11B Overhead view of major misalignment of front-end wheels (original).

Figure 11C Front view of modern hip joint bones, from original plates (circa 1747) on page 29 and 31 from *Albinus on Anatomy* (1979) by Robert Beverly Hale and Terence Coyle. New York: Dover Publications, Inc.

Figure 11D Rear view of modern hip joint bones, from page 31 also from *Albinus on Anatomy* (1979).

Figure 12A&B Modified Leonardo De Vinci sketch known as “The Vitruvian Man”, showing the two abnormal, unnatural general structural positions of modern legs and hip joints: bow-legged legs and knock-kneed legs.

Figure 13A Front view of the illiotibial tract based on a figure from unknown source (being searched).

Figure 13 B&C The Figure shows (B) Sway back most typical of males and (C) Kyphosis most typical of females, from Google figure search.

Figure 14A&B Male and female pelvises comparison, from Figure 241 and 242 of the classic 1918 Edition of Henry *Gray's Anatomy of the Human Body*.

Figure 15A&B Side view of typical human spines, from Dynamic to Static, based on Figure 8, page 61, from Kapandji, I. A. (1974). *The Physiology of the Joints (Volume 3): The Trunk and Vertebral Column (Second Edition)*. Edinburgh: Churchill Livingstone.

Figure 15C Eadweard Muybridge standing naked by a chair, frontal view, from the second frame on

the title page of Muybridge, Eadweard (1887). *The Human Figure in Motion*. New York: Dover Publications, Inc. (1955).

Figure 16A Skeleton of a typical full-term fetus showing its disproportionate very large relative size of head, front view, by Ontleding des menschelyken lichaams (1690). In *Human Anatomy: A visual History from the Renaissance to the Digital Age*, page 135. (2006) Rifkin, Benjamin A. and Ackerman, Michael J. New York: Abrams.

Figure 16B Pelvic openings in selected primate species including human, Figure 5-2, page 93, from Trevathan, Wenda (2010). *Ancient Bodies, Modern Lives*. Oxford: University Press.

Figure 16C Four main types of pelvises, from Figure 24, page 75, of Francis, Carl C. (1952). *The Human Pelvis*. St. Louis: The C. V. Mosby Company.

Figure 16D Fetus during labor, from figure by William Smellie (1754) *A Sett of Anatomical Tables*, from page 203, in *Human Anatomy: A Visual History from the Renaissance to the Digital Age*, page 203. (2006) Rifkin, Benjamin A. and Ackerman, Michael J. New York: Abrams.

Figure 16E Typical asymmetrical prenatal position of human fetus in the womb, right ear facing outward, from Figure 4.36, page 158, of Gazzaniga, Michael S. et al. (2014). *Cognitive Neuroscience: The Biology of the Mind* (4th Ed.). New York: W. W. Norton & Company.

Figure 16F Pelvis as a basin for viscera, from figure by Giulio Cesare Casseri (1627) *De humani corporis favrica libri decem*. Page 118 in *Human Anatomy: A visual History from the Renaissance to the Digital Age*, page 135. (2006) Rifkin, Benjamin A. and Ackerman, Michael J. New York: Abrams.

Figure 16G Viscera spilling out, unsupported by pelvic basin, Plate 57 of Andreas Vesalius from the First Edition of the *De Humani Corporis Fabrica* (1543), page 165 of *The Illustrations from the Works of Andreas Vesalius of Brussels* by Saunders, J. B. deC. M. and O'Malley, Charles D. (1950) New York: Dover Publications, Inc.

Figure 17A Plate 23 Man Running, Frame 4 rear view at midstance, from Muybridge, Eadweard (1887). *The Human Figure in Motion*. New York: Dover Publications, Inc. (1955).

Figure 17B Plate 23 Man Running, Frame 10 rear view at midstance, from Muybridge, Eadweard (1887). *The Human Figure in Motion*. New York: Dover Publications, Inc. (1955).

Figure 17C Composite of previous Frames 4 and 10 above with pelvis leveled in order to show the true relative position of the flexed legs at the maximum weight-bearing load in the midstance position.

Figure 17D Rear view of a Bushman running barefoot from a **YouTube** video clip of *Barefoot running Bushman versus me (shod Finn)* <https://www.youtube.com/watch?v=H1Ej2Qxv0W8>. Published on May 26, 2013.

Figure 17E Front view of Kenenisa Bekele of Ethiopia is shown finishing the second fastest marathon in history (2 hours, 3 minutes, 3 seconds).

Figure 18A Hip Adduction Deformity from Figure 440 from Samuel L Turek, *Orthopaedics: Principles and Their Application*. Philadelphia: J. B. Lippincott Company, 1967.

Figure 18B Corresponding still photos of left and right legs at midstance of woman walking in high heels, from a video clip of a Depend advertisement from September 2016.

Figure 18C-E Figures 17.12 C-D are still photos from a video of Kim Phuk by Nick Ut of Associated Press, shown running from a napalm bombing in PBS *The Vietnam War*, A Film by Ken Burns & Lynn Novick, 2017, Florentine Films and WETA, Washington, D.C. Figure 17.12E is from a website advertisement of unknown source.

Figures 19 A&B A rear view still photo frame of a Bushman (A) and Shod Finn (B) from a **YouTube** video clip of *Barefoot running Bushman versus me (shod Finn)* <https://www.youtube.com/watch?v=H1Ej2Qxv0W8>. Published on May 26, 2013.

Figure 20 A front view still photo frame from a **YouTube** video clip of *Zola Budd 'world record' 2000 metres* <https://www.youtube.com/watch?v=FGSjpUIGbZs> Uploaded on Dec 10, 2010.

Figure 21A Heavily cropped and highlighted photograph taken from an old 19th Century archive still photo of the office of Rudolf Virchow (b. 1821, d. 1902), a pioneer in the study of leukemia, used in **PBS Ken Burns Presents Cancer: The Emperor of All Maladies** (2015). A film by Barak Goodman

Figure 21B Comparison of normal and coxa valga femoral neck-shaft angles, based on modified femur front view drawings from the classic 1918 Edition of Henry *Gray's Anatomy of the Human Body*.

Figures 22A&B Comparison of skeletons with naturally erect posture and poor posture, from Mary Bond's *The New Rules of Posture: How to Sit, Stand, and Move* (2006) Healing Arts Press; the drawings are modified from originals by Brenna Maloney and Patterson Clark of *The Washington Post*. See at: <http://www.washingtonpost.com/wp-dyn/content/graphic/2007/04/16/GR2007041600761.html>

Figure 22C A Modification of **Figure 5A** showing ankle height difference between pronated and supinated foot.

Figure 23A Knock-kneed caucasian male with well-developed vastus lateralis, Figure 9.7 of I. S. Smillie (1974). *Diseases of the Knee Joint*. Edinburgh: Churchill Livingstone.

Figure 23B Same male surgically made bow-legged, with relatively wasted vastus lateralis, Figure 9.10 of Smillie (1974) of preceding figure reference.

Figure 24 Frame 2 rear view, Plate 21, Man Running at midstance, in Muybridge, Eadweard (1887). *The Human Figure in Motion*. New York: Dover Publications, Inc. (1955).

Figure 24A The heart and complex network of surrounding arteries and veins, from Figure 505 from the classic 1918 Edition of Henry *Gray's Anatomy of the Human Body*.

Figure 25 1960's Limbo King Mike Quashie, in *The New York Times* (March 13, 2010) page A13.

Figure 26A Neck torsion and skull positions, Figures 64 and 65, page 219, from Kapandji, I. A. (1974). *The Physiology of the Joints (Volume 3): The Trunk and Vertebral Column (Second Edition)*. Edinburgh: Churchill Livingstone.

Figure 26B Jim Ryun's head and neck position at the end of a race. Ryun's Run. In *Runner's World*, September 2003, page 79.

Figure 26C Roger Banister's head and neck position at the finish line of his successful attempt to break the four-minute mile on May 6, 1954, from an AP Photo File.

Figure 26D Composite of previous Frames 4 and 10 like Figure 17.2A above with pelvis leveled in order to show the true relative position of the flexed legs at the maximum load-bearing at midstance position and showing the effect of the unstable pelvis, resulting in a bent-out spine and tilted head. Plate 23 Man Running, from Muybridge, Eadweard (1887). *The Human Figure in Motion*. New York: Dover Publications, Inc. (1955).

Figure 27A Five still frames (three right and two left, all at the midstance position) from a front view video clip of Usain Bolt's head while running in a Gatorade advertisement.

Figure 27B An Xray example of typical cervical vertebrae asymmetry from unknown web source.

Figure 27C Side view of the eye muscles, from Figure 885 in the classic 1918 Edition of Henry Gray's *Anatomy of the Human Body*.

Figure 28A Figure 4.5 from page 126 of **Gazzaniga**, Michael S. et al. (2014). *Cognitive Neuroscience: The Biology of the Mind (4th Ed.)*. New York: W. W. Norton & Company. The torsional-shift anatomical asymmetries between the right and left hemispheres are shown in a bottom view.

Figure 28B The Base of the Brain from **Vesalius**, Andreas (1543). *De Humani Corporis Fabrica Libri Septem*, Basel. From Wikipedia Commons. See also Saunders, JB de CM. and O'Malley, Charles D. (1973). *The illustrations from the works of Andreas Vesalius of Brussels*. New York: Dover.

Figure 28C Christopher Wren's drawing of the base of the human brain, the first figure of Thomas Willis' *Cerebri anatome* (1664), from the President and Council of the Royal College of Surgeons of England. From **Sandrig**, Susan (2016). A brief history of topographical anatomy. In *Journal of Anatomy* 229: 32-62, **Figure 7** on page 44. **Arraez-Aybar**, Luis-Alfonso et al. (2015). Thomas Willis, a pioneer in translational research in anatomy (on the 350th anniversary of *Cerebri anatome*), **Figure 3** on page 295. In *Journal of Anatomy* 226: 289-300. Available on <https://archive.org/stream/cerebriatomecu00will#page/n71/mode/2up>.

Figure 28D Foville's drawing of a top view of the human brain (1844). From **Sandrig**, Susan (2016). A brief history of topographical anatomy. In *Journal of Anatomy* 229: 32-62, **Figure 10** on page 56. Plate 11 in Achille Louis Foville's Atlas published with *Traite complet de l'anatomie, de la*

physiologie et de la pathologie du system nerveux cerebro-spinal (1844), from the President and Council of the Royal College of Surgeons of England.

Figure 28E Top view of Einstein's brain, showing asymmetrical hemispheres with the right shifted forward, from Figure 1 of Dean Falk, Frederick E. Lepore, and Adrienne Noe (2013). The cerebral cortex of Albert Einstein. *Brain* 136: page 1306.

Figure 29A The asymmetrically twisted body of wheel-chair-bound Steven Hawking from **Hawking** (2014), a PBS biography of his life.

Figures 29B A photo of Steven Hawking's college age asymmetrical standing posture, with higher right shoulder from **Hawking** (2014), a PBS biography of his life.

Figure 29C The asymmetrical eyes of Steven Hawking with larger left eye, from *Genius By Steven Hawking* (2016), a PBS series.

Figure 30 Photo of computer simulation of human brain concussion with intense sideways motion shown in frontal plane cross-section causing maximum tissue stretch in the central brain, from a TED Talk titled *Why Helmets don't prevent concussions – and what might* by David Camarillo, Ph.D. of Stanford University on April 24, 2016.

Figure 31 Photo of frontal plane cross-section of a normal human brain showing the corpus callosum (circled in red), the physical portion of the brain that provides a fiber bundle connecting the two hemispheres. Also from Camarillo TED Talk.

Figure 32 A similar photo like the previous figure, but of a retired NFL football player who suffered from CTE, his highly abnormal brain indicating extreme deterioration of the corpus callosum. Also from Camarillo TED Talk.

Figure 33 A CT scan of the brain of a stroke patient, from "A Stroke Treatment Mired in Controversy" in the *Science Times* of *The New York Times*, March 27, 2018, page D1.

Figure 34 Modified **Leonardo De Vinci** sketch known as "**The Vitruvian Man**" (c. 1485), showing the abnormal, unnatural general cross-over structural position of modern legs and hip joints, as well as showing the effect of the unstable pelvis, which results in a bent-out spine and tilted-in head.

Figure 35 Unmodified **Leonardo De Vinci** sketch known as "**The Vitruvian Man**" (c. 1485), Accademia, Venice.

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