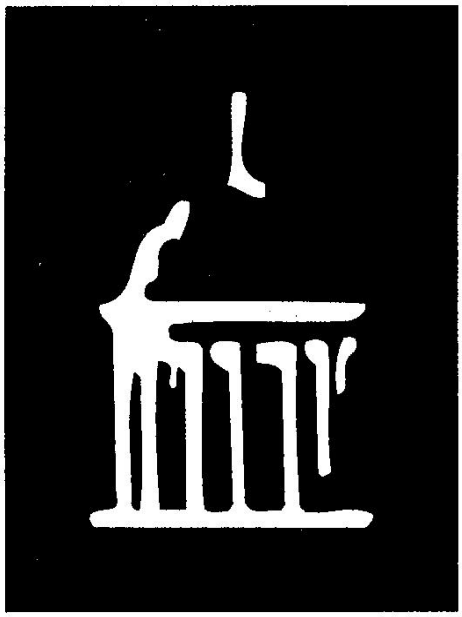
The 16th Annual Meeting of the American Association of Clinical Anatomists



June 8-12, 1999
Iowa City, IA

jointly sponsored by the

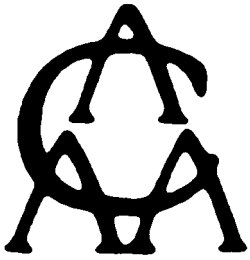
University of Iowa College of Medicine
and the
American Association of Clinical Anatomists

COLLEGE OF MEDICINE

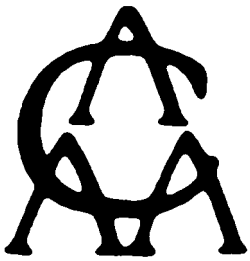
About the Cover Illustration

The University of Iowa was founded on February 25, 1847, fifty-nine days after Iowa became a state. The original campus was composed of Old Capitol and the 10 acres of land on which it stood. Following the placing of the cornerstone July 4, 1840, the building housed the Fifth Legislative Assembly of the Territory of Iowa and then became the first capitol of the State of Iowa (December 28,1846). Until that date, it had been the third capitol of the Territory of Iowa. When the capitol of Iowa was moved to Des Moines in 1857, Old Capitol became the first permanent "home" of the University of Iowa. Sitting high atop a hill in the center of campus above the Iowa River, the ***Old Capitol gold dome*** is recognized by one and all as the center of The University of Iowa.

The
American Association
of
Clinical Anatomists



The object of the Association shall be to advance the science and art of Clinical Anatomy, to encourage research and publication in the field and to maintain high standards in the teaching of Anatomy.



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Clinical Anatomy

Official Journal of the
American Association of clinical Anatomists
and the
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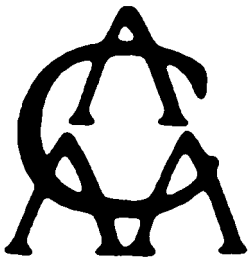

Annual Banquet

Thursday June 10, 1999

Presentation of *Honored Member Award*
to
Donald R. Cahill, Ph.D.

Iowa Memorial Union

6:15 pm - Reception (cash bar) in the Sunporch

7:00 pm - Dinner and presentation of *Honored Member Award* to Don R. Cahill

The $150 registration fee paid by members includes the cost of the Scientific Program and the Banquet. The spouse or guest of a registrant is welcome to attend the banquet. Additional tickets are available at a cost of $35

Previously Honored Members

W. Henry Hollinshead, 1984
Chester B. McVay, 1985
Donald James Gray, 1986
Russell T. Woodburne, 1988
Oliver Beahrs, 1988
N. Alan Green, 1989
Frank H. Netter, 1990
Ralph Ger, 1991
M. Roy Schwatrz, 1992
Carmine D. Clemente, 1992
Keith L. Moore, 1994
Roy J. Scothorne, 1995
Robert A. Chase, 1996
Tatsuo Sato, 1997
John E. Skandalakis, 1998

Honored Member, 1999

The American Association of Clinical Anatomists

recognize and award honored membership to

Donald R. Cahill, Ph.D.

*Anatomist * Scholar * Educator * Editor * Mentor*

For his distinguished career in and enthusiasm for clinically-applied anatomy, and in appreciation of his outstanding record of service to the **AACA** and the journal, ***CLINICAL ANATOMY***.

At the 16th Annual Meeting of the **AACA**, Iowa City, Iowa, June 10, 1999.

Sponsors/Commercial Exhibitors

Generous donations and/or commercial exhibitor fees paid by the following companies and organizations have substantially reduced the Association's expenses in presenting this meeting. You are encouraged to visit the exhibits available for viewing in the *Amos Dean Ballroom, Section D*. Please refer to the loose materials in your registration packet for an up-to-date listing, including sponsors who have registered after the date of this printing.

American Biosafety (formerly S & S of Georgia)
Gold Standard Multimedia, Inc.
Holt Anatomical, Inc.
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King Chemical
Jones Scientific Products, Inc.

The 16th Annual AACA Scientific Session

COLLEGE OF MEDICINE CME ACCREDITATION

The 16th Annual Scientific Session of the American Association of Clinical Anatomists has been planned and implemented in accordance with the Essentials and Standards of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of The University of Iowa College of Medicine and the American Association of Clinical Anatomists. The University of Iowa College of Medicine is accredited by the ACCME to sponsor continuing medical education for physicians.

DESIGNATION OF CME CREDIT

The University of Iowa College of Medicine designates this continuing medical education activity for 12.5 credit hours in Category 1 of the Physician's Recognition Award of the American Medical Association.

16th Annual Scientific Session
of the
American Association of Clinical Anatomists

June 8 - 11, 1999
University of Iowa College of Medicine
Iowa City, IA

Tuesday, June 8, 1999 - All events at *City Plaza Hotel* (formerly *Iowa City Holiday Inn)*

8:00 a.m. **Journal Committee Meeting** - (for members of Journal Committee) - *Lucas Room*
9:30 a.m. **Council Meeting** - (for AACA Officers and Councilors) - *Lucas Room*
3:00 p.m. Set-up for Commercial Exhibits and Posters - *Amos Dean Ballroom, Section D*
5:30 p.m. **Registration** -- *Pre-function area outside Amos Dean Ballroom*
6:00 p.m. **Welcome Reception** with cash bar (for all meeting attendees & their accompanying persons) - *Pre-function area outside Amos Dean Ballroom*

Wednesday, June 9, 1999- All events at *City Plaza Hotel*

7:00 a.m. **Editorial Board Breakfast Meeting** - breakfast hosted by John Wiley & Sons, Inc. (for Editors/Associate Editors of *CLINICAL ANATOMY*) - *Lucas Room*

8:00 a.m. **Registration and Continental Breakfast**
Commercial Exhibits
Poster Session I (Head & Neck, Musculoskeletal)
Amos Dean Ballroom, Section D

Poster Session I: All posters listed below will be on display throughout Thursday, 7:30 a.m. to 4:30 p.m. ***Presenters of even-numbered posters must be present at their posters during the morning refreshment break, those presenting odd numbered posters must be present during the afternoon refreshment break.***

***** *preceding the poster number indicates the presentation is in the Predoctoral Award Competition.*

***01 -** False tendons: morphological and clinical aspects. LOUKAS Marios, Christos Dimopoulos, Ewa Walcak*, and Stefan Krus*. Department of Pathology, Warsaw Medical University , Poland.

02 - Fracture of the coronoid process of the mandible: Accident reconstruction in the gross lab. PORTA, David J. Department of Biology, Bellarmine College, Louisville, KY. And Department of Anatomical Sciences & Neurobiology, University of Louisville School of Medicine, Louisville, KY.

***03 -** A unilateral accessory digastric muscle; anatomy and clinical correlation. GUELFGUAT, Mark, Nurulhusein Nurbhai*, and Nikos Solounias*. Department of

Gross Anatomy, New York College of Osteopathic Medicine, Old Westbury, NY.

04 - Blocking the buccal nerve using two methods of inferior alveolar (mandibular) block injection. AKER, F. David. Department of Anatomy and Cell Biology, Temple University School of Medicine, Philadelphia, PA.

05 - Abduction and external rotation of the upper extremities triggers symptoms in patients with thoracic outlet syndrome and migraine: MRI and MRA. SAXTON*, Ernestina H., James D. Collins, Samuel S. Ahn*, and Theodore Q. Miller*. UCLA School of Medicine, Los Angeles, CA.

06 - Speculation about the tendinous connection between the extensor carpi radialis brevis and brachialis muscles in man. THOMAS, Pamela P., and Charles R. Thomas*. Department. of Anatomy, University of Health Sciences College of Osteopathic Medicine, Kansas City, MO, and Department of Anatomy and Cell Biology, University of Kansas Medical Center, Kansas City, KS.

07 - The arterial architecture of the human femoral diaphysis. ABDEL MEGUID*, E. M., and Maha D. Sawat*. Department of Anatomy, Faculty of Medicine, Alexandria, Egypt (sponsored by A.F. Dalley).

08 - Clinico-anatomical examination of the fibula: anatomical basis for installation of dental implants. MATSUURA* Mitsuhiro, Kohsuke Ohno*, Kenichi Michi*, Kaoru Egawa*, Reiji Takiguchi*, and Michael Von Luedinghausen. First Department of Oral and Maxillofacial Surgery, First Department of Oral Anatomy, School of Dentistry, Showa University Tokyo, Japan, and Anatomisches Institut, Universitaet Wuerzburg, Germany.

09 - Morphological analysis of the nerve supply of the superior and inferior gemelli, obturator internus and quadratus femoris muscles. HTAR* Htar Aung, Hirokazu Sakamoto*, Keiichi Akita* and Tatsuo Sato. Department of Anatomy, School of Medicine, Tokyo Medical and Dental University, Japan.

10 - Identification of muscle spindles in suboccipital muscles. ROSS, Lawrence M., Ramzi M. Mansoob*, Richard C. Halgren* and Jane Walsh*. Departments of Anatomy, of Physical Medicine & Rehabilitation and of Osteopathic Manipulative Medicine, Michigan State University, East Lansing, MI.

11 - On the trapezius and the rhomboideus additionally supplied by branches of the dorsal thoracic rami. SAKAMOTO* Hirokazu, Keiichi Akita*, and Tatsuo Sato. Department of Anatomy, School of Medicine, Tokyo Medical and Dental University, Japan.

12 - Technique for rapidly locating and dissecting superficial abdominal wall vessels. QUINN, T.H., S.M. Bhatia*, and S.K. Mittal*. Departments of Biomedical Sciences and Surgery, Creighton University School of Medicine, Omaha, NE.

13 - Paraspinal muscles and the movement of the spine. RODRIGUES Aldo J. Jr., Thais W.A. Bojadsen*, Erasmo S. Silva*, and Alberto C. Amadio*. Department of Surgery and Department of Biomechanics, University of São Paulo, São Paulo, Brazil.

14 - An anatomical study on the human coronary sinus and its tributaries. ABDEL MEGUID*, E. M. and Wafaa A. Ahmed*. Department of Anatomy, Faculty of Medicine, Alexandria University, Alexandria , Egypt (sponsored by A.F. Dalley).

***15 -** A clinical, anatomical and confocal microscopic study of a unique case of long-surviving levocardia with partial situs inversus. RAMAN, R*, S. Al-Ali, C.A. Poole*, B. Dawson and J.B. Carman*. Department of Anatomy with Radiology, School of Medicine, University of Auckland, Auckland, New Zealand.

16 - Morphology of infrarenal aortic aneurysms. RODRIGUES, Aldo J. Jr, Erasmo S. Silva*, Consuelo J. Rodrigues, Erasmo M.C. Tolosa*, Gladys V.B. Prado* and João C. Nakamoto*. Department of Surgery, University of São Paulo, São Paulo, Brazil.

17 - Clinical anatomy of the lumbar and inferior mesenteric arteries. PIETRASIK, Kamil M.[1], Malgorzata Brzozowska*[2], Bogdan Ciszek*[1], Ireneusz Nawrot*[3] and Marek Molski[4]. Departments of Anatomy[1], Forensic Medicine[2], and Vascular and Transplantation Surgery[3], The Medical University of Warsaw, Poland, Department of Plastic and Reconstructive Surgery[4], The Center of Postgraduate Medical Education, Warsaw, Poland.

18 - Phrenic paresis: a neglected possible component of cervical spondylotic myelopathy. PARKE, Wesley W., Joseph L Whalen*, Paul C. Bunger and Suelman Said*. Department of Anatomy & Structural Biology, University of Souih Dakota School of Medicine, Vermillion, SD., and The Springfield Clinic, Springfield, IL.

19 - Anatomical basis for nerve-sparing surgery in the male pelvis. DE CARO, Raffaele, Veronica Macchi*, Francesco Aragona*, Ackim Herms*, and Francesco Pagano*. Depoartments of Human Anatomy and Physiology, and Urology, University of Padua, Italy.

8:45 a.m. ***Bus departs Iowa City Holiday Inn for Accompanying Persons' Day Trip*** to Herbert Hoover Historical Site, West Branch, IA, lunch at Mad Hatter Tea Garden, and visit to Devonian Fossil Gorge.

9:00 a.m. **Opening Ceremonies and Remarks**: *Amos Dean Ballrooms A, B & C*

Art Dalley, Ph.D., AACA President, Vanderbilt University, TN;
Carol Scott-Conner, M.D., Ph.D., Professor and Head, Department of Surgery;
Michael G. Kienzle, M.D., Associate Dean for Clinical Affairs & Medical Communications;
Michael W. Vannier, M.D., Professor & Head, Department of Radiology;
Mary J.C. Hendrix, Ph.D., Professor & Head, Department of Anatomy & Cell Biology,
University of Iowa, IA.

9:30 a.m. **Scientific Platform Session I** - Dr. Dan Graney, University of Washington, moderator - *Amos Dean Ballrooms A, B & C*

***** *preceding the time of presentation indicates it is in the Predoctoral Award Competition.*

9:30 - Total prosthetic replacement of the hip and the problem of the arterial blood supply of the femoral trochanters. FEIGL*, G., R. Jeserschek*, and F. Anderhuber*. Anatomical Institute, Karl- Franzens-University, Department of Orthopaedics , LKH-Graz, Austria (sponsored by Andreas Weiglein).

9:45 - Pedal bypasses from a posterior approach. BEST, Irwin M. Department of Surgery, Morehouse School of Medicine, Atlanta, GA.

10:00 - The cadaver as a model in harvesting semitendinosus and gracilis tendons for anterior cruciate ligament (ACL) repair. BOON, Johannes M., Jan H. Meiring, Penelope A. Richards*, and Gert M. Lewis*. Department of Anatomy, University of Pretoria, Pretoria, South Africa.

10:15 - The role of the manubrium sterni, clavicle and subclavius muscle and scapula in venous obstruction of the brachial plexus : MRI and MRA. COLLINS, James D., Ernestina H. Saxton*, Samuel S. Ahn*, and Theodore Q. Miller*. UCLA School of Medicine, Los Angeles, CA.

10:30 a.m. **Refreshment Break** – browse the posters/demonstrations/commercial exhibits – *Amos Dean Ballroom, Section D.*

11:00 a.m. **Presidential Presentation:** Activities of the Forensic Anthropology Center at the University of Tennesee, Knoxville. **Murray K. Marks**, Ph.D., Associate Director, Forensic Anthropology Center, University of Tennessee, Knoxville - *Amos Dean Ballrooms A, B & C*

12:00 p.m. **Lunch** (on your own - at hotel or pedestrian mall restaurants and food shops, etc.) **Browse the posters and commercial exhibits** – *Amos Dean Ballroom, Section D*

1:30 p.m. **Scientific Platform Session II** - Dr. Benton Adkins, Vanderbilt University, moderator - *Amos Dean Ballrooms A, B & C*

1:30 - The endonasal dacryocystorhinostomy. WEIGLEIN, Andreas H., Gerald Wolf*, Klaus Muellner*, and Dieter Szolar*. Anatomical Institute, Department of ENT-Surgery, Department of Ophthalmology, and Department of Radiology, Karl-Franzens-University Graz, Austria.

1:45 - The pterygospinous complex in the human. Von Luedinghausen, Michael, Mohamed AL KHATIB*, and Mitsuhiro Matsuura*. Department of Anatomy, University of Wuerzburg, Wuerzburg, Germany; and First Department of Oral and Maxillofacial Surgery, School of Dentistry, Showa University, Tokyo, Japan.

2:00 - Circular craniotomy in malignant brain edema. FIRBAS, Wilhelm, Hannes Traxler*, Hannes G. Ender*, Radu Surd*, and Gerhard Weber*. Department of Anatomy and Department of Human Biology, University of Vienna, Austria, and Lorenz Boehler Hospital, Vienna, Austria.

2:15 - Clinical anatomy of the anterior clinoid region. KELLER, Jeffrey T, Abhay Sanan*, and Harry R. van Loveren*. University of Cincinnati, Cincinnati, OH.

2:30 - Retaining ligaments of the cheek and face. FURNAS, D.W. Division of Plastic Surgery, University of California Irvine, Orange, CA (sponsored by B.R. MacPherson)

2:45 p.m. **Refreshment Break** – browse the posters/demonstrations/commercial exhibits -- *Patterson Ballrooms A & D*

3:30 p.m. **Scientific Platform Session III** - Dr. Benton Adkins, Vanderbilt University, moderator - *Amos Dean Ballrooms A, B & C*

***** *preceding the time of the presentation indicates it is in the Predoctoral Award Competition.*

3:30 - The morphology and location of the coronary arterial orifices in the human heart. LOUKAS, Marios, Christos Dimopoulos, Ewa Walcak, and Stefan Krus*. Department of Pathology, Warsaw Medical University, Warsaw, Poland.

4:00 - An unusual origin of the posterior intercostal arteries. GEST*, Thomas R., and Gerald W. Cortright. Department of Anatomy & Cell Biology, University of Michigan Medical School, Ann Arbor, MI.

4:15 - Benign anatomical mistakes: myths or enigmas? SKANDALAKIS, John E., Gene L. Colborn, and Lee J. Skandalakis*. Centers for Surgical Anatomy and Technique, Emory University School of Medicine, Atlanta, GA.

4:30 p.m. **Adjourn**/buses return to hotel from Accompanying Persons' Day Trip

Dinner – on your own.

7:30 p.m. **Reception at John Martin Rare Book Room** and Annual John Martin Lectureship in the History of Anatomy, presented by Ronald A. Bergman, Ph.D., Professor of Anatomy, University of Iowa

Thursday, June 10, 1999- Daytime events at *Iowa City Holiday Inn*

7:00 a.m. **Past President's Breakfast Meeting**, *Swan's Casual Dining* (Holiday Inn)

7:00 a.m. **Financial Affairs Committee/Treasurer Breakfast Meeting**, *Swan's Casual Dining* (Holiday Inn)

7:30 a.m. **Registration and Continental Breakfast**
Commercial Exhibits

Poster Session II (Education & Computer-Assisted Instruction)
Amos Dean Ballroom, Section D

Poster Session II: All posters listed below will be on display throughout Thursday, 7:30 a.m. to 4:30 p.m. ***Presenters of even-numbered posters must be present at their posters during the morning refreshment break, those presenting odd numbered posters must be present during the afternoon refreshment break.***

***** *preceding the poster number indicates the presentation is in the Predoctoral Award Competition.*

01 - Applying "learning through discussion" to embryology in the physical therapy curriculum. ZARDETTO-SMITH, Andrea M., and Charlotte B. Royeen*. Departments of Physical Therapy and Occupational Therapy, Creighton University, Omaha, NE.

02 - Interactive notes for human gross anatomy: A CD-ROM and web-based form of course notes. WALKER*, James J., J. Leslie Booth*, and Aaron D. Booth*. Lafayette Center for Medical Education, Indiana University School of Medicine and Department of Basic Medical Sciences, Purdue University, West Lafayette, IN (sponsored by M. F. Seifert).

03 - Digital video, the web, and CD-ROM publishing: Integrating recent advances in media technology into effective tools for anatomy instruction in a changing medical school curriculum. TRELEASE, Robert B. Department of Pathology and Laboratory Medicine, UCLA School of Medicine, Los Angeles, CA.

04 - From the AACA archives: the 1984 and 1989 annual meetings. PETTERBORG, Larry J. Texas Woman's University, School of Physical Therapy, Dallas, TX.

05 - The internet- based assessment of first year medical students in both gross anatomy and histology courses. PAWLINA, Wojciech, Kyle E. Rarey, Lynn J. Romrell, Gene L. Cornwall*, and Richard J. Rathe*. Department of Anatomy, Mayo Medical School, Rochester, MN, and Department of Anatomy and Cell Biology, University of Florida College of Medicine, Gainesville, FL.

06 - Extended capabilities of QuickTime VR applied to the presentation of gross anatomical specimens. NIEDER, Gary L., Frank Nagy , Patricia L. Peirce*, and Robert L. Baltzer*. Department of Anatomy, Wright State University School of Medicine, Dayton, OH.

07 - Using the web to provide supplementary course materials. MA, Terence P., J. Matthew Velkey*, and March D. Ard*. Department of Anatomy, University of Mississippi Medical Center, Jackson, MS.

08 - Improving the clinical relevance of medical anatomy: the clinician's perspective.

JONES, Kenneth, and James Schneider*. Department of Cell Biology, Neurobiology & Anatomy, The Ohio State University, Columbus, OH.

09 - An NIH image-based program for the display of Visible Human data sets. HENSON*, O.W., Jr., Thomas Hazel*, and Sheila St. Amour*, Department of Cell Biology and Anatomy, University of North Carolina, Chapel Hill, NC (sponsored by B.R. MacPherson).

10 - Resource usage by students in gross anatomy. GUTTMANN, Geoffrey D., Marcel Deon*, and Michael J. Cunningham*. Department of Anatomy and Cell Biology and Educational Support Division, College of Medicine, University of Saskatchewan, Saskatoon, SK.

11 - The use of Adobe® Photoshop® layered illustrations for the development of syllabi and web sites in the teaching of gross anatomy. GRANEY, Daniel O., Robert Holmberg*, and Shelley Golard*. Department of Biological Structure and Health Sciences Center for Educational Resources, University of Washington, Seattle, WA.

12 - Evolution of a web-based practical examination in human gross anatomy. DEPHILIP*, Robert M., and Timothy J. Cain*. Department of Cell Biology, Neurobiology & Anatomy, The Ohio State University, Columbus, OH (sponsored by B.R. MacPherson).

13 - The relationship between premedical curriculum and medical school performance in gross anatomy and histology. COLE, Maria S. ,and David L. McWhorter. Department of Anatomy, University of Health Sciences, College of Osteopathic Medicine, Kansas City, MO.

***14 -** The use of computer tomography in student and postgraduate education. BURGER, R., K.U. Huebner, K.H. Kunzel, and O. Gaber. Department of Anatomy, University of Innsbruck, Innsbruck, Austria.

15 - Use of a local website to provide postexam review of anatomy practical examinations. BOLENDER, D.L., J.P. Francois, and G.L. Kolesari. Department of Cell Biology, Neurobiology and Anatomy, and Family and Community Medicine, Medical College of Wisconsin, Milwaukee, WI.

16 - Physical therapy's web site for anatomy. ANDERSON, Paul A. Physical Therapy Department, University of Maryland, Baltimore, MD.

17 - A clinical laboratory exercise during dissection of the orbit. Boehlke*, Christopher S., Molly M. Christianson*, Alan S. Crandall* and Ronald L. SHEW. Department of Cell Biology and Neuroanatomy, University of Minnesota, Minneapolis, MN. Department of Ophthalmology, University of Utah, Salt Lake City, UT.

8:00 a.m. **Bus departs for Accompanying Person's Program** trip to Amana Colonies and country breakfast at Colony Inn

8:30 a.m. **Scientific Platform Session IV** - Dr. Todd Olson, Albert Einstein College of Medicine, moderator - *Amos Dean Ballrooms A, B & C*

***** *preceding the time of the presentation indicates it is in the Predoctoral Award Competition.*

8:30 - Reconstruction of injury mechanisms using computer generated 3-D animations. FRICK, Stephen J.[1,2], Peter M. Fuller[1], and David J. Porta[1]. [1] Department of Anatomical Sciences & Neurobiology, University of Louisville School of Medicine, Louisville, KY. and [2] Department of Biology, Bellarmine College, Louisville, KY.

8:45 - Computer grading of practical exams. Burkel, William E., and Theodore V. FISCHER*. Department of Anatomy and Cell Biology, The University of Michigan Medical School, Ann Arbor MI.

9:00 - A multimedia program for the brachial plexus. GOULD, Douglas J., Clarissa Spawn*, and Martha Cooper*. Department of Anatomy & Neurobiology and Medical Arts & Photography, University of Kentucky, Lexington, KY.

9:15 - Teaching computers anatomy. HILBELINK, Don R. Department of Anatomy, University of South Florida, Tampa, FL.

9:30 - Converting histology practicals to computer-based exams. SHEETZ, James H. Department of Cell Biology, University of Alabama at Birmingham, Birmingham, AL.

9:45 – Computer-based lab practicals – practice and real-time exams. MacPHERSON, Brian R., T.M. Symons*, and R.M. Hales*. Anatomy & Neurobiology, and Media Design and Production, University of Kentucky, Lexington, KY

10:00 a.m. **Refreshment Break** – browse the posters/demonstrations/commercial exhibits - *Amos Dean Ballroom, Section D*

10:45 a.m. **Scientific Platform Session V** - Dr. Todd Olson, Alberta Einstein College of Medicine, moderator - *Amos Dean Ballrooms A, B & C*

***** *preceding the time of the presentation indicates it is in the Predoctoral Award Competition.*

10:45 - The jugular foramen: a motion picture perspective in three dimensions. ACLAND, Robert, and Heidi Bas*. Division of Plastic and Reconstructive Surgery, University of Louisville, Louisville, KY.

11:00 - Animating dental anatomical functions and procedures for CAL programs. GUTTMANN, Geoffrey D., Rosaleen Shavron*, James Stephenson*, Reena Kalotti*, Tony Romaniuk*, and Michael J. Cunningham*. Department of Anatomy and Cell Biology, College of Medicine and the College of Dentistry, University of Saskatchewan, Saskatoon, SK, Canada.

11:15 - Gross topographical prosections and their use in the self-directed study of sectional anatomy. STEWART*, Fiona. Department of Anatomy & Histology, University of Sydney, Australia (sponsored by A.F. Dalley).

11:30 - Student perceptions of the influence of clinical anatomy on the educational process. BOON, Johannes M., Penelope A. Richards*, and Jan H. Meiring. Department of Anatomy, University of Pretoria, Pretoria, South Africa.

11:45 - Old anatomy embalming and preparation methods. WADE, R.S. Anatomical Services Division/State Anatomy Board, University of Maryland School of Medicine, Baltimore MD.

12:00 - Formaldehyde neutralization in embalmed cadavers using monoethanolamine. BURKEL, William E., Dean A. Mueller*, Janet Follo*, and Leonard Wessels*. Departments of Anatomy and Cell Biology, and Occupational Health and Safety, University of Michigan, and Wessels & Associates. Ann Arbor, MI.

12:15 p.m. **Lunch** (on your own - at hotel or pedestrian mall restaurants and food shops, etc.)
Browse the posters and commercial exhibits - *Amos Dean Ballrooms A, B & C*

1:30 p.m. **Annual AACA Business Meeting** - *Amos Dean Ballrooms A, B & C* (for AACA members, including membership applicants)

3:00 p.m. **Refreshment Break** - Posters/Demonstrations/Commercial Exhibits - *Amos Dean Ballroom, Section D*

3:30 p.m. **Educational Affairs Symposium** -- *Amos Dean Ballrooms A, B & C* (All interested registrants are invited to attend)

- *On the agenda:* **Dr. Don Jacobs** from the Association of Surgical Educators will speak on "*The significance of anatomy in surgical education*".

Evening events at Iowa Memorial Union (IMU)

6:00 p.m. Walk to **Iowa Memorial Union** (3 blocks from the Holiday Inn)
6:15 p.m. Reception (cash bar) in the Sunporch
7:00 p.m. **Annual AACA Banquet** and presentation of Honored Member Award to Donald R. Cahill, Ph.D., Former Chair and Emeritus Professor of Anatomy, Mayo Foundation/Mayo School of Medicine, Rochester, MN.
8:45 p.m. Adjourn

The **Iowa Arts Festival** will be in full swing on the evening of the Banquet, on the grounds of the Old Capital (1 block from the IMU). This event includes music, crafts, quilts, and art vendors as well as a summertime evening concert beginning at 8:30 p.m. We hope our members will take in a bit of Iowa culture on their way back from the banquet.

Friday, June 11, 1998- All events at *Iowa City Holiday Inn*

7:30 a.m. **Registration and Continental Breakfast**
Commercial Exhibits
Poster Session III
Amos Dean Ballroom, Section D

Poster Session III: All posters listed below will be on display Friday, 7:30 a.m. to 12:00 p.m. ***Presenters of even-numbered posters must be present at their posters during Continental breakfast session, those presenting odd numbered posters must be present during the morning refreshment break***

***** *preceding the poster number indicates the presentation is in the Predoctoral Award Competition.*

01 - An ultrastructural study of the developing human umbilical cord vasculature at different gestational periods. ABDEL MEGUID*, E. M., and Ghada M. Fouad*. Anatomy Department, Faculty of Medicine, Alexandria, Egypt (sponsored by A.F. Dalley).

02 - Microanatomy of the small intestine wall and the duodenal papilla as the basis of their microsurgery. KAGAN*, Ilia I., Sergey N. Lyaschenko*, and Egor R. Idgan*. Department of Operative Surgery and Clinical Anatomy, Orenburg Medical Academy, Orenburg, Russia (sponsored by B.R. MacPherson).

03 - Medical mummies: The Burn's Museum collection. WADE, R.S. Anatomical Services Division/State Anatomy Board, University of Maryland School of Medicine, Baltimore MD.

04 - Post-embalming perfusion with InfutraceTM limits exposure to noxious fixatives. CAUWENBERGS, Peter, Allan Jones*, and Alex Zabobonin*. Canadian Memorial Chiropractic College, Department of Anatomy, Toronto, ON.

05 - Nail transplantation to amputated proximal phalanges induces bone growth. MOHAMMAD*, Khalid S., and Daniel A. Neufeld*. Department of Anatomy, University of South Dakota School of Medicine, Vermillion, SD (sponsored by B.R. MacPherson).

06 - Ultrastructural changes of human hepatocytes in complicated duodenal ulcer. SARGSYAN * N.H. Department of Normal Anatomy, State Medical University, Yerevan, Republic of Armenia (sponsored by B.R. MacPherson).

07 - The effects of lesions to the fornix on metallothionein I. NORTON, Neil S., Jorge F. Rodriguez-Sierra*, and Manuchair Ebadi*. Creighton University School of Dentistry, and Departments of Cell Biology and Anatomy and Pharmacology, UNMC, Omaha, NE.

08 - Nuclear beta-galactosidase staining of squamous cell carcinoma in vitro. NGUYEN*, Chau T., Eri Srivatsan*, and Marilene Wang*. Department of Surgery, Division of Head and Neck Surgery, UCLA School of Medicine, Los Angeles, CA (sponsored by B.R. MacPherson).

09 - Low-power laser treatment after burning injuries. HUEBNER, K.U.[1], R. Burger[1], A. Schlager[2], K. Ohler[3], M. Schmuth[4], and L. Spotl[4]. [1]Department of Anatomy, University of Innsbruck. [2]Department of Anaesthesiology and Emergency Medicine, University of Innsbruck. [3]Plastic Surgeon, Innsbruck. [4]Department of Skin Diseases and Venereal Diseases, University of Innsbruck.

7:30 a.m. **Meeting of Educational Affairs Committee** (All interested are invited to attend) – *Lindquist Conference Center*

8:30 a.m. **Scientific Platform Session VI** - Dr. Larry Ross, University of Michigan, moderator - *Amos Dean Ballrooms A, B & C*

8:30 - Elastic fiber system in the normal and neoplastic prostate. RODRIGUES, Consuelo J., and Aldo J. Rodrigues, Jr. Department of Surgery, Sao Paulo School of Medicine, and University General Hospital, University of Sao Paulo, Sao Paulo, Brazil..

8:45 - Defects in the antero-lateral abdominal wall musculature: causes, effects and management. GER, Ralph. Department of Surgery, Nassau County Medical Center, East Meadow, NY.

9:00 - Extracellular matrix aging in the transversalis fascia as a mechanism of direct inguinal hernias. RODRIGUES Jr., Aldo J., Consuelo J. Rodrigues, and Ruy Bevilacqua*. Department of Surgery, Faculty of Medicine, University of Sao Paulo, Sao Paulo, Brazil.

10:00 - Aging histotopographic changes in human gastric muscular layer. KYALYAN*, Gohar P., and Anna J. Harutyunyan*. Department of Normal Anatomy, State Medical University, Yerevan, Republic of Armenia (sponsored by A.F. Dalley).

10:15 a.m. **Refreshment Break** – browse the posters/demonstrations/commercial exhibits -- *Amos Dean Ballroom, Section D*

10:45 a.m. **Special Interest Group: Directors of Willed-Body Programs** *Amos Dean Ballrooms A, B & C* (All interested registrants are invited to attend)

1:00 p.m. **Meeting of new Council** – *Lucas Room*

Saturday, June 12, 1998:

7:30 a.m. AACA -University of Iowa Joint-Sponsored Postgraduate Course:
"***Cardiovascular Imaging***"
Ziffren Conference Room, 1502 John Colloton Pavilion
University of Iowa Hospitals & Clinics
Separate registration fee required
For a description of the program, please see the following page

Iowa City Postgraduate Course

on

Cardiovascular Imaging

Saturday, June 12, 1999
Ziffren Conference Room
1502 John Colloton Pavilion
the University of Iowa Hospitals & Clinics
Iowa City, IA

Jointly sponsored by
The University of Iowa College of Medicine
Departments of Anatomy & Cell Biology, Radiology, and Surgery
and the
American Association of Clinical Anatomists

COLLEGE OF MEDICINE

COLLEGE OF MEDICINE CME ACCREDITATION

The Postgraduate Course on Cardiovascular Imaging has been planned and implemented in accordance with the Essentials and Standards of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of The University of Iowa College of Medicine and the American Association of Clinical Anatomists. The University of Iowa College of Medicine is accredited by the ACCME to sponsor continuing medical education for physicians.

DESIGNATION OF CME CREDIT

The University of Iowa College of Medicine designates this continuing medical education activity for 6.5 credit hours in Category 1 of the Physician's Recognition

Award of the American Medical Association.

ABDEL MEGUID*, E M., and Wafaa A. AHMED*. Department of Anatomy, Faculty of Medicine, Alexandria University, Alexandria , Egypt (sponsored by A.F. Dalley). An anatomical study on the human coronary sinus and its tributaries.

The purpose of this research was to evaluate the various morphologic features of the human coronary sinus which is of clinical importance nowadays as the coronary sinus interventions today are used in many methods for protection of the ischemic myocardium. The anatomical features of cardiac veins of 30 preserved human hearts with no microscopic abnormalities were studied. The coronary sinus was cannulated and injected with blue latex to allow better visualization of the small branches. For the injection and corrosion preparations, after injection of coronary veins with blue latex, the specimens were corroded in concentrated hydrochloric acid for one day. Thebesian valve that covers the ostium of the coronary sinus was examined. The formation, tributaries, length and diameter of the coronary sinus were studied. The tributaries of the coronary sinus were studied with special care to their relation with the accompaning arteries. The tributaries of the coronary sinus were highly variable. The main and constantly present tributaries of the coronary sinus were the great and middle cardiac veins. An intramyocardial course of the lower part of great cardiac vein was found in one case and in one case this vein curved around the anterior interventricular branch of left coronary artery. In two cases, it was found that the small cardiac vein joined the middle cardiac vein to form a common trunk which opened into the coronary sinus. In one specimen, two parallel middle cardiac veins ran in the posterior interventricular groove with an extramyocardial course of the upper part of one of them and an intramyocardial course of the lower part while the second tributary was totally intramyocardial. In another specimen, two posterior interventricular arteries ran in the posterior interventricular groove with the middle cardiac vein and passed superficial to the vein then crossed it to continue on its left side.

ABDEL MEGUID*, E. M., and Ghada M. FOUAD*. Anatomy Department, Faculty of Medicine, Alexandria, Egypt (sponsored by A.F. Dalley). An ultrastructural study of the developing human umbilical cord vasculature at different gestational periods.

The objective of this study was to examine the histological and ultrastructural features of the endothelia and smooth muscle cells of the human umbilical vessels and correlation of their changes to the establishment of an adequate fetoplacental circulation. The developmental defects in some umbilical vessels which may have an etiological role in intrauterine fetal deaths were also examined. 18 umbilical cords were collected from legal terminations of pregnancies and from normal vaginal and cesarean deliveries. They represented all three trimesters of pregnancy. All specimens were studied histologically. Measurement of vessel wall thickness was done using an eyepiece micrometer. Specimens for each trimester of pregnancy were examined ultrastructurally using the transmission electron microscope. The tunica intima of all vessels were formed of a single endothelial layer of flat squamous cells that showed evidence of some synthetic and secretory activities. These activities were more prominent at the middle, lesser at the early and least in late trimester of pregnancy. They were generally more evident in the umbilical vein than the arteries. The tunica media is composed of smooth muscle cells which formed thicker bands and became more spirally arranged with different orientations as pregnancy advanced. They were more developed in the umbilical arteries with great amount of elastic laminae in between its layers than in the vein. The muscle cells of the outer layers showed features midway between those of smooth muscle cells and fibroblasts. The tunica adventitia was ill-defined and intermingled with the surrounding mesenchymal tissue of the umbilical cord.

Neither nerve endings nor vasa vasora were detected among the structures of the umbilical vessels. The evidence of some synthetic secretory activities in the endothelial cells, together with the failure to detect any nerve endings among the vascular structures suggest the paraneural role of the endothelial cells in controlling the blood flow in the umbilical vessels. Some umbilical cords revealed unequal development of both umbilical arteries and veins with rupture and hemorrhage inside their walls.

ABDEL MEGUID*, E. M., and Maha D. SAWAT*. Department of Anatomy, Faculty of Medicine, Alexandria, Egypt (sponsored by A.F. Dalley). The arterial architecture of the human femoral diaphysis

In view of the inadequacy of accounts of exact anatomical description of femoral diaphyseal vascularization of human, it appeared therefore of interest to examine the participation of the vessels in the arterial supply of the femoral diaphysis. This study is of utmost importance to human because it is relevant to fracture treatment. The nutrient foramina of 130 cleaned and dried femora were examined and representative specimens were photographed. The foramen number in both sexes and both sides were studied. Intravascular perfusion of the common iliac artery of 15 cadavers were done using latex and radioopaque substance to show the arterial supply of femoral diaphysis. Anteroposterior projections of X-ray films on the thighs were done followed with dissection to confirm what appeared in the x-ray films. The diaphyses were then sectioned with a saw. Decalcification of these sections was done and the femora were then sectioned transversely and sagittally. Slides were then prepared for examination using light microscopy. Of the entire collection of dried femora examined, the foramen numbers of all 130 dried bones were submitted to chi square (x2) analysis. The effect of sex on side and the effect of side on sex were tabulated. This revealed a significant interaction between sex and the right femora. The effect of side on foramen number was analysed separately in the 2 sexes. In summary, (x2) test showed significant sex difference in foramen number between men and women for right bones but not for left bones. The blood supply of the femur was achieved by one or more nutrient arteries arising from the profunda in addition to periosteal branches. There were two main periosteal branches, one arose from the profunda femoris artery at its end and the other arose from the lower end of the femoral artery. X-ray showed the presence of single or double nutrient artery which is the main source of blood to the diaphysis. The double nutrient arteries may give off ascending and descending branches after it enters the medullary cavity and give off twigs that enter the cortex and supply the vessels of the Haversian canal. An anastomotic loop between the ascending and descending branches of the two nutrient arteries may be present in the medulla. Microscopic studies of the femora showed that the Haversian canals contained vessels. In transverse sections,. it was noted that the Haversian canals tended to be larger near the endosteal surface and smaller near the periosteal surface. This observation was considered indirect evidence that arterial blood flow goes from the nutrient artery in a centrifugal direction from the endosteum to the periosteum.

ACLAND, Robert, and Heidi BAS*. Division of Plastic and Reconstructive Surgery, University of Louisville, Louisville, KY. The jugular foramen: a motion picture perspective in three dimensions.

Teachers and students find it hard to create a three-dimensional image of the jugular foramen. Because the jugular foramen is hard to see, our thoughts about the structures that pass though it tend to be disjointed. From outside the cranium, the foramen is seen in the dry skull only from below and in front. In dissection it is seen only after the important structures related to it have been destroyed. There are also difficulties in looking at the jugular foramen from inside the cranium. It is best appreciated when seen from above and behind. Unfortunately the squamous

occipital bone, left in place by the standard coronal skull cut, gets in the way of this view both in dissection and in the dried skull. In making the Video Atlas of Human Anatomy we took the opportunity to provide images of the jugular foramen that give a clear, three-dimensional understanding of the foramen and the structures that pass though it. The images combine established prosection approaches, unusual cuts through the bone, the use of fresh tissue and rotation of the specimen about vertical and horizontal axes. Some of these images will be shown as part of this presentation.

AKER, F. David. Department of Anatomy and Cell Biology, Temple University School of Medicine, Philadelphia, PA. Blocking the buccal nerve using two methods of inferior alveolar (mandibular) block injection.

The anatomic relations of the buccal nerve (BN) branch of the mandibular division of the trigeminal nerve were studied to explain the rationale for the discrepancy in blocking the BN using two inferior alveolar (mandibular) block technics, the conventional method and the Gow-Gates method. The conventional method routinely blocks the inferior alveolar (IA) and lingual nerves but rarely blocks the BN, necessitating a separate buccal block injection. The Gow-Gates method is reported to consistently block all three nerves at once. To explain this difference, 8 head specimens were dissected from the medial approach to gain access to the pterygomandibular space (PMS). The PMS is the site of deposit of local anesthetic solution in IA block injection technics. The mandible was mobilized to simulate the open mouth position used for the conventional and Gow-Gates injection technics by cutting the masseter and temporalis muscles proximal to their mandibular attachments. Hypodermic needles were placed in the position of the conventional and Gow-Gates injections and the position of the BN noted relative to the path of the needle. Further, the relation of the BN to the temporalis muscle was examined on 8 mandibles in which part of the temporalis and buccinator muscles and BN were intact. The BN courses inferolaterally from the PMS into the retromolar fossa by crossing or piercing the anterior border of the of the deep head of the temporalis muscle. The fossa is situated between the superficial and deep heads of the temporalis muscle which are respectively attached to the anterior border of the ramus and internal oblique line (temporal crest) of the mandible. Within the retromolar fossa the BN is encased in a dense fascial sleeve (temporobuccinator band, Barker, Br. J. Oral Surg., 10, 43-55, 1972) before terminating. At the level of the conventional block injection the BN was enclosed in the fascial sleeve within the retromolar fossa lateral to path of the needle. In the Gow-Gates block injection the BN was on the medial surface of the deep head of the temporalis muscle proximal to the fascial sleeve and exposed within anterior part of the PMS immediately lateral to the path of the needle. Consequently, the anatomical relations of the BN in convention block method essentially shield the nerve from being bathed by anesthetic solution while in the Gow-Gates method the relations are such that the BN can be exposed to anesthetic solution and thus blocked, explaining the findings in clinical dentistry.

ANDERSON, Paul A. Physical Therapy Department, University of Maryland, Baltimore, MD. Physical therapy's web site for anatomy.

Human Anatomy is the first course taught in the University of Maryland, Baltimore physical therapy curriculum. The students are immersed only in this course during twelve weeks of summer school. It is a dissection based functional anatomy course with fifty hours of lecture, 220 hours of dissection laboratory and six test days. A web site (http://www.pt.umab.edu) was developed for the summer of 1998. There are four functional areas, which are employed throughout the course. One area is the administrative folder that contains the syllabus, grading format, instructors, petition of questions format, and course philosophy statement. Another area

contains PowerPoint presentations with one presentation for each bone studied. This totals 22 bones with content labeled slides. Several content summary databases reside in a third area of the web site. An example is origin, insertion, named nerve, spinal level and function of the muscles studied. This is located in an excel database which permits online sorting of the content for the student needs. Finally, the last area is for the in-house dissector. All of the areas are linked on the web site, which permits a great deal of integration of the information. Of course this web site is linked to several other anatomy URLs. The flexibility of the electronic media and the ability to interact with the web site information in a variety of settings has been the cornerstone of use.

BEST Irwin M. Department of Surgery, Morehouse School of Medicine, Atlanta, GA. Pedal bypasses from a posterior approach.

All pedal bypass grafts have been described with the patient in the supine position. However, heavy scarring from prior surgery, infection, or inadequate native conduit may deter the surgeon. Exploration of inflow and distal vessels from the prone position may be quite advantageous. Exposure of the lesser saphenous vein is facilitated while access to the greater is slightly impeded in the proximal thigh. This prone approach has not been previously described for bypasses to the dorsalis pedis or posterior tibial arteries below the ankle. Anatomy texts were reviewed to determine the basis for arterial bypass grafts to the dorsalis pedis, posterior tibial, and plantar arteries from a posterior approach**.** Surgically, the popliteal and proximal tibial arteries may be uncovered via a medial, lateral or posterior midline approach. At the ankle, access to the posterior and anterior tibial arteries is obtained by incising midway between the back of Achilles tendon and the lateral edge of the fibula 10cm above the lateral malleolus. The peroneus longus and brevis are identified. An incision into the interosseous membrane just above the perforating branch of the distal peroneal artery opens a passage for a grafts to the tibialis anterior and dorsalis pedis arteries. Access to the dorsalis pedis artery is obtained by external hip rotation and knee flexion. Internal hip rotation and gentle knee flexion facilitates exposure of the distal tibial and plantar branches. An incision inferior to the ankle results in exposure of the plantar arteries when the abductor hallucis muscle is retracted caudad. The inframalleolar bypass from the prone position is an anatomically sound approach. Grafts may be routed subcutaneously or follow the anatomical pathways with the perforating and communicating branches of the peroneal artery. Gentle manipulation of the foot, knee and hip joints helps in obtaining adequate surgical exposure. This approach is best suited to patients without ileofemoral disease. The posterior approach to the pedal arteries should be of great value to surgeons caring for patients with inframalleolar occlusive disease as seen in diabetes mellitus.

BOEHLKE*, Christopher S., Molly M. CHRISTIANSON*, Alan S. CRANDALL*, and Ronald L. SHEW. Department of Cell Biology and Neuroanatomy, University of Minnesota, Minneapolis, MN. Department of Ophthalmology, University of Utah, Salt Lake City, UT. A clinical laboratory exercise during dissection of the orbit.

During the first year of medical school most anatomy dissections of the orbit usually involves an approach from above. This approach includes removal of the floor of the anterior cranial fossa exposing the periorbital region and subsequently the orbital contents. This dissection allows access to the muscles, nerves and vessels in the orbit and exposure of the frontal and ethmoidal air sinuses and lacrimal apparatus. What we have proposed is a simple supplement to this laboratory dissection that will review surface anatomy of the eye that many of us take for granted and review the anatomy of the eye important for cataract surgery. The student should review and identify the following from the anterior view; palpebral fissure, medial canthus, lacrimal caruncle,

cornea, iris, pupil, sclera. Then identify the following from the lateral or horizontal view; sclera, anterior chamber, cornea, posterior chamber, lens, pupil, ciliary, muscle, ciliary body, ciliary muscle and suspensory ligaments of the lens. Cataracts are the result of a portion of the lens or all of it becoming opaque. As a practical laboratory exercise, a procedure required for a typical cataract surgery will be performed by making an incision into the eye and removing the lens. The initial incision will be at the sclerocorneal (corneal limbus) junction. Reflect the cornea, proceed from the anterior to the posterior chamber and remove the lens.

BOLENDER, D.L., J.P. FRANCOIS*, and G.L. KOLESARI. Department of Cell Biology, Neurobiology and Anatomy, and Family and Community Medicine, Medical College of Wisconsin, Milwaukee, WI. Use of a local website to provide postexam review of anatomy practical examinations.

Laboratory examinations in our Clinical Human Anatomy course use the traditional practical exam format consisting of a series of individual stations at which each student must identify a structure. To accommodate our large medical class, two similar but not identical exams must be set up. A variety of materials are used to construct these exams including cadaveric material, plain radiograph films, models, skeletal material and full sized cross sections. At the completion of the exam, it is disassembled and a key posted. In the past we have struggled with the problem of providing the students with a review of the exam once their corrected papers have been returned. We have solved this problem by capturing images of each station on the exam using a digital camera. The images are merged with appropriate answers and placed on the local web site. The site is opened for the students soon after the exam has been graded. Students now have the ability to review the exam as they compare their responses to those posted on the key. Archiving the practical examinations has transformed them into meaningful learning experiences where students are better equipped to understand the nature of their mistakes. Most students who took advantage of this opportunity fond it useful and instructive. An unexpected use of this process has been the use of the archived practical exams by upper class students to review anatomy during their clinical rotations.

BOON*, Johannes M., Penelope A. RICHARDS*, and Jan H. MEIRING. Department of Anatomy, University of Pretoria, Pretoria, South Africa. Student perceptions of the influence of clinical anatomy on the educational process.

The University of Pretoria is currently undergoing curricular change, from a traditional to a problem-orientated approach, where clinical anatomy forms the basis of the second year dissection block with specialist clinical anatomy modules taking place in subsequent organs systems blocks. This study was aimed at assessing undergraduate student perceptions of the influence of clinical anatomy on the educational process. Perceptions of career based knowledge, career expectations, content integration, content depth perception and life long learning attitudes, as related to clinical anatomy, were assessed by means of a Likert-type closed questionnaire. These perceptions were assessed (t-test) for both the 'Dissection Block' and the 'Introduction to Clinical Medicine Block'. The use of clinical problem-orientated anatomy significantly improved the students ability to perceive content depth ($p<0.001$). However, when compared no statistical difference was noted in perceptions of career based knowledge and career expectations although both of these elements scored very positively. Content integration was not improved by this teaching method and students were not sure as to how well they were able to perform this task. Unfortunately students appear to remain oblivious to the advantages of life-long learning and this facet of the educational process was not improved with the new methodology.

BOON*, Johannes M., Jan H. MEIRING, Penelope A. RICHARDS*, and Gert M. LEWIS*. Department of Anatomy, University of Pretoria, Pretoria, South Africa. The cadaver as a model in harvesting semitendinosus and gracilis tendons for anterior cruciate ligament (ACL) repair.
The usage of autogenous semitendinosus and gracilis tendons for ACL repair has become common. Tendon damage on harvesting, particularly in terms of premature amputation of the tendons when a length of approximately 20 cm is required, occurs frequently. It is therefore crucial to practice the procedure beforehand. The question was asked whether an embalmed cadaver could provide a good model for practising the harvesting of these tendons. Harvesting was carried out on 7 embalmed knees by 7 different orthopaedic surgeons who were inexperienced as to the technique. A single 4 cm anteromedial incision superficial to the insertion of the tendons was made. Apart from the pes anserinus, ensheathed dense facial bands also attach the distal 8-10 cm of the tendons to the tibia. These attachments may impede tendon stripping and need to be resected by gliding a pair of scissors along the course of the tendon before stripping. An anthropometer was used to measure the tendons obtained. Although average harvested length was 23.2 cm and 20.5 cm for gracilis and semitendinosus tendons respectively, only 86% and 71% of gracilis and semitendinosus tendons respectively were of sufficient length. Even though these percentages are not optimal it appears that the embalmed knee can provide a good model for practising the harvesting of tendons for ACL.

BURGER, R., K.U. HUEBNER, K.H. KUNZEL, and O. GABER. Department of Anatomy, University of Innsbruck, Innsbruck, Austria. The use of computertomography in student and postgraduate education.
The cooperation between various departments can have a high standard output in clinical "education". One point is the education of the student, with the approach of teaching clinical anatomy with the help of modern technologies, such as the yearly held workshop for US, CT and MRI for interested students, supported by the department owned CT, US and in cooperation with the MRI of the department of radiology in Innsbruck. The CT is also used in various workshops for postgraduate education of anaesthesiologists. Modern techniques are taught in cooperation with the department of anaesthesiology and emergency medicine, like regional anaesthesia, peridural anaesthesia and epiduroscopie, all monitored by CT. The great acceptance is not only shown by the large and inceasing number of participants, but also by the interest in participation and support of the European Society for Regional Anaesthesia (ESRA).

BURKEL, William E., and Theodore V. FISCHER*. Department of Anatomy and Cell Biology, The University of Michigan Medical School, Ann Arbor MI. Computer Grading of Practical Exams.
Practical exam days are usually the more tedious times in the teaching of gross anatomy. Watching students rotate past specimens for an hour or two is then followed by stacks of exam papers shuffled from one instructor to another as the hand written responses are evaluated. Often these responses may be only partly correct, sometimes it is problematical just what the student had in mind. Often conferences of the full staff have to happen before one response of one student can be fairly graded. We decided to see if a computer graded practical exam system could be implemented. We started by listing all the items dissected in our gross course, then grouped them in various ways: by region, by general type of structure, by relationships, etc. Each grouping was a list of no more than 26 structures presented in alphabetical order, since the optically read exam sheets were able to list this many. On exam day, each student received this machine readable card as well as one blank sheet for note taking at the starting station. The practical exam process was similar to previous years, except that at each station its particular alphabetical list of possible structures was posted, and the student was able to choose from that

list only to mark the corresponding letter on his/her card. Following the exam the cards could be quickly read and unambiguous results returned. Analysis of student performance over several years showed no differences from earlier handwritten responses, even though with this system students were prevented from giving nonsense responses, and had the opportunity to have their memories jogged by seeing the correct response listed.

BURKEL, William E., Dean A. MUELLER*, Janet FOLLO*, and Leonard WESSELS*
Departments of Anatomy and Cell Biology, and Occupational Health and Safety, and Wessels & Associates. Ann Arbor, MI. Formaldehyde neutralization in embalmed cadavers using monoethanolamine.
Despite its known carcinogenic effects and unpleasantness of use, formaldehyde remains the primary active ingredient of anatomical embalming fluids. More stringent regulatory enforcement of lower exposure limits has driven anatomists to adopt innovative facility design utilizing engineering controls, such as ventilation and down-draft dissecting tables. At the same time, the search for safe formaldehyde substitute formulations has become more active. Recently emphasis has been placed on the use of chemicals that neutralize formaldehyde after embalming, such as Infutrace (TM). While very effective, Infutrace (TM) often leaves undesirable white precipitates on tissues and dissecting tables and the cost per cadaver high with this product. Monoethanolamine (MEA), a chemical commonly used in the automotive industry to clean parts, was used in a similar manner following the embalming process. When reacted with formalin, MEA produces a nontoxic imine alcohol and forms a mild soap with fats. It has no noticeable effect on tissue quality if cadavers are properly fixed before neutralization. Our study has found MEA to be a low toxicity, cost-effective method to neutralize formaldehyde.

CAUWENBERGS, Peter, Allan JONES*, and Alex ZABOBONIN*. Canadian Memorial Chiropractic College, Department of Anatomy, Toronto, ON, Canada. Post-Embalming Perfusion With InfutraceTM Limits Exposure to Noxious Fixatives.
A new post-embalming Infutrace TM perfusion technique was used in our anatomy laboratory to determine if ambient levels of formaldehyde and phenol could be reduced. A group of 12 cadavers were routinely embalmed via the femoral artery and following a seven day fixation period the body was again perfused with a 20% InfutraceTM solution (Infutrace TM is a commercially available compound known to degrade aldehydes). Prior to dissection intraperitoneal formaldehyde and phenol levels were measured using low level formaldehyde and phenol detection tubes and measured levels were compared to those measured in non-Infutraced TM cadavers, to determine the concentration of these fixatives within the cadaver. In addition, environmental formaldehyde levels were recorded before, during and after dissection periods and compared to similar measurements made prior to implementation of this post-embalming technique, to determine exposure levels within the anatomy laboratory. The results demonstrated a dramatic (90%) reduction of intraperitoneal formaldehyde and phenol levels following Infutrace TM perfusion as well as ambient formaldehyde levels in the dissection laboratory which were consistently well below exposure limits set by the National Institute for Occupational Safety and Health. We have also observed a significant reduction of student and faculty concerns resulting from exposure to noxious fixatives since this Infutrace TM post-embalming procedure was implemented. It is suggested therefore that whole-body perfusion of cadavers following standard formaldehyde embalming procedures may be a simple, inexpensive technique to reduce exposure to chemical irritants during anatomical dissections.

COLE, Maria S., and David L. McWHORTER. Department of Anatomy, University of Health

Sciences, College of Osteopathic Medicine, Kansas City, MO. The relationship between premedical curriculum and medical school performance in gross anatomy and histology. Many first-year medical students believe they are at an academic disadvantage by not taking human anatomy and histology before their matriculation into medical school. Thus, the purpose of this study was to investigate whether taking anatomy and histology before entering medical school affects academic performance in medical gross anatomy and histology. A survey that assessed premedical anatomy and histology experience was administered to first-year medical students in two successive classes (N=440). Survey data were categorized on the basis of premedical experience type (i.e., none, lecture only, lecture and laboratory, and type of laboratory). These data were compared to the total number of points earned in the medical gross anatomy course and to the total number of points earned in the medical histology course using a one-way ANOVA. Pair-wise comparisons were made using the Tukey-Kramer method. Results from this study demonstrated a significant difference between students with premedical histology experience and students without premedical histology experience ($p<0.05$). Although not statistically significant, students with premedical anatomy experience that included a laboratory component tended to perform better in medical gross anatomy than students without premedical anatomy experience. The findings from this study may have implications in the design of undergraduate premedical curricula.

COLLINS, James D, Ernestina H. SAXTON*, Samuel S. AHN*, and Theodore Q. MILLER*. UCLA School of Medicine, Los Angeles, CA. The role of the manubrium sterni, clavicle and subclavius muscle and scapula in venous obstruction of the brachial plexus : MRI and MRA. Abduction and external rotation of the upper extremities posterior inferiorly rotate the clavicles and subclavius muscles which trigger complaints of brachial plexopathy. The manubrium sterni is displaced posteriorly with the first ribs and the clavicles. The scapula rotates posterior, anteriorly so the glenoid fossa is near horizontal in position. The diaphragm elevates with increased intrathoracic and abdominal pressure. This decreases venous return to the heart; triggers complaints of brachial plexopathy, migraine headache, numbenss and tingling around the face. Chest radiographs demonstrate narrowed thorax, round and drooping shoulders, and other abnormalities of the thoracic inlet. Bilateral magnetic resonance imaging (MRI) demonstrates compression abnormalities of the brachial plexus. (CLIN ANAT.1997; 10:131). Patients were imaged with the 1.5 Tesla magnet (Signa; General Electric Medical Systems, Milwaukee, WI) 3-D reconstruction MRI. T1W and T2W pulse sequences were performed in the coronal, transverse, transverse oblique, sagittal, coronal and sagittal abduction external rotation sequences using 4 mm slice thickness and 512 x 256 matrix size. Water bags were used to enhance the signal to noise ratio. Magnetic resonance angiography (MRA) 2-D Time Of Flight (TOF) were performed to evaluate the perfusion of the brachial plexus. Abduction external rotation MRI sequence captured the sites of brachial plexus compromise for anatomic display. This sequence demonstrated posterior displacement of the manubrium sterni 8-15 degrees and rotation of the clavicles and subclavius muscles 18-45 degrees; also obstruction of vertebral, subclavian, internal jugular, brachiocephalic and innominate veins as contributing factors which cause thoracic outlet syndrome as displayed by MRI, MRA and 3D reconstruction.

DE CARO, Raffaele, Veronica MACCHI*, Francesco ARAGONA*, Ackim HERMS*, and Francesco PAGANO*. Department of Human Anatomy and Physiology, Department of Urology, University of Padua, Italy. Anatomical basis for nerve-sparing surgery in the male pelvis. The knowledge of the topography of the pelvic plexus (PP) in the male is important to performe a nerve- sparing surgery during radical cystectomy or retropubic prostatectomy. A histotopographic

study of the male pelvic viscera has been performed to evaluate the position of the PP in relation to the seminal vesicles. The specimens were obtained from 12 male cadavers 42 to 71 years old. Eight specimens were embedded in paraffin and cut into 10 *m thick sections stained with Azan-Mallory. Four specimens underwent sheet plastination (E12). The PP is a plexiform sagittal lamina running on the lateral surface of the rectum at the base of the plicae rectovescicalis. It reaches the tip and the posterior surface of the seminal vesicle. Further ramifications of the PP reach the ampulla deferentialis, the bladder neck and the juxtavesical ureter. During a standard radical cystectomy the inferior vesical arteries are divided. It is presumable that, due to its close relation with the ureter and the tip of the seminal vesicles, the PP is irreparably damaged. In order to avoid a damage to the PP it could be advisable: 1. to dissect close to the wall of the seminal vesicle; 2. to divide the ureter (during radical cystectomy) at the tip of the seminal vesicle; 3. to leave in situ the tip of the seminal vesicle in case of difficult dissection.

DEPHILIP, Robert M., and Timothy J. CAIN*. Department of Cell Biology, Neurobiology & Anatomy, The Ohio State University, Columbus, OH. Evolution of a web-based practical examination in human gross anatomy.
The goal of this project was to use computer and web technology for student self-assessment of anatomical structures prior to a faculty-graded practical examination. In the original version, student dissections were imaged with a digital camera and displayed in the teaching auditorium. Students were given 1 min to answer a question of identity or function. Answers were then provided and reviewed. In the second version, dissections were imaged and delivered to the students via the web with answers to questions provided. Both questions and answers were reviewed in the auditorium. In the third version, images, questions, and answers were delivered via the web, but no time was spent displaying the questions in the auditorium because the majority of students surveyed (20 of 22) had studied the examination prior to class. In this third version of the examination, the entire review session was devoted to an explanation of relationships that could be used to answer a question correctly. The web-based practical examination served two functions: 1) it acquainted students with the format of the practical examination, and 2) it engaged students actively in self-assessment and was an efficient means of reviewing a large amount of material.

FEIGL, Georg*, R. JESERSCHEK*, and F. ANDERHUBER*. Anatomical Institute, Karl-Franzens-University Graz, Department of Orthopaedics , LKH-Graz, Austria (sponsored by Andreas Weiglein). Total prosthetic replacement of the hip and the problem of the arterial blood supply of the femoral trochanters.
Fifty cadavers were investigated without paying any heed to age, sex and side of the cadavers. All were fixed by Thiel's method and the arteries were injected via the extern iliac artery with Thiel's DGM 85 mass, consisting of dextrin, latex, and lead tetroxidefor precise and easy identification of the arteries. The dissection follows the three main blood supplying vessels, the medial and lateral circumflexal femoral arteries and the first perforant artery, preparing the branches forming the rete trochantericum and also the branches entering the femur either at the anterior side of the greater trochanter, or on the backside at the neck, the intertrochanteric crest or the trochanteric fossa. The main vessel was the medial circumflex femoral artery with their ascending branch, sending branches to the arterial rete of the lesser trochanter in all cases, in 48 cases to the arterial rete of the greater trochanter and one to four branches entering the bone at the points already mentioned. In eight cases, one or two branches coming from the transverse branch of the lateral circumflex femoral artery were found. Those vessels entering at the neck or the intertrochanteric crest were going to the lesser trochanter, while the vessels entering the

femur at the trochanteric fossa and at the anterior side ran to the greater trochanter. Several anastomoses among those three vessel and the two gluteal arteries were found ,too. Especially the vessels entering the bone are in real danger to be cut of by the saw, when cutting the femoral neck. Trying to keep the vessels entering the bone may help orthopedics to prevent most this osteolysis after total prosthetic replacement of the hip and to reduce not only the length but also the costs of the postoperative therapy.

FIRBAS, Wilhelm, Hannes TRAXLER*, Hannes G. ENDER*, Radu SURD*, and Gerhard WEBER*. Department of Anatomy and Department of Human Biology, University of Vienna, Austria, Lorenz Boehler Hospital, Vienna, Austria. Circular craniotomy in malignant brain edema.
In malignant brain edema the prognosis is often very poor. The usual surgical method of bitemporal trepanation can cause heavy brain damage by herniation at the edges of the trepanation openings. In one case of a 32 years old male with severe head injury a circular craniotomy was performed after ineffectual bitemporal trepanation. This heroic but successful operation stimulated experimental and morphological investigations with the hope to develop a new surgical procedure for lowering intracranial pressure. In five human cadavers the intracranial pressure was increased and could be lowered by circular craniotomy and a 9 mm elevation of the calotte. Ten CT series of human skulls were three dimensionally reconstructed and a 10 mm virtual elevation of the cranial vault was performed according to a circular craniotomy. An additional volume of 6% was gained by this procedure, with an elevation of 20 mm the volume was enlarged by 12.2%. (With support of the AUVA Insurance Company, Vienna).

FRICK, Stephen J.*[1,2], Peter M. FULLER*[1], and David J. PORTA[1,2]. [1] Department of Anatomical Sciences & Neurobiology, University of Louisville School of Medicine, Louisville, KY. [2] Department of Biology, Bellarmine College, Louisville, KY. Reconstruction of injury mechanisms using computer generated 3-D animations.
It can be a challenge to explain medical conditions to the untrained individual (in teaching and litigation) especially with respect to long bone fractures and associated injuries. The use of visual aids such as plastic models, illustrations, and radiographs are common. However, conventional models cannot show anatomical variation. With the rapid evolution of computer graphics it is now possible to recreate many of these conditions on a slightly modified personal computer. Using digital three-dimensional models one can translate a specimen in space allowing the viewer to see it in its entirety. The program that was used to create these animations was 3D Studio Max R 2.5 by Kinetix Inc. and was run on a Windows NT machine with dual 400 mHz Pentium II processors and 512 megabytes of RAM. This technology allows us to visually explain mechanisms of injury. 3-D animations can be produced that show these events in slow motion. The end result is a full motion video that allows the viewer to see the deforming events as they are causing the resultant injury. These animations, when coupled with a narration, have proven to be an effective teaching tool whether in a clinical setting or the courtroom.

FURNAS*, D.W. Division of Plastic Surgery, University of California Irvine, Orange, CA (sponsored by B.R. MacPherson). Retaining ligaments of the cheek and face.
The zygomatic ligament is located at the inferior border of the zygomatic arch about 45 mm anterior to the tragus just behind the origin of the zygomaticus major. It consists of several 3-4 mm flat multifibered, transversely oriented layers of firm fibrous bands which provide skeletal anchorage to the dermis of the cheek. An artery and a sensory nerve accompany the ligament. Rami of the zygomatic branch of the facial nerve traverse beneath the ligament. The mandibular ligament is located 4-5 mm above the border of the mandible about 45 mm from the midline, and

is similar in morphology to the zygomatic ligament. It lies at the transition area of the lax cheek tissue and the firm chin tissue. It marks the border of the aging jowl. The anterior platysma cutaneous ligaments are attachments from the dermis to the deep points on the anterior masseteric fascia of similar character but varying sites and morphology. The playtsma auricular fascia and periauricular telae subcutanae are a consistent aponeurotic extension from the periauricular area to the posterior border of the platysma and is a specific segment of the parotid fascia. It is a valuable surgical plane for avoiding the facial nerve. Morphological and functional parallels with the retaining ligments of the hand and fingers are noted.

GER, Ralph. Department of Surgery, Nassau County Medical Center, East Meadow, NY. Defects in the antero-lateral abdominal wall musculature: causes, effects and management.
The functions of the antero-lateral abdominal wall muscles are well known and include support of the viscera, movement of the trunk, and abdominal compression. When these muscles are absent or deficient, attempts at replacement address, at best, only one of the above functions or, at worst, no treatment is offered. These muscular deficiencies occur on a congenital or acquired basis. The former is called the Prune Belly Syndrome (PBS), and the latter situation arises following operative procedures that result in loss of most of the abdominal wall. An 18 year follow up is presented of a 13 year old boy who was incapacitated by PBS. He could not move his trunk, developed scoliosis, and suffered from backache amongst other symptoms. He was managed by an operative procure that placed transposed muscles onto his abdominal wall with relief of his symptoms and halted progression of his scoliosis. Prior to this report, only hopeful optimism was offered as treatment, as some of these patients did improve with the passage of time. Acquired effects are currently treated by mesh replacements which serve, at best, only the support function of the muscles and, at worst, lead to further complications. Patients are presented where the above technique of muscle replacement is shown to relieve the many of the symptoms associated with abdominal wall muscle loss.

GEST*, Thomas R., and Gerald W. CORTRIGHT. Department of Anatomy & Cell Biology, University of Michigan Medical School, Ann Arbor, MI. An unusual origin of the posterior intercostal arteries.
A case of an unusual origin of the posterior intercostal arteries was observed in a female cadaver during dissection for the gross anatomy laboratory. Rather than arising from the posterolateral aspect of the descending thoracic aorta, the posterior intercostal arteries arose from an additional artery positioned in the midline on the thoracic vertebral bodies. This aberrant artery branched from the posterior aspect of the aorta at the level of the celiac trunk (T12), passed superiorly through the aortic hiatus, and delivered paired posterior intercostal arteries as far superiorly as the third intercostal space. Additional findings on this case will also be presented.

GOULD, Douglas J., Clarissa SPAWN*, and Martha COOPER*. Department of Anatomy & Neurobiology and Medical Arts & Photography, University of Kentucky Chandler Medical Center, Lexington, KY. A multimedia program for the brachial plexus.
The objective of the present study is to use current multimedia technology to simplify the structure and function of the brachial plexus. The program uses a combination of novel illustrations, animations, explanatory text, and a set of printable sample questions to provide an easy to understand tutorial for the brachial plexus. The course of each of the five terminal branches of the brachial plexus are illustrated and accompanied by a general pathway description. Muscles receiving motor innervation from each terminal branch are listed and shown diagrammatically in a separate set of images. In addition, the cutaneous patterns of sensory innervation are illustrated.

One of the most advantageous aspects of the program is an animation showing the development of the brachial plexus from its embryological origins that illustrates limb rotation and the resulting adult anatomy and dermatomal arrangement. The program, which will run on either Macintosh or PC platforms and requires Quicktime 3.0, is packaged on CD-ROM. Student evaluation of the program highlights its ease of use, clear and intuitive navigation, and validation that the use of illustrations and animations were extremely beneficial to their understanding and retention of the material. We plan to incorporate other multimedia aspects to provide clinical photographs of related pathologies, photographs of dissections from the gross anatomy lab, and video clips of laboratory dissections to further enhance the clinical/functional aspects of the brachial plexus. As the program continues to evolve it will provide a premiere ancillary for the complete study of the brachial plexus for those students in a lab-based course as well as provide a stand-alone substitute for students in courses without a lab component.

GRANEY, Daniel O., Robert HOLMBERG* and Shelley GOLARD*, Department of Biological Structure and Health Sciences Center for Educational Resources, University of Washington, Seattle, Washington, USA. The use of Adobe® Photoshop® layered illustrations for the development of syllabi and web sites in the teaching of gross anatomy.
An extensive database of Adobe® Photoshop® layered color anatomical illustrations of regional head and neck anatomy have been developed for the purposes of teaching medical and dental students. As layered electronic documents of bones, muscles, nerves, blood vessels, etc., an individual illustration is developed by adding or subtracting the various layers. An illustration can be used in a syllabus as a gray-scale image or retained as a color drawing for use on an Internet web-site. Both of these purposes have been used in our current program. The specific purpose of the collaboration of an anatomist and a graphic artist was to build images that could be used in a pedagogical method consistent with the teaching of regional anatomy. The intent is for the illustrations to present the concepts of regional anatomy as well as providing the detail. Because the illustrations can be built either from the deep bony origin up to the skin or vice versa, a logical sequence can be presented to the student. When this is exported to a web-site, the change of layers is not done by turning pages of a syllabus, but simply by mouse clicks on a preprogramed series of layers. The regional anatomy, eg. orbit, neck, larynx, etc, can be built or electronically dissected in a matter of a few seconds, depending on the number of layers and the pace of the student. The use of the web is open to the student through the Internet when using a computer from a University connection. Dial-up access by modem is also possible but is slow because of the size of the graphics programs. For this reason the program is provided to the students on a compact disk as an html executable along with some supporting Java/Jamba code. The program is viewed by an Internet browser residing on the computer or installed on the compact disk. Because of the current problem of varied versions and standards of browsers, it may be necessary to provide a browser on the disk. The disk has not been sold as a product, but is being given to the students in order to evaluate it student learning. The results of these educational surveys will be presented.

GUELFGUAT, Mark, Nurulhusein NURBHAI*, and Nikos SOLOUNIAS*. Department of Gross Anatomy, New York College of Osteopathic Medicine, Old Westbury, NY. A unilateral accessory digastric muscle; anatomy and clinical correlation.
A unilateral right accessory digastric muscle was revealed during a dissection of a submental region. The muscle was located medially to the anterior belly of the right digastric, superior to the right mylohyoid and inferior to the platysma. It appeared as a flat triangular sheet. Its base arose from the front of the body of the hyoid bone near its upper border distally and perpendicular to the

lower fibers of the mylohyoid. The narrow apex inserted into the digastric fossa medially to the anterior belly of the digastric. The muscle elevated the hyoid bone and depressed the mandible when appropriate stress was applied. No other morphologic abnormalities were found in this region. Abberant anterior bellies of digastric muscles are uncommon and occur bilaterally. This observation of a unilateral accessory digastric muscle has not been reported yet. Knowledge of this variant will help to avoid confusion with pathological conditions of the floor of the mouth and submental region. It is relevant both for interpretation of radiological images and surgical accesses for perimedian mandibulotomies and trauma explorations.

GUTTMANN, Geoffrey D., Marcel DEON* and Michael J. CUNNINGHAM*. Department of Anatomy and Cell Biology and Educational Support Division, College of Medicine, University of Saskatchewan, Saskatoon, SK, Canada. Resource Usage by Students in Gross Anatomy.
To determine the effectiveness of a computer aided learning (CAL) program, it was necessary to determine which resources students relied upon for their studying in gross anatomy. A questionaire was designed to ask the students which resources were used for their weekly study sessions and how long each resource was used. The questionnaires were administered weekly during a period when there was heavy emphasis on computer material in lecture and for an equivalent period where there was little emphasis on computer material in the lecture. The sample size was 25 dental and 55 medical students. A focus group session was conducted with a number of selected students from each group. We found that students concentrated their studying on the notes given by the lecturer, the textbook, and atlas. Students tended not to supplement their studying with CAL programs or other materials and to focus on what they thought the professor wanted them to know for the exam‰. Self-directed learning was definitely not evident among the majority of the students. We did notice that students who used the U-SCALE program, a CAL program for clinical gross anatomy, did score higher on exams and did better in the course overall.

GUTTMANN, Geoffrey D., Rosaleen SHAVRON*, James STEPHENSON*, Reena KALOTTI*, Tony ROMANIUK* and Michael J. CUNNINGHAM*. Department of Anatomy and Cell Biology, College of Medicine and the College of Dentistry, University of Saskatchewan, Saskatoon, SK, Canada.
Animating Dental Anatomical Functions and Procedures for CAL Programs.
To enhance the clinical relevance of gross anatomy for dentistry, we have created animations that illustrate various dental anaesthetic procedures, functional anatomy relevant to dentistry and anatomical pathologic conditions that a dentist may encounter. The dental anaesthetic procedures, that were animated, are the mandibular nerve anaesthesia techniques, inferior alveolar, incisive/mental, Gow-Gates, and Akinosi. We also animated the muscles of mastication and their function in occlusion, protrusion, retrusion, and lateral movement. Lastly, we animated the temporomandibular joint in the normal situation, and then in six pathologic cases. To aid in the animation of the mandibular nerve anaesthetic techniques, we injected aliquots of ZOE (zinc oxide-eugenol) and india ink of various volumes into cadaver heads to determine the spread of anaesthetic. The cadaver dissections were photographed. The photographic information was used to complete the required illustrations. Cephalometric x-rays and MRIs were also used as baseline information for the animations. Each frame was developed from illustrations, that were digitized (i.e. scanned), imported into Adobe Photoshop and then colored. The frames were then placed into Adobe Premiere, whereupon a QuickTime movie was generated. The movies were placed into the USCALE shell with text discussing the clinical and anatomical aspects of the procedure or condition.

HENSON*, O.W., Jr., Thomas HAZEL* and Sheila St. AMOUR*, Department of Cell Biology and Anatomy, University of North Carolina, Chapel Hill, NC (sponsored by B.R. MacPHERSON). An NIH image-based program for the display of Visible Human data sets.
The Visible Human Project of the National Library of Medicine has provided complete sets of serial images through male and female cadavers. The present project was initiated to use these images in the medical gross anatomy course at the University of North Carolina. We will demonstrate a custom rendition of a NIH Image-based (freeware) program that allows one to rapidly step through images in all three planes, select any slice interval in 0.660 mm. increments, select a wide range of magnifications, and make custom arrangements of the windows on the computer screen. Corresponding CT scans can be simultaneously displayed and on-screen image processing slide bars can be used to adjust brightness and contrast for bringing out just bone or bone with soft tissue. Reference lines can be added to all three windows to simultaneously show the same voxel element in each plane. The gray scale images can be printed for students to label and color. Any of the images can be opened individually or in sets that can be cropped and made into QuickTime movies that can be linked to specific parts of an electronic syllabus. The main program is currently limited to Macintosh computers but the QuickTime movies are cross platform. Any structure can be segmented and reconstructed to produce a variety of solid or semi- transparent structures that can be rotated and viewed from any angle in QuickTime or QuickTime Virtual Reality displays. The main program is well suited for displaying any series of anatomical images with isotropic voxels. Supported by a University of North Carolina Chancellor's Instructional Technology Fund.

HILBELINK, Don R. Department of Anatomy, University of South Florida, Tampa, FL. Teaching computers anatomy.
Although computer and medical imaging technologies have advanced rapidly, automatic segmentation and modeling of anatomical structures from digital data is not possible. A major reason for this is that anatomy remains primarily a descriptive science. The existence of anatomical variation has been used far to long to excuse us from objectively defining human anatomy. The fact is that, within any species, anatomical structures are far more similar than they are dissimilar. If we wish for computers to be able to independently locate and segment anatomical structures, they must be provided with objective data and a set of rules to use in locating and differentiating structures. In this study a segmentation and classification data set for the Visible Human Male (VHM) was obtained from Gold Standard Multimedia. The data was converted for analysis in a high-end computer aided design (CAD) program. Once in CAD format, a range of objective data concerning each of the segmented and three dimensionally reconstructed anatomical structures was extracted. Several segmentation algorithms commonly described in the literature were applied to segment a series of MR images. Geometric data obtained from the CAD models of the VHM, as well as the MR images, were used to test, refine and provide feed back to the computer in the segmentation process. A set of specific segmentation rules is now being developed for a series of organs. With further development of segmentation methods and establishment of an objective quantitative anatomy data base, it will be possible for computers to automatically segment anatomical structures, produce three dimensional models for viewing, extract quantitative data concerning individual structures, objectively describe relationships between structures, and ultimately provide data that will be helpful in range of clinical diagnoses. (Support by a State of Florida I-4 Initiative Grant).

HTAR* Htar Aung, Hirokazu SAKAMOTO*, Keiichi AKITA*, and Tatsuo SATO. Department of

Anatomy, School of Medicine, Tokyo Medical and Dental University, JAPAN. Morphological analysis of the nerve supply of the superior and inferior gemelli, obturator internus and quadratus femoris muscles.
It is generally described that the superior gemellus is innervated by the nerve to obturator internus (Oi), and the inferior gemellus by the nerve to quadratus femoris (Qf). However, frequently the superior gemellus is supplied by both nerves. In the present study, we investigated the innervation patterns of gemelli, obturator internus, and quadratus femoris and the origins of the nerves to these muscles. Here, we discuss the positional relationship of the nerves arising from the ventralmost layer of the lumbar and sacral plexuses; the obturator nerve, Qf, Oi and pudendal nerve. Thirty - eight pelvic halves from 24 Japanese cadavers were examined under a stereomicroscope. The superior gemellus was innervated by Oi and Qf in 24 sides (63%), only by Oi in 8 (21%) and only by Qf in 6 (16%). The Qf arose from more cranial levels (L4-S2) than the Oi (L5-S4). These two nerves formed a common trunk in 33 sides (85%) and often connected to each other outside or inside the superior gemellus. In one side (3%), a branch from Qf supplied the adductor magnus and communicated with the obturator nerve in this muscle. In two sides (5%), a branch from Oi innervated the inferior gemellus. Also, Oi frequently communicated with the pudendal nerve. In light of these findings, Oi and Qf can be considered to belong to the same group. Furthermore, the obturator nerve, Qf, Oi and pudendal nerve are suggested to be closely related.

HUEBNER, K.U.[1], R. BURGER[1,] A. SCHLAGER[2], K. OHLER[3], M. SCHMUTH[4,] and L. SPOTL [4]. [1]Department of Anatomy, University of Innsbruck. [2]Department of Anaesthesiology and Emergency Medicine, University of Innsbruck. [3]Plastic Surgeon, Innsbruck. [4]Department of Skin Diseases and Venereal Diseases, University of Innsbruck. Low-power laser treatment after burning injuries.
A randomized study of 30 male Sprague-Dawley rats was conducted to assess the effect of laser on healing in burns. Clinical use for this purpose seem to be widely accepted and implemented, despite the few substantiating reports. Two burns were inflicted on each back-side of the animals; one was treated, and the other was left untreated. Three groups of 10 animals each were randomly organized. In group one the rats were killed after 10 days, in group two after twenty days and in group three after 30 days. By macroscopic regarding of the epithelialization, the redness and the edema, there was no significant difference the treated and untreated burning. Also regarding the epithelialization, the cellular content, the granulation tissue and vascularization in histology, there was no significant difference between both sides. However, any observed difference appears so little that the therapeutic effectiveness and practical feasibility can be questioned. Systemic effects should be drawn in regard.

JONES, Kenneth, and James SCHNEIDER*. Department of Cell Biology, Neurobiology & Anatomy, The Ohio State University, Columbus, OH. Improving the clinical relevance of medical anatomy: the clinician's perspective.
Practicing physicians were questioned to determine whether basic anatomy courses have enough clinical relevance so that the anatomy learned is easily transferable to physical examinations and modern diagnostic technology. Questionnaires were mailed to surgeons, internists, and family practitioners in Ohio. Physicians were asked to consider their own basic anatomy course in relation to subsequent clinical training and experience. The questionnaire consisted of 50 items, 25 each for the thorax and abdomen. The goal was to have physicians rank the clinical significance of anatomical structures to determine a realistic level of competence in anatomy that practitioners believed should be required of all physicians. Rank of clinical relevance of each

item was then compared among the three groups of physicians. Data were tested by ANOVA, and significance was determined by the post-hoc Scheffe test. Thoracic items were ranked similarly by all three groups. For the abdomen, surgeons ranked items higher compared to internists and family practitioners, but the relative ranks of importance among the groups was similar. It was concluded that practicing physicians considered two topics the most clinically relevant: 1) spatial relationships of anatomical structures, and 2) clinically useful surface projections and landmarks. (Supported by The Foundation, Academy of Medicine of Columbus & Franklin County).

KAGAN*, Ilia I., Sergey N. LYASCHENKO* and Egor R. IDGAN*. Department of Operative Surgery and Clinical Anatomy, Orenburg Medical Academy, Orenburg, Russia (sponsored by B.R. MacPherson). Microanatomy of the small intestine wall and the duodenal papilla as the basis of their microsurgery.
The purpose of the research was the obtaining of findings for the perfection of the microsurgical operating on the small intestine and duodenal papilla. Method of the preparation of the duodenum, jejunum and ileum diametrical sections in 7 levels, the duodenal papilla, horizontal, sagittal and frontal sections was used on the material of 45 adult cadavers. Histotopographical sections were dyed by hematoxylin-eosin, methods of Van Gison and Mallory. Morphometry and the study of the topographic relations of the intestine wall tunics carried out by 8-32-folds increase of the stereomicroscope. It was founded, that the thickness of the mucosa varies from 0.3 to 0.9 mm, the muscular tunic from 0.24-0.8 mm, the serous tunic from 0.1-0.6 mm. Submucosa is the most various, its thickness - from 0.2-3.9 mm. The location of the duodenal papilla changes from the superior to the middle of the descending duodenum on its medial wall nearer to the posterior wall, the size of the papilla being 1-9 mm. The hepatopancreatic sphincter is formed mainly by the longitudinal layer of the duodenal muscular tunic, whose muscular fibers approach the walls of the hepatopancreatic ampulla and common bile duct mainly from above and below. The circular layer of the duodenal muscular tunic forms the thickening around the common bile and primary pancreatic ducts. This thickening is expressed better from above the foramen in the muscular tunic. These findings have allowed us to make a base of the modifications of the small intestine microsurgical suture enteroanastomosis and papillosphincterotomy.

KELLER, Jeffrey T, Abhay SANAN*, and Harry R. van LOVEREN*. Department of Neurosurgery, University of Cincinnati, OH. Clinical anatomy of the anterior clinoid region.
Knowledge of the anatomy of the anterior clinoid process (ACP) and surrounding region (paraclinoid region) is essential for the surgical management of paraclinoid aneurysms and neoplasms. A detailed understanding of the complex anatomical relationships of the dural, vascular and neural structures of this region is requisite to ensure the safety and efficacy of surgical approaches to this region. The paraclinoid region was observed in 70 specimens from 35 formalin-fixed cadaveric heads. Detailed microanatomic dissections were performed in 10 specimens. Histologic sections of this region were obtained from the formalin-fixed cadaveric specimens. The intracavernous internal carotid artery (ICA), the C4 segment of the ICA according to Bouthillier et al., is separated from intradural space by the wall of the cavernous sinus, a dural boundary that consists of two layers, an outer dura propria and an inner membranous layer. The inner membranous layer encircles the ICA and forms the proximal dural ring where the ICA abuts the inferior surface of the anterior clinoid process. At the point that ICA enters intradural space, the ICA becomes invested by a distal dural ring that tightly and circumferentially attaches to the adventitia of the ICA. The medial continuation of the distal dural ring is the falciform ligament.

The optic nerve passes immediately below the falciform ligament. The distal dural ring represents the strict anatomic boundary between intradural space and extradural space. The clinoid (C5) segment of the ICA is defined as that segment of the ICA that lies medial to the anterior clinoid process and is bounded superiorly by the distal dural ring and inferiorly by the proximal dural ring. The carotid cave is a redundant dural pouch that was identified at the medial aspect of the distal dural ring in 54 (77%) of our specimens. In 13% of our specimens the ICA was completely encircled by bone, the cariticoclinoid foramen. Generally, no arterial branch originates from the clinoid (C5) segment of the ICA. In four (6%) cases, the ophthalmic artery arose from the clinoid (C5) segment below the distal dural ring. One hundred and sixty-two superior hypophyseal arteries were identified in the 70 specimens examined. All arteries originated from the medial or posterior aspect of the ophthalmic segment of the ICA. This study has clearly described the essential anatomic features of the paraclinoid region including the proximal and distal dural rings, clinoid (C5) segment of the ICA, the carotid cave, variations of the ophthalmic and superior hypophyseal arteries, and the dural layers investing these structures.

KYALYAN*, Gohar P., and Anna J. HARUTYUNYAN*. Department of Normal Anatomy,State Medical University, Yerevan, Republic of Armenia (sponsored by A.F. Dalley). Aging histotopographic changes in human gastric muscular layer.
The histotopographic peculiarities of the gastric muscular layer from the body, fundus and pyloric antrum were studied using paraffin serial sections stained with various histologic methods: hematoxylin-eosin stain, van Gieson's, and Giemsa. The material was obtained from 25 corpses of people who died by accidental death, of both sexes between the ages of 21-68 was investigated. Sectioned material was distributed in 3 age periods: I - the first period of maturity (7cases), II - the second period of maturity (10cases), III - elderly (8cases). The whole thickness of muscular layer, the partial volumes of smooth muscle fibers and of the connective tissue framework were estimated by morphometric methods. The correlation of partial volumes was calculated as the: Vm/Vc=K. The investigation showed, that thickness of gastric muscular layer in the body forms 848.0Å2.7mm in the first period of maturity and reaches 878.1Å2.0mm in elderly. However, in the undus and pyloric antrum it decreases accordingly from 884.1Å1.7 to 857.7Å1.0mm and from 783.7Å1.6 to 717.0Å2.5mm. In the first period of maturity the values of K forms 2.15 in the body, 1.08 in the fundus and 2.31 in the pyloric antrum of the organ. This means at that age the partial volumes of the connective tissue framework is maximal in the gastric fundus. The aging involution of the gastric muscular layer begins to reveal itself in the second period of maturity. The values of K decreases in elderly and accordingly forms 1.69 in the body, 0.74 in the fundus and 1.24 in the pyloric antrum. So, the different changes of gastric muscular layer thickness deal with the process of its histologic and histotopographic involution during postnatal ontogenesis. That is why we consider that the revealed peculiarity of gastric muscular layer histotopographic changes in different parts of organ can be seen as one of the reasons directed in pathogenesis the development of some motor digestive dysfunctions.

LOUKAS Marios, Christos DIMOPOULOS, Ewa WALCAK*,and Stefan KRUS*. Department of Pathology, Warsaw Medical University False tendons: morphological and clinical aspects.
False tendons are fibrous strings that originate from the ventricular endocardium, but do not insert into the atrioventricular valve leaflets. The incidence and distribution of left ventricular false tendons (FT) were studied in a series of 20 autopsy specimens of human hearts from subjects evenly distributed by sex and age. FT were observed in 8 specimens (40%), and their incidence was greater in hearts from male than from female subjects (5 male 83.3% p less than 0.01). Neither the incidence nor the location of FT varied appreciably with age. Of the 8 specimens

containing false tendons, 2 (25.5%) exhibited 2 or more. Of these 4 (50%) were located between the posteromedial papillary muscle and the ventricular septum, 1 (12.5%) between the two papillary muscles, 1 (12.5%) between the anterolateral papillary muscle and the ventricular septum, and 1 (less than 12.5%) between two aspects of the free wall; 1 (12.5%) had three or more points of insertion and formed weblike structures. Morphometric evaluation of the false tendons was performed, the range of the FT ranged from 4mm to 21mm. FT are common anatomic variants of the normal human left ventricle which may be detected by two-dimensional echocardiography.

LOUKAS, Marios, Christos DIMOPOULOS, Ewa WALCAK*, and Stefan KRUS*. Department of Pathology, Warsaw Medical University, Warsaw, Poland. The morphology and location of the coronary arterial orifices in the human heart.

The aim of this study was to describe and classify the coronary aortic orifices in a clinically useful way. The study was conducted on 15 hearts obtained from the routine medicolegal autopsies without any cardiac abnormalities. Macroscopic and microsurgical methods were applied for the measurements of the structures. The aortic valve had 3 leaflets in all specimens. The left coronary artery arose within the left posterior aortic sinus (of Valsava) in 10 (66.6%) specimens, above the sinotubular junction in 4 (26.6%) and at the level of the junction in 1 (6.6%). The right coronary artery arose within the anterior aortic sinus in 11 (73%) specimens, above the junction in 2 (15.3%) and at the level of the junction 1 (6.6%). An accessory coronary orifice was found in the anterior aortic sinus in 4 (26%) specimens, whereas a third orifice in this sinus was found in 1 heart. The coronary arterial orifices are usually located within the aortic sinuses below the sinotubular junction but are rarely centrally located. Accessory coronary arterial orifices are found in the minority or the aortic sinuses. We also determined the position of the zones of apposition between leaflets, the size of the leaflets, the number, position and shape of the coronary arterial orifices, and their relation to the sinotubular junction. The above results may play an important role for the further investigation and explanation of the “high take off coronary arteries”.

von LUEDINGHAUSEN, Michael, Mohamed AL KHATIB*, and Mitsuhiro MATSUURA*. Department of Anatomy, University of Wuerzburg, Wuerzburg, Germany; First Department of Oral and Maxillofacial Surgery, School of Dentistry, Showa University, Tokyo, Japan. The pterygospinous complex in the human.

The pterygospinous complex (PSC) encompasses of ligaments, muscles, and osseous bridges connecting the lateral lamina of the pterygoid process and the sphenoid spine. In Gray's Anatomy and in other textbooks these structures are mentioned and it is pointed out that the may replace each other. Because we do not agree with this interpretation and to achieve a better understanding of the topography we studied microanatomically 100 macerated skulls and 64 halves of fixed cadaveric head specimens. A complete "Arcus osseus pterygospinosus" existed in 13% of the cases and served as an area of origin of the frequently occurring lateral pterygoid muscle fibres. A slender or broad "Lig. pterygospinosum" was found in 44%, where it reinforced the superior part of the interpterygoid fascia. A "M. Pterygospinosus" was observed in 9%; this inserted into the adjacent neighborhood of the SS, the medial surface of the temporomandibular joint capsule and the articular disc and therefore represented a medial part (third belly) of the lateral pterygoid muscle. In one case both, ligament and muscle, and in another both, osseous bridge and ligament coexisted on one side. The distribution pattern of the mandibular nerve and maxillary artery was dependent upon the morphology of PSC. As it is demonstrated by CT scans the osseous bridges of the PSC can be visualized preoperatively. The single parts of the PSC

may occur in 9-44 % of the cases. They do not constitute separate anatomical identities, but each is derived from the neighborhood bones, fascias and muscles.

MA, Terence P., J. Matthew VELKEY*, and March D. ARD*. Department of Anatomy, University of Mississippi Medical Center, Jackson, MS. Using the web to provide supplementary course materials.
Students at the University of Mississippi have access to electronic information in the library and on the Internet. However, the information is not directed toward their courses. To address this issue, we developed Web sites to provide supplementary information using the Apache Web server implemented on a Sun Microsystems UNIX computer. This allowed for a virtual Web site for the Dental Gross Anatomy and Histology courses and one for the Medical Histology course. We used standard password protection, but not encryption (SSL) for the Web sites. This permitted protection of the information and tracking of Web usage. The Dental Gross Anatomy web site contained announcements, lecture materials, pre-lab lectures, old exam questions, and grades. For Medical and Dental Histology, the Web sites primarily contained micrographs developed for teaching purposes in our Department. Generally, student use of the Web sites increased during the courses. Students accessed the Web sites from campus-based computers as well as from off-campus sites. These off-campus sites were typically commercial internet services providers (ISPs), suggesting that students may have accessed these sites from home. On the basis of our positive preliminary experiences with this system, we plan to expand the content of the Web sites for next year.

MacPHERSON[1], Brian R., Timothy M. SYMONS[2]*, and Rene M. HALES[2]*. Anatomy and Neurobiology[1], and Media Design and Production[2], University of Kentucky, Lexington, KY. Computer based lab practicals – practice and real-time exams.
Over the past two years, our oral histology course has moved from a self-instructional 35 m.m. slide laboratory format to a web/CD hybrid using digital images available on the web or CD-ROM. This shift in technology has been extremely popular with the students. Aligning the practical exam format with the instructional format has been under development for the past year. A new digital laboratory practical exam template was constructed using Authorware by Macromedia. The template is designed to facilitate the simple incorporation of a certain number of labelled images linked to a corresponding number of multiple choice questions. The time allotted can vary but in this instance is set at 1 minute per question. The program runs from a local server with a security password required for access. The questions appear randomly on adjacent computers. Students can progress through the exam at their own pace allowing them to return to questions they were unsure of with any remaining time. Once they finish, their results are e-mailed to the instructor and they pick up their own printed copy in the computer classroom. A practice practical format is also available to the students allowing them to experience the timed exam format and the nature of the questions asked. The template can also be used in gross anatomy to familiarize the students with similar aspects of our lab-based practical exam. The digital exam and practice exam programs, constructed with this template, has been highly rated by the students. The template makes instructor use/question modification far more user friendly.

MATSUURA* Mitsuhiro, Kohsuke OHNO*, Kenichi MICHI*, Kaoru EGAWA*, Reiji TAKIGUCHI*, and Michael VON LUEDINGHAUSEN. First Department of Oral and Maxillofacial Surgery, First Department of Oral Anatomy, School of Dentistry, Showa University Tokyo, Japan, and Anatomisches Institut, Universitaet Wuerzburg, Germany. Clinico-anatomical examination of the

fibula: anatomical basis for installation of dental implants.
Advantages of the free vascularized fibula flap include its ability to be shaped with relative ease and grafted at the same time, that tumors are removed with a consequent reduction in operation time. In addition, few complications occur at donor sites. Since Taylor et al. (1975) reported on vascularized fibula grafting for the reconstruction of a large tibia defect, this method has been used extensively in orthopedic surgery and plastic surgery. Vascularized fibula grafts have been used for mandibular reconstruction, both alone and with dental implants, and have resulted in good postoperative restoration of masticatory function. However, a large, systematic, and detailed investigation of clinico-anatomical problems of the fibula has not been carried out. In the present study, fibula flaps from cadavers were examined morphologically and morphometrically with special reference to the regions important in placement of dental implants. Eighty fibulae of 41 Japanese cadavers of individuals aged 46 to 92 years (mean, 72.7 years) were fixed with 70% alcohol after infusion of about 6 l of 10% formalin via the femoral artery. Results of morphometric examination were as follows: 1) The nutrient foramen was located posteriorly in 85.0%. 2) The maximal width of fibular cross sections was 13.1 mm. 3) The maximal cortical thickness of fibula cross sections was 4.1 mm.

MOHAMMAD*, Khalid S., and Daniel A. NEUFELD*. Department of Anatomy, University of South Dakota School of Medicine, Vermillion, SD (sponsored by B.R. MacPherson). Nail transplantation to amputated proximal phalanges induces bone growth.
Mammals are able to regenerate the tips of amputated fingers and toes. The process is dependent upon the presence of the nail organ. If nail organ is responsible for bone growth in digit-tips, we reasoned that transplanted nail organ might be able to induce outgrowth from more proximal amputation levels. Partial nail organ has been transplanted to amputated proximal phalanges of young rats with varying degrees of success. Many transplants were lost, several became buried beneath the skin, and some have successfully established a nail bed and outgrowth of keratinized nail. Toes of animals in which transplanted nail persisted for several days and later fell off showed more new bone formation than control toes. New bone growth, documented by x-ray and by alizarin red and calcein injections, was seen in all animals in which nail persisted to exceed that of control amputated digits. Histological analysis of implanted nail revealed intimate association between nail organ epithelium and underlying skeletal tissue in dorsally proliferating bone. Thus, it has been demonstrated that nail transplantation to proximal phalangeal amputation sites is possible and, when transplantation is most successful, amputation sites of proximal phalanges resemble the tips of distal phalanges. Unique new bone is directed toward the implanted nail. Supported in part by NIH HHS 1R15 HD35322-01 and the W.W. Parke Research Fund.

NGUYEN*, Chau T., Eri SRIVATSAN*, and Marilene WANG*. Department of Surgery, Division of Head and Neck Surgery, UCLA School of Medicine, Los Angeles, CA (sponsored by B.R. MacPherson). Nuclear beta-galactosidase staining of squamous cell carcinoma in vitro.
Previously in our laboratory it was shown that antisense to cyclin D1, a molecule involved in cell cycle signaling, inhibits the proliferation of squamous cell carcinoma in vitro. In order to develop this model into a viable novel genetic therapy, we test the feasibility of using a retrovirus vector encoding a nuclear beta galactosidase gene to successfully transfect two squamous cell cancer cell lines. Twenty thousand cells of each of the two lines were grown in 12 well tissue culture plates for 48 hours before being transfected with varying amounts (0 ^ 0.5 ml) of nuclear beta galactosidase encoding retrovirus and control empty vector. After 72 hours, the cells were

stained for the expression of the galactosidase gene. Transfection efficiency was measured as cells staining blue divided by total number of cells counted (300). The range was 0.3% to 8%, with a mean of 2.2% and the effect was dose dependent. These results are comparable to percentages reported in the literature (Gordon, EM et al, for pancreatic cancer cell lines). This is an important first step in determining if this approach will work utilizing a viral vector encoding antisense cyclin D1 to be injected into human tumors in the future. (We would like to acknowledge Nian Ling Zhu, Ling Wu, and Drs. Maria Gordon and Fred Hall of the University of Southern California Gene Therapy Group for their invaluable advice on this project).

NIEDER, Gary L., Frank NAGY , Patricia L. PEIRCE*, and Robert L. BALTZER*. Department of Anatomy, Wright State University School of Medicine, Dayton, OH. Extended capabilities of QuickTime VR applied to the presentation of gross anatomical specimens.
The typical QuickTime VR (QTVR) object is a photo-based image of a real 3-dimensional object that can be spun on two axes via a cursor drag. In our application of QTVR to gross anatomy instruction, we have altered the standard QTVR metaphor so that different actions occur when the user drags the cursor. As an example, one dimension of QTVR control can be used to show deepening layers of dissection in a prosection while the other dimension Œspins, the object. Intrinsic movement within a specimen (eg. a knee joint flexing and extending) can also be controlled by the user as a QTVR dimension. Complex interactivity can be provided by linking various media elements together within QTVR Œscenes,. Scenes are composed of two or more QTVR objects, panoramas, linear movies, still pictures, or sound tracks. The user navigates through scenes using either clickable hotspots or QTVR positional information. We have used QTVR scenes to construct mini-applications entirely within the QuickTime format that demonstrate anatomical structures and concepts. QTVR scene-based applications can also be built into more complex authored applications while retaining their intrinsic properties.Hotspots in QTVR scenes can also execute html code controlling access to Internet-based data within a web browser. This feature was used to construct web pages containing QTVR objects and text frames whose content is controlled by the users interaction with the QTVR object. QTVR objects and scenes have proven useful in gross anatomy lecture presentations and as a resource for students outside the dissection lab.

NORTON Neil S., Jorge F. RODRIGUEZ-SIERRA*, and Manuchair EBADI*. Creighton University School of Dentistry, and Departments of Cell Biology and Anatomy and Pharmacology, UNMC, Omaha, NE. The effects of lesions to the Fornix on Metallothionein I.
Previous studies in our laboratory have concentrated on the expression of the various isoforms of Metallothionein in the brain. We have observed Metallothionein in the hippocampus, an area of the brain important in the processes of learning and memory. In this study, we examined the expression on Metallothionein I (MT-I) in rats that received lesions of the Fornix, an important efferent pathway of the hippocampus. Under pentobarbital (40 mg/kg, ip) anesthesia, the animals were placed in the stereotaxic apparatus and the cranium was exposed via a midline incision. After a burr hole was made, an electrode was aimed unilaterally into the brain at the level of the left Fornix (F) (at coordinates -3.8 mm Bregma; 1 mm lateral, and 5.5 mm deep to the dura) (Paxinos and Watson, 1997). A 10 mA current was applied for 30 s. Rats were sacrificed the next day (short term effects) or 7 days following the lesion (long term effects). The results of the short term effects displayed expression of MT-I immunoreactivities in the olfactory cortex. A small cluster of neurons ventrally were found to positively stain in the Organ of Vasculosa Lamina Terminalis. In addition, there was expression in the piriform, rhinal areas, and cerebellum with MT-I. We found no expression of MT-I in the hippocampus other than the glial elements. The

results of the long term effects displayed similar results to the short term effects. There was great expression of MT-I in the piriform, rhinal areas, and cerebellum, whereas there was none in the hippocampus. The greatest expression was observed in the hypothalamus. In both the short and long term studies, MT-I was observed in the choroid plexus and in blood vessels.

PARKE, Wesley W., Joseph L. WHALEN*, Paul C. BUNGER, and Suleman SAID*. Department of Anatomy and Structural Biology, University of South Dakota School of Medicine, Vermillion, SD, and The Springfield Clinic, Springfield, IL. Phrenic paresis: a neglected possible component of cervical spondylotic myelopathy.

Cervical spondylotic myelopathy (CSM) results from the encroachment of hypertrophic degenerative vertebral elements upon the neural contents of the cervical spinal canal. Although this condition is relatively common, and all comprehensive descriptions list its mid-cervical manifestations of limb dysfunctions in quantitative detail, none of the extant accounts mention phrenic paresis as a possible complication. This is surprising when it is considered that the phrenic spinal nuclei and their efferent nerve root fibers are likely to be affected by a stenotic compression in the regions of the 3rd, 4th and 5th cervical vertebrae. We here present two cases that involved males, aged 54 and 67 years. Both were diagnosed with advanced CSM with mid-cervical cord AP diameters reduced by approximately 50% and with marked lower limb dysfunction. Both underwent laparotomies for unrelated conditions in which anesthetic intubation involved manipulative neck extension. During recovery, the patients complained of increased weakness in the shoulder girdle muscles and had sufficient respiratory distress to require ventilator assistance. The younger man eventually regained some diaphragmatic function, but the older individual remained respirator dependant until a lethal stroke six months later. Considering the mid-cervical location of the phrenic motor nuclei and their efferent intradural tracts, it is surprising that phrenic paresis has not been previously included as a possible complication of mid-cervical CSM. This may be due to the fact that diaphragmatic weakness may not be apparent until it is bilaterally substantially advanced, or it simply may not be reported as a related occurrence. These cases may provide a future awareness of the possibility of phrenic paresis (CSM/PP) resulting from mid-cervical CSM.

PAWLINA, Wojciech, Kyle E. RAREY, Lynn J. ROMRELL, Gene L. CORNWALL*, and Richard J. RATHE*. Department of Anatomy, Mayo Medical School, Rochester, MN and Department of Anatomy and Cell Biology, University of Florida College of Medicine, Gainesville, FL. The Internet- based assessment of first year medical students in both gross anatomy and histology courses.

The teaching faculty of Medical Human Anatomy (MHA) and Medical Cell and Tissue Biology (MCTB) courses implemented paperless Internet-based assessment of student performance. During 16-week period for MHA and MCTB, eight quizzes and two unit examinations, that integrated gross and microscopic anatomy were administered to first year medical students. Fifty percent of thequestions on each quiz included digital images to assess practical knowledge of gross and microscopic anatomy. Unit examinations contained several formats of multiple-choice questions, as well as short answer questions. We used quiz CGI online testing engine developed at the University of Florida. This engine automatically generated questions using MTX2html v1.5 software. After submitting their final answers, students received immediate grading and feedback, and were able to review their incorrect responses. Student's written responses were easier to grade, because they were "typed" and not hand written. The program also generated grading data, that were imported into spreadsheet. Grades and performance data were posted immediately after the examination on secure web pages that were accessed by the students

using assigned passwords. In both courses students evaluated their experience with Internet-based testing very positively, especially because the USMLE has been changed to a computer-based examination format.

PETTERBORG, Larry J. Texas Woman's University, School of Physical Therapy, Dallas, TX.
From the AACA Archives: the 1984 and 1989 Annual Meetings.
Within a year of forming, the American Association of Clinical Anatomists (AACA) held its first annual meeting at the Mayo Clinic in Rochester, MN. The registration fee was a scant $30.00. There were a total of 37 abstracts scheduled for presentation beginning with a paper on neck anatomy given by President Oliver H. Beahrs. For his 50 years of contributions to clinical anatomy, W. Henry Hollingshead, Ph.D., was the first "Honored Member". Ten years ago, the 1989 Annual Meeting was held at Vanderbilt University in Nashville, TN. The registration fee by then had jumped to $60.00. Thirty-two abstracts were accepted and presented over three days. Of the six attendees chosen to receive the first "Annual Students and Residents Expense Awards", four (Drs. Arruda, Baskin, Dawson, and Spinner) are still members of AACA. There were only three commercial exhibitors, Ciba Geigy, Scholastech, and William & Wilkins. N. Alan Green, M.S., F.R.C.S. Was honored at the banquet that year. Following the meeting, a two-day postgraduate course on the "Clinical Anatomy of the Gastrointestinal Tract" was offered. From 1984 to 1989, AACA evolved from a group whose stated purpose was to "emphasize the importance of the teaching of gross anatomy" to one that strove to "advance the science and art of Clinical Anatomy".

PIETRASIK, Kamil M.[1], Malgorzata BRZOZOWSKA*[2], Bogdan CISZEK*[1], Ireneusz NAWROT*[3], and Marek MOLSKI[4]. Departsments of Anatomy[1,] Forensic Medicine [2], and Vascular and Transplantation Surgery [3], The Medical University of Warsaw, Poland, [4] Department of Plastic and Reconstructive Surgery, The Center of Postgraduate Medical Education, Warsaw, Poland.
Clinical anatomy of the lumbar and inferior mesenteric arteries.
"Endoleak" phenomenon is one of the most frequent complications (8-15%) in the patients after endovascular treatment of the abdominal aorta aneurysm. Searching for the reason of such a unfavorable outcome and means of its prevention, we decided to undertake our study on anatomy of the abdominal aorta branches that my be important in both these aspects. The study was performed on 20 fresh cadavers. After perfusion with saline abdominal aorta was injected with radiopaque medium and X-rays were taken. In the next step dissections were carried out with the special respect to lumbar and inferior mesenteric arteries. Appropriate measurements were performed on both, radiograms and specimens, and compared to provide clinicians with the most accurate data. The lumbar arteries arose most frequently in pairs (85%), furthermore, as a bifurcating common trunks (11%) or solitary branches on the left side (4%) from the postero-lateral aspect of the aorta. The fourth pair of lumbar arteries was least constant in presence and point of origin. In majority of the cases it arose at the level of bifurcation of the abdominal aorta. The fifth pair of lumbar arteries was present in 10 % of examined specimens and arose from left common iliac artery.

PORTA, David J. Department of Biology, Bellarmine College, Louisville, KY. Department of Anatomical Sciences & Neurobiology, University of Louisville School of Medicine, Louisville, KY.
Fracture of the coronoid process of the mandible: Accident reconstruction in the gross lab.
According to the medical literature, isolated fracture of the coronoid process of the mandible is a relatively rare occurrence. While performing a standard dissection of the infratemporal fossa of a geriatric African American male cadaver, students failed to locate the left coronoid process. There

were no gross signs of fracture to the zygomatic arch or basilar skull. More aggressive dissection revealed the displaced coronoid fragment in the substance of the temporalis muscle, 2 cm superior to the mandible. The margins of both the fragment and its former site on the mandible were marked by thoroughly healed compact bone. There were no signs of damage to the main neurovascular components in the area. The temporalis tendon was firmly attached to the mandible both laterally and medially and the muscle presumably maintained its function as a strong elevator of the mandible. The discovery of connective tissue encapsulated cubes of glass in the left supraorbital region led to the conclusion that the patient was likely the victim of a motor vehicle accident (not proximate to the cause of death). As the driver of a vehicle subjected to lateral impact, occupant kinematics suggest he would have struck the side window with the left portion of his head. Automotive side windows are designed to break into numerous cubes in an effort to absorb the energy of impact and limit injury. The fracture likely occurred due to direct contact with the window or avulsion during the crash event.

QUINN, T.H, S.M. BHATIA*, and S.K. MITTAL*. Departments of Biomedical Sciences and Surgery, Creighton University School of Medicine, Omaha, NE. Technique for rapidly locating and dissecting superficial abdominal wall vessels.

Clinical anatomists recently have focused increased attention on the surgical anatomy of the anterior abdominal wall. Since this has occurred, for the most part, in response to the burgeoning use of minimally invasive laparoscopic techniques, a proportionately larger amount of time is now devoted in many student laboratories to the deep aspect of the anterior abdominal wall than in the past. In some laboratories this has led to the devotion of less time to the external abdominal wall structures including vessels, nerves, fascias, muscles, and aponeuroses. To conserve time, superficial fat and fascia along with concomitant nerves and vessels often are stripped away without detailed study. Recent reports in the surgical literature, however, underline the importance of avoiding damage to these structures during placement of surgical laparoscopic instruments. To ascertain whether the amount of laboratory time spent dissecting the superficial structures of the anterior abdominal wall could be minimized by using guidelines outlined for the placement of surgical laparoscopic ports, we dissected the major superficial vessels in five abdominal walls. We relied on data based on ultrasound findings (Hurd, et al.), previous dissections and angiographs. The superficial epigastric and superficial circumflex iliac vessels were initially located by making superficial incisions 6 cm (superficial epigastric vessels), and 9 cm (superficial circumflex iliac vessels) from the midline at a level 3 cm above the symphysis pubis. A second set of incisions was placed at a level 3 cm below the umbilicus. These incisions were located 5 cm from the midline and 11 cm from the midline in order to locate the superficial epigastric vessels and the superficial circumflex iliac vessels respectively. The vessels were easily located and could then be dissected free as the superficial fat and fascia was removed. We feel that this procedure will allow students to quickly gain an appreciation for the location of major superficial abdominal vessels without undue expenditure of laboratory time.

RAMAN, R*, S. AL-ALI, C.A. POOLE*, B. DAWSON and J.B. CARMAN*. Department of Anatomy with Radiology, School of Medicine, University of Auckland, Auckland, New Zealand. A clinical, anatomical and confocal microscopic study of a unique case of long-surviving levocardia with partial situs inversus.

This study describes a unique case of long surviving levocardia and partial situs inversus with major cardiac defects. A review of the clinical history, chest Xray, electrocardiogram, and gross dissection were followed by confocal histological examination of respiratory mucosa. Clinically, the 45 year old male patient had a long history of cyanotic heart failure. The electrocardiogram

showed a supraventricular tachycardia with a 2:1 conduction block. The Chest X-ray showed evidence of pulmonary hypertension and cardiac failure. Dissection of the thorax revealed that the heart had a rudimentary right ventricle and exhibited gross dilatation of the left ventricle. The atria were replaced by a single chamber and a persistent atrioventricular canal. The heart had only one coronary artery arising posteriorly and three anteriorly situated coronary veins emptying into the left atrium. The great vessels arose beside each other, with a d-loop aorta arising on the left whilst the pulmonary trunk was dissected to the right. The superior vena cava was on the left, as was the termination of the azygous vein. The tracheal bifurcation pattern was reversed. The left lobe of the liver was larger than the right lobe. Since situs inversus is strongly associated with primary ciliary dyskinesia, the respiratory epithelium was examined. Histological preservation was satisfactory even one year after being embalmed. Confocal histology revealed prominent goblet cells, thickened basal laminae and coalesced cilia that had a random orientation, not present in controls. The striking feature of this case is the relatively long survival period given these gross congenital anomalies.

RODRIGUES Jr., Aldo J., Consuelo J. RODRIGUES, and Ruy BEVILACQUA*. Department of Surgery, Faculty of Medicine, University of Sao Paulo, Sao Paulo, Brazil. Extracellular matrix aging in the transversalis fascia as a mechanism of direct inguinal hernias.
The cause of groin hernias is multifactorial. Otherwise all the groin hernias emerge through the myopectineal orifice of Fruchaud. This orifice varies in size from one individual to another, but any diameter it presents all the stress forces acting in the lower abdominal wall do challenge the transversalis fascia the sole defense mechanism providing inguinal abdominal wall integrity, mainly at the weak area in the floor of the inguinal canal. Groin hernias, especially direct inguinal hernia, are most common in men over the age of fifty years. This study was designed to quantify the elastic components of the extracellular matrix in patients, at different ages, at the transversalis fascia, in the inguinal canal floor. Twenty male patients aged between 13 to 78 years with right indirect inguinal hernia were submitted to hernia repair. During the surgical procedure after considering macoscopically integre the transversalis fascia, A fragment of 1 sq cm of normal transversalis fascia was obtained and 7 um thick sections were alternatively stained by Verhoeff, Weigert and Weigert–oxone methods. Histomorphometry of the linear densities to elastic, elaunin and oxytalan fibers were obtained by using an image analysis computerized system (Kontron 300 – Zeiss). The statistical analysis showed a decrease in oxytalan fibers as a function of age, particularly over the fifties. In this way, it was possible justify the alterations in the resistance of the transversalis fascia that brings and the high incidence of direct inguinal hernias in older men.

RODRIGUES Aldo J. Jr., Thais W.A. BOJADSEN*, Erasmo S. SILVA*, and Alberto C. AMADIO*. Department of Surgery and Department of Biomechanics, University of São Paulo, São Paulo, Brazil. Paraspinal muscles and the movement of the spine.
The difficulty to study paraspinal muscles individually had led many authors to study them as a single mass. Their functions are also considered the same: intervertebral movement and spine stabilization. Aiming a better understanding of how the same muscles respond to these different mechanical solicitations, we dissected 12 fresh cadavers. Ours findings reveal that paraspinal muscles vary in number, cross sectional area and direction of the fibres according to the spine segment. In lumbar spine where the largest load transmition occurs and where the largest amplitude of movement are in the sagital plane, paraspinal muscles are represented by three muscles. Multifidus, iliocostalis and longuissimus dorsi present their largest transsectional area and their fibres are also more vertical, when compared to the upper segments of the spine. In the

thoracic spine, the main amplitude of movement occurs in the transverse plane and precisely in this region paraspinal muscles present an increase in number of oblique muscles. Above T12, rotator muscles and semi spinalis are present and multifidus present a marked increase in the obliquity of their fibres and a marked decrease in their mass. It seems that the differences of mass, trajectory of fibres and number of muscles are adaptations to produce different degrees of movement and to support different loads.

RODRIGUES, Aldo J. Jr., Erasmo S. SILVA*, Consuelo J. RODRIGUES, Erasmo M.C. TOLOSA*, Gladys V.B. PRADO*, and João C. NAKAMOTO*. Department of Surgery, University of São Paulo, São Paulo, Brazil. Morphology of infrarenal aortic aneurysms.
The diameter and morphology of infrarenal aortic aneurysms were studied in 78 fresh autopsy specimens. The aneurysms were removed from the corpses and in order to avoid underestimation of the arterial diameter post mortem and to re-establish aneurysm morphology a device was designed and introduced into the vessel and inflated to 80 mmHG, and the largest external diameter was measured. Thirty eight aneurysms were ruptured with diameter ranged from 5.3 cm to 17.0 cm (mean: 7.97). Forty aneurysms were non ruptured with diameter variation from 2.8 cm to 6.1 cm (mean: 4.02). Fusiform aneurysms were more frequent and they rupture with the diameter lesser than spherical aneurysms ($p < 0.05$). The aneurysms ruptured more frequently in the posterior wall (67%) and in the inferior portion (61%). The mural trombus was found near the rupture site in 80% of the specimens and blisters or blebs were found in 20% of all aneurysms.This study was different from others made in necropsy because the specimens were analyzed in a prospective way and recomposed the morphological aspects of the aneurysms. In this sample rupture was found solely in aneurysms with diameter superior than 5.0 cm and rupture occurred earlier in fusiform aneurysms.

RODRIGUES, Consuelo J., and Aldo J. RODRIGUES Jr. Department of Surgery, Sao Paulo School of Medicine, and Universitary General Hospital, University of Sao Paulo, Sao Paulo, Brazil. Elastic fiber system in the normal and neoplastic prostate.
It is suggested that the infiltrating process of cancer cells, in analogy to wound healing process, brings the characteristic desmoplastic reaction, as it is seen very often. Elastosis is a well-recognized feature of infiltrating breast carcinoma with elastic fibers synthetized "de novo", with a high microfibrill/elastin ratio. To evaluate the amount of elastic fibers in the normal and neoplastic prostate we studied 17 normal prostate (nl), 28 benign prostatic hyperplasia (bph) and 28 prostatic carcinoma (pc). The elastic fibers were evaluate in slices stained by Weigert (W), intermediary and mature elastic fibers, and Weigert-oxone (WO) mature, intermediary and young elastic fibers, using an Images Analysis System (Kontron 300). We showed significant difference between all three groups. The normal prostate contain less amount of elastic fibers (%Wnl=0.032, and %WOnl= 0.091), the hyperplasia showed an intermediary amount of elastic fibers (%Wbph=0.080, and %WObph=0.16), and the prostatic cancer showed higher amount of elastic fibers (%Wpc=0.14, and %WOpc=0.21). The TGFb increases the synthesis of elastin in a great variety of cells by inducing the increase of elastin mRNA. Our results may be related to the higher levels of TGFb in prostate cancer, that enhances paradoxically prostate tumor growth and metastasis.

ROSS, Lawrence M., Ramzi M. MANSOOB*, Richard C. HALLGREN*, and Jane WALSH*. Departments of Anatomy, of Physical Medicine & Rehabilitation and of Osteopathic Manipulative Medicine, Michigan State University, East Lansing, MI. Identification of muscle spindles in suboccipital muscles.

The suboccipital nerve (C1) is typically described as a purely motor nerve providing innervation to the four suboccipital muscle pairs. A small cutaneous branch accompanying the occipital artery to the scalp has been described. The dorsal root of C1 is often described as small or absent, and the dorsal root ganglion of C1 is rarely mentioned specifically. The long deep back muscles acting across multiple joints are decribed as richly supplied with muscle spindle organs. The presence of spindle organs have not been described in the rectus capitis posterior major (RCPM) or minor (RCPm). The RCPM and RCPm muscles were removed from 10 cadaver specimens, 5 male and 5 female. Each specimen was measured, and post-fixed in 10% neutral formalin. The largely triangular muscles were subdivided into numbered samples beginning at the muscle's origin. Each sample was embedded separately, 6 &m sections and stained with Gomori's Trichrome. Muscle spindles were counted, tabulated and means for each sample calculated. The largest number of spindles were located towards the insertion end of the muscle samples. The highest mean number of spindles for the combined samples of RCPM was 12.1, while 6.2 for RCPm. Gender differences were not apparent. The larger number of spindles in the RCPM may reflect muscle size or need to monitor across two joints when compared to the RCPm acting across one joint. The presence of muscle spindles in the RCPM and the RCPm muscles indicates the suboccipital nerve is both a motor and sensory nerve. Preliminary macroscopic and histologic examination of the C1 dorsal root for evidence of a ganglion or sensory neurons within the root are ongoing, but negative at this time.

SAKAMOTO* Hirokazu, Keiichi AKITA*, and Tatsuo SATO. Department of Anatomy, School of Medicine, Tokyo Medical and Dental University, Japan. On the trapezius and the rhomboideus additionally supplied by branches of the dorsal thoracic rami.

An anomalous nerve supply of the trapezius and rhomboideus was observed during a routine dissection. The trapezius and rhomboideus were supplied by branches of the dorsal thoracic rami in addition to typical nerve supply. The process of formation of the double nerve innervation is discussed on the basis of anaylsis of the supplying nerves and their intramuscular distribution. Most of the trapezius was supplied by the accessory nerve, and 3rd and 4th cervical nerves. Furthermore, the lateral branch of the 4th dorsal thoracic ramus entered the inferior part of the trapezius. The rhomboideus consisted of two parts, rhomboideus minor and major, and was innervated by the dorsal scapular nerves arising from the 4th and 5th cervical nerves. The lowermost part of the rhomboideus major (0.6cm wide and 8cm long) was independent and was supplied by the lateral branch of the 3rd dorsal thoracic ramus. As these additional branches of the dorsal thoracic rami entered the trapezius and rhomboideus after innervating the iliocostalis thoracis, they were thought to arise from the ventralmost layer of the lateral branches of the dorsal thoracic rami. However, the dorsal scapular nerve is reported to arise from the dorsal layer of the ventral cervical ramus (Kato et al., 1978). Therefore, the additional branch and the dorsal scapular nerve were suggested to be closely related at the initial portion of the spinal nerve. In the present case, it is suggested that the splenius thoracis component, normally supplied by the lateral rami of the 3rd and 4th dorsal thoracic rami, remained unseparated in the lowermost part of the rhomboideus and the trapezius.

SARGSYAN N.H.* Department of Normal Anatomy, State Medical University, Yerevan, Republic of Armenia (sponsored by A.F. Dalley). Ultrastructural changes of human hepatocytes in complicated duodenal ulcer.

In order to reveal specific ultrastructural injuries of liver obtained from 18 patients at the age of 21-35 with complicated duodenal ulcer we have carried out a study by a transmission electron microscope using generally accepted methods. The material was morphometrically processed.

Hepatocytes of the I and II zones of the acinus had standard sizes. Their nuclei had rounded shape with preserved nuclolemma, aggregation of chromatin in the clods and swollen enlightenment of the nucloplasm was observed. The increase of the quantity of mitochondria in cytoplasm was determined, part of them was bigger than ordinary ones and had swollen enlightenment matrix as well as curled or fragmented cristae. Smooth endoplasmic reticulum of I and II type was weakly revealed. Granules of lipofuscin were 2% of the cytoplasmic volume. Glycogen was not revealed. The average volume of nucleus in cytoplasm was 1:5. Hepatocytes of III zone wase large. The average volume of nucleus in cytoplasm here was 1:6. The granules of lipofuscin were 4% of the volume of cytoplasm. Accumulation of glycogen was revealed. Hyperplasia of smooth endoplasmic reticulum of the I type is also revealed. The cytoplasm of all hepatocytes was swollen enlightened. There were no free ribosomes in cytoplasm. Thus our preliminary ultrastructural study of liver cells shows the existence of compensating destructive changes which was mostly expressed in the III zone of acinus.

SAXTON*, Ernestina H., James D. COLLINS, Samuel S. AHN*, and Theodore Q. MILLER*. UCLA School of Medicine, Los Angeles, CA. Abduction and external rotation of the upper extremities triggers symptoms in patients with thoracic outlet syndrome and migraine: MRI and MRA.

Patients with acute sloping ribs, narrowed thorax, straight back syndrome, drooping and round shoulders (laxity), Scheuermann's disease and migraine with thoracic outlet syndrome complain of upper extremity pain, numbness, tingling and migraine headache. Abduction external rotation of the upper extremities causes the clavicles and subclavius muscles to rotate and compress (costoclavicular) the brachial plexus which triggers brachial plexopathy; migraine attacks, facial and lower extremity numbness tingling and pain. Bilateral magnetic resonance imaging and angiography (MRI, MRA) with abduction external rotation sequence capture images of neurovascular compression at the time of the patient's complaints (CLIN ANAT, 10:.131,1997) Patients were imaged with the 1.5 Tesla magnet (Signa; General Electric). 3-D reconstruction MRI. T1W and T2W pulse sequences were performed in the coronal, transverse, transverse oblique, sagittal planes and coronal abduction external rotation sequence using 4 mm slice thickness and 512 x 256 matrix size. Water bags were used to enhance the signal to noise ratio. Magnetic resonance angiography (MRA) 2-D Time Of Flight (TOF) demonstrated compression of the subclavian artery and vein. The internal jugular, subclavian, brachiocephalic, vertebral and the innominate veins also were obstructed . Venous stasis was demonstrated as high signal intensities within the neck, lungs, chest wall, liver and mesentery on T1 weighted images This triggered brachial plexus symptoms; pain and numbness of the face and lower extremity, and migraine headache. Surgical decompression confirmed the MRI/MRA findings and relieved the the patient's symptoms.

SHEETZ, James H. Department of Cell Biology, University of Alabama at Birmingham (UAB), Birmingham, AL. Converting histology practicals to computer-based exams.

The increased availability and use of computer aided instructional material as well as the conversion of some national board licensing exams to a computer format has helped justify an increased utilization of computers in the instruction and testing of health professional students. In an effort to utilize available technology and to expose students to more computer based exams, histology practicals in a course of Medical Cell and Tissue Biology (MCTB) were given in a format utilizing computers. Digitized images for the practicals were acquired by capturing images from a video-camera equipped microscope utilizing a computer video capture card or by digital scanning of 35mm slides. After images were enhanced utilizing Adobe Photoshop4, they were organized

into MS PowerPoint97 slide shows which were converted to a HTML format incorporating frames. Text for questions were included as "Notes" in the slide shows. Navigation through the images (practical questions) was provided by a Question Page written with HTML editing software (Claris HomePage 2.0) in which each question was linked to its appropriate set of images within a slide show. Responses from students have been overwhelmingly positive. This format for practical exams allows the building of image (question) libraries and provides flexibility in generating future exams..

SKANDALAKIS, John E., Gene L. COLBORN, and Lee J. SKANDALAKIS*. Centers for Surgical Anatomy and Technique, Emory University School of Medicine, Atlanta, GA. Benign anatomical mistakes: myths or enigmas?

There are a number of anatomical entities which are repeatedly misrepresented in the literature from an embryological and anatomical standpoint. There is also much confusion concerning the terminology which is used to identify certain entities or regions of the body. This presentation will include a discussion of several of these "benign mistakes" as they pertain to choledochal cysts, the pancreatic capsule, the phrenicocolic ligament, the transversalis fascia and the iliopubic tract. Embryologically, type II choledochal cysts are universally accepted as diverticular malformations of the common bile duct. As such, are they true choledochal cysts or just an accessory gallbladder? What is the best operation for type II choledochal cysts? Several anatomical mistakes will also be presented: 1) Pancreatic Capsule - The pancreas is covered anteriorly by the peritoneum but not posteriorly. A capsule is present enveloping the pancreas only with pancreatitis, which produces a thickening of the anterior and posterior surface of the pancreas which is able to hold sutures. The term "pancreatic capsule" is misleading. 2) "Right Phrenicocolic Ligament" - Although often reported in the literature, the right phrenicocolic ligament does not exist. There is only one phrenicocolic ligament and it is on the left side. Concerning the terminology, the multiple names and terminology of the iliopubic tract are confusing. We propose that the term "iliopubic tract" is anatomically and surgically correct. Also, many textbooks and papers suggest closing a hernia defect by using the transversalis fascia. However, the transversalis fascia itself is not strong enough to retain sutures. To say that the transversalis fascia is used for repair of inguinofemoral herniorrhaphy is wrong; only its "analogues" (sling of internal ring, iliopubic tract, femoral sheath) are used.

STEWART*, Fiona. Department of Anatomy & Histology, University of Sydney, Australia (sponsored by A.F. Dalley). Gross topographical prosections and their use in the self directed study of sectional anatomy.

The University of Sydney's Wilson Museum of Human Anatomy dates from 1890. Founded to produce teaching material for gross topographical anatomy, its prosections were intially produced by "appointed prosectors". Today the collection's prosections are dominated by student-produced material, generated via monetary prizes from dedicated donated funds. Famous names from the past and present abound. Twenty-first century technological developments, have led to an expansion of imaging techniques and with them, a demand for accurate sectional anatomical interpretation. Teaching of sectional anatomy has become increasingly important. Interpretation of "sections" requires a sound foundation in gross topographic regional and surface anatomy. Student-generated museum prosections keyed with selected plastinated "sections" have been correlated for self-directed student study. Given a specific vertebral level of surface anatomy medical and dental students are able to examine prosections and sections and systematically determine what structures and viscera are contained in the cut.

THOMAS, Pamela P., and Charles R. THOMAS*. Department of Anatomy, University of Health Sciences College of Osteopathic Medicine, Kansas City, MO and Department of Anatomy and Cell Biology, University of Kansas Medical Center, Kansas City, KS. Speculation about the tendinous connection between the extensor carpi radialis brevis and brachialis muscles in man. Over years of upper extremity dissection, it became obvious that the arcade of Froshe was more complicated than previously described. Examiniation of 56 cadaveric specimens demonstrated an attachment of variable thickness between the extensor carpi radialis brevis (ECRB) and the brachialis muscles. This varied from a moderately strong fascia to tendon containing muscle fibers from the brachialis. This connective tissue fused with the supinator immediately anterior to where the deep radial nerve passed between its two heads of origin. A literature search confirmed our observations and suggested its possible involvement in lateral supracondylar syndrome. This preliminary study focuses on the nature of the connection between the ECRB and the brachialis. The connecting fiber direction and occasional muscular contribution from the brachialis suggests a functional coupling between these two muscles with a common tendon crossing the wrist. Fibers arising from the brachialis cross the cubitus obliquely to join the ECRB. Thisobliquity suggests that their combined action may pronate the wrist upon extension. This might irritate the deep branch of the radial nerve as the brachialis portion is pulled medially and proximally. Additional studies are being conducted to compare this two-muscle connection in arboreal primates and to examine their electromyographic activity.

TRELEASE, Robert B. Department of Pathology and Laboratory Medicine, UCLA School of Medicine, Los Angeles, CA. Digital Video, the Web, and CD-ROM Publishing: Integrating Recent Advances in Media Technology into Effective Tools for Anatomy Instruction in a Changing Medical School Curriculum.
Conventional anatomy instruction has historically relied on two complementary teaching methods: Lecture and cadaver dissection. Over the past decade at UCLA School of Medicine, total number of hours of gross anatomy lectures and laboratories has been reduced to provide time for clinical and problem-based learning. The recently initiated process of changing to a systems-oriented curriculum favors additional reductions in anatomy instruction hours. From the faculty perspective, while it may seem unacceptable to eliminate a specific didactic presentation from an already-minimal class schedule, it is easier to use current technology to supplant lectures than to replace the cadaver dissection experience. At the cost of eliminating real-time pedagogical interactions, judiciously designed computer-based video programs can readily replace lectures. To supplement heavily used World Wide Web resources for static lecture text/image content, we have implemented streaming video for delivery to student personal computers. We will also use digital video and interactive stereoscopic 3D programs to present dissections via the Web. Web anatomy content is transferable to CD-ROMs, so students can avoid dial-up network bandwidth limitations and access course content on non-networked computers. Experienced anatomists will control such innovation in order to assure educational quality.

WADE, R.S. Anatomical Services Division/State Anatomy Board, University of Maryland School of Medicine, Baltimore MD. Medical mummies: The Burn's Museum collection.
The Burn's Museum collection is a unique collection of anatomical specimens prosected with prepared vascular castings, then salt and sugar cured. This collection was prepared by the Scottish anatomist, Allen Burns, in the late 1700s and survives today at the University of Maryland School of Medicine. A pictorial review of the specimens will be presented along with a discussion of the use and history of the collection.

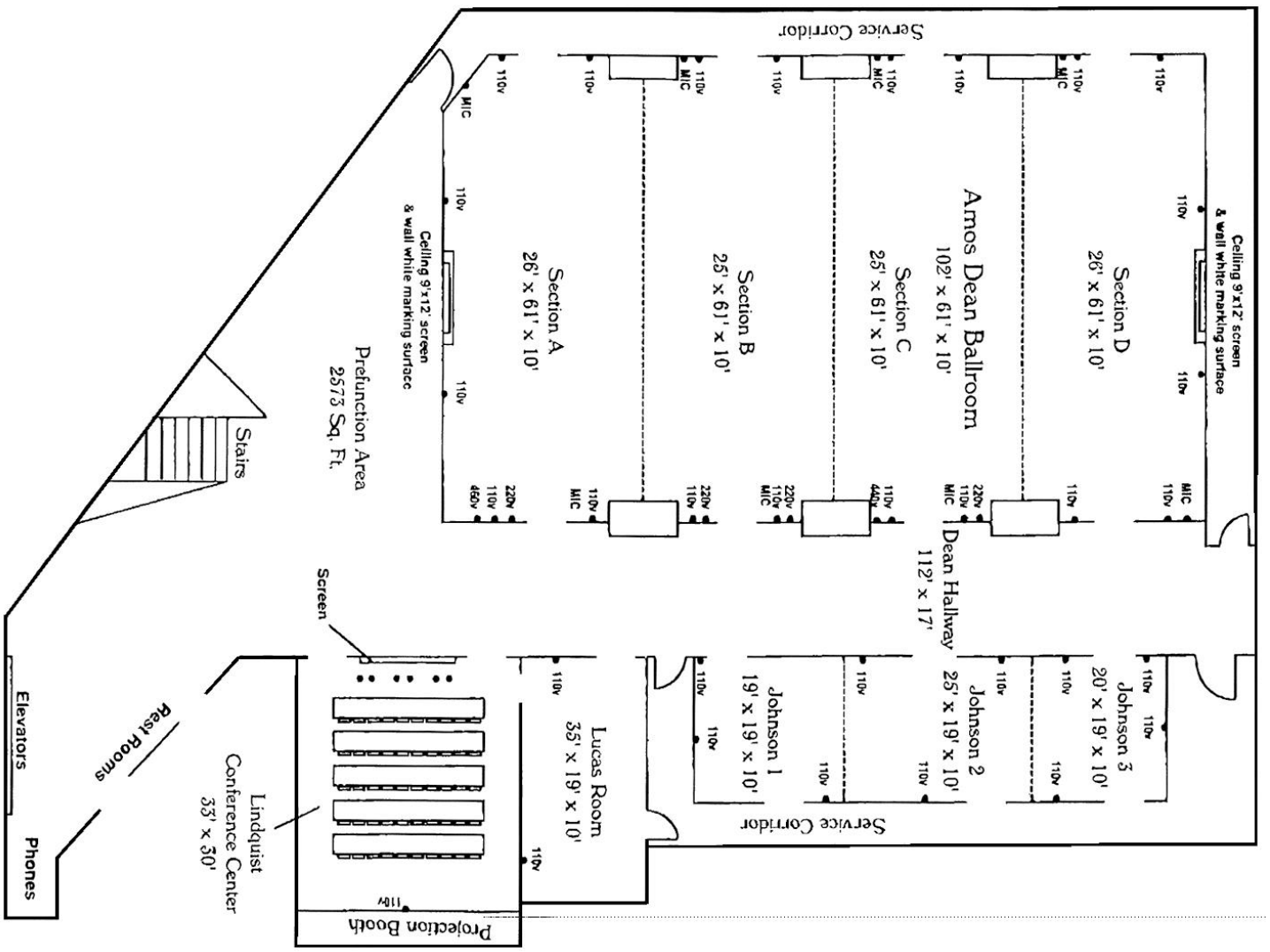
WADE, R.S. Anatomical Services Division/State Anatomy Board, University of Maryland School of Medicine, Baltimore MD. Old anatomy embalming and preparation methods.
This presentation will cover a selected review of some old embalming formulas and methods used in medical school cadaver preparations. The skills of the classic preparator to perform museum preparations and some of the methods used for preparing medical teaching specimens, including castings and colorings to emphasize structure, will be presented.

WALKER*, James J., J. Leslie BOOTH*, and Aaron D. BOOTH*. Lafayette Center for Medical Education, Indiana University School of Medicine and Department of Basic Medical Sciences, Purdue University, West Lafayette, IN (sponsored by M. F. Seifert). Interactive Notes for Human Gross Anatomy: A CD-ROM and Web-based form of course notes.
Gross anatomy is one of the most intensive basic science courses taken by freshmen medical students. Recent changes in the medical curriculum have placed greater demands on the student's ability to manage large volumes of learning resources that are often widely dispersed. Moreover, teaching faculty are confronted with maximizing course content while trying to provide the students with the most viable learning options. Thus, there is an immediate need to augment core anatomy materials with learning resources that integrate related disciplines and provide them in an accessible format that promotes active learning. We have addressed this problem by developing the ***Interactive-Notes for Human Gross Anatomy***, a new type of technology-delivered instruction that expands text-based materials into one that includes a cyber-based component delivered through a combination of CD-ROM and HTML publications on the Internet. Using various multimedia development tools (Macromedia Dreamweaver, Adobe Photoshop, etc.) we have converted traditional textual-based materials into a broadbased, non-platform specific format that integrates text, images and online materials. Our interactive form of class notes contains such things as; (1) pop-up images from Grant's Atlas and cross sections from the Visible Human, (3) mouse-over access to a glossary of clinical terms, (4) embedded "links" to pertinent anatomy Web-sites and (5) practice quizzes. The goal of this project is to create a comprehensive, dynamic learning environment that enhances the effectiveness of student learning while producing a fast, accessible and functional learning resource that students use regularly. (Funded by a grant from the MIDC).

WEIGLEIN, Andreas H., Gerald WOLF*, Klaus MUELLNER*, and Dieter SZOLAR*. Anatomical Institute, Department of ENT-Surgery, Department of Ophthalmology and Department of Radiology, Karl-Franzens-University Graz, Austria. The endonasal dacryocystorhinostomy.
The tear conducting system consist of the lacrimal sac and the nasolacrimal duct (NLD). The later is a membranous canal of about 18 mm length, and extends from the lower part of the lacrimal sac to the anterior part of the inferior meatus of the nose. The duct is contained in an osseous canal, formed by the maxilla, the lacrimal bone and the inferior concha. The direction of the NLD is described by a line drawn from the medial corner of the eye to the second upper molar. It is directed downwards, backwards and laterally or straight downwards. We subdivide the NLD into an upper part lateral to the middle nasal meatus - the meatal part - and a lower part lateral to the attachment of the inferior concha - conchal part. Stenosis of the nasolacrimal drainage system leads to epiphora. To improve lacrimal drainage in such cases of dacryostenosis a stoma is built up between the nasal cavity and the NLD. This procedure, called dacryocystorhinostomy is usually performed via the skin. However, to avoid scars an endonasal approach is preferred. In order to detremine the best endonasal approach to the NLD we measured the thickness of the surrounding bone in both cadaver sections and CT-scans. We found that the surrounding bony structures are of different thickness. The thinnest part of the osseous canal is in its posteromedial

quarter and in its lateral aspect adjacent to the maxillary sinus. For the endonasal approach only the posteromedial quarter of the meatal part of the NLD is of relevance. In this part the bony wall of the nasolacrimal canal measures 1 mm and less in thickness. Based on this anatomical findings a series of endonasal dacrycystorhinostomies have been performed at the department of ENT surgery Graz with excellent results and without complications.

ZARDETTO-SMITH, Andrea M., and Charlotte B. ROYEEN*. Departments of Physical Therapy and Occupational Therapy, Creighton University, Omaha, NE. Applying "Learning Through Discussion" to embryology in the physical therapy curriculum.
Embryology in the physical therapy curriculum is typically incorporated into the course in gross anatomy. Teaching embryology usually employs a traditional lecture instructional format. However, research suggests that alternative instructional strategies may better assist students to integrate concepts, master terminology and increase recall. This, pilot investigation of an instructional strategy based upon W.H. Fawcett's Learning Through Discussion (LTD) (Rabor, Charness, Kipperman and Vasille, 1994) was implemented into a one credit, eight week embryology course for first year doctorate of physical therapy (DPT) students. The DPT students were oriented to the LTD process during a brief class overview in the first session of the course. Prior to each class, students read Langman's Medical Embryology (Sadler, 7th Ed.) on specific topics in general or special (systems) embryology. They also completed worksheets highlighting particularly important details that would be relevant to the ensuing discussion. Accompanying each worksheet was one or two clinical case studies obtained from websites and a set of questions to guide the discussion. A brief overview of the topic was presented at the beginning of each class. Students then divided into small groups and chose a discussion leader (thus rotating leaders weekly) to guide the hour and half discussion process. "Talking points" for the case studies always included how they as physical therapists might be involved. In addition to facilitating the process, group leaders evaluated individual student participation as part of the overall course grade. Students responded positively to this method of instruction and felt it enhanced learning key concepts in embryology relevant to physical therapists.


Service Corridor
Ceiling 9'x12' screen & wall white marking surface
Section D
26' x 61' x 10'
Amos Dean Ballroom
102' x 61' x 10'
Section C
25' x 61' x 10'
Section B
25' x 61' x 10'
Section A
26' x 61' x 10'
Ceiling 9'x12' screen & wall white marking surface
Prefunction Area
2573 Sq. Ft.
Stairs
Dean Hallway
112' x 17'
Johnson 3
20' x 19' x 10'
Johnson 2
25' x 19' x 10'
Johnson 1
19' x 19' x 10'
Service Corridor
Screen
Lucas Room
35' x 19' x 10'
Projection Booth
Lindquist Conference Center
33' x 30'
Rest Rooms
Elevators
Phones