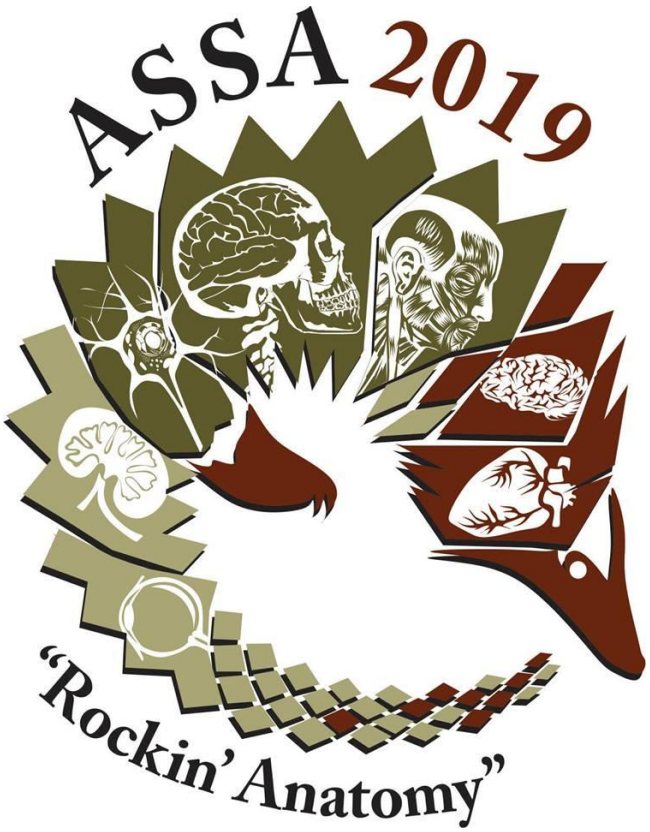
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences
Department of Anatomy

ASSA AVSA



Abstracts

47th Annual Conference of the Anatomical Society of Southern Africa

April 7-10, 2019

Kwa Maritane Bush Lodge and Conference Centre, Pilanesberg,
North-West Province, South Africa

Symposium 1A: Sunday, 7 April 2019

Forensic Anthropology Interest Group:

10:30 – 12:30

Tau room

TIME	PRESENTER	TOPIC
10:30 - 12:30	Ms S. Eppel Ms L Liebenberg	How standard is standard? A glimpse at current anthropology methodology, proficiency and practice

Chairperson: Prof E.N L'Abbe (UP)

Symposium 1B: Sunday, 7 April 2019

Clinical Anatomy Interest Group:

10:30 – 12:30

Nare Room

TIME	PRESENTERS	TOPIC
10:30 - 12:30	Dr D Mohr Ms S Govender	**Ultrasound anatomy of the brachial plexus blocks**

Chairperson: Prof A van Schoor (UP)

Symposium 1C: Sunday, 7 April 2019

Medical Education Interest Group:

10:30 – 12:30

Rhino Room

TIME	PRESENTER	TOPIC
10:30 - 12:30	Mr L Shapiro	Body painting as an anatomical teaching and learning resource

Chairpeople: Dr G Gunston and Prof G Louw (UCT)

Symposium 1D: Sunday, 7 April 2019

Cell biology / Histology Discussion group:

10:30 – 12:30

Hippo Room

TIME	FACILITATOR	TOPIC
10:30 - 12:30	Mr M Loots	HIstology education session

----------LUNCH TIME----------

Symposium 2A: Sunday, 7 April 2019

Forensic Anthropology Interest Group:

13:30 – 15:30

Tau room

TIME	FACILITATOR	TOPIC
13:30 – 15:30	Ms G Kruger Ms L Liebenberg	Findings, discussions and sharing of best practices The future of anthropology in South Africa

Symposium 2B: Sunday, 7 April 2019

Clinical Anatomy Interest Group:

13:30 – 15:30

Nare room

TIME	FACILITATORS	TOPIC
13:30 – 15:30	Dr D Mohr, Prof. A van Schoor Dr N Keough Ms U Purchase	Ultrasound demonstration

Symposium 2C: Sunday, 7 April 2019

Medical Education Discussion Group:

13:30 – 15:30

Rhino Room

TIME	PRESENTERS	TOPIC
13:30 – 15:30	Dr W Cordier Ms C Sutherland	Game-based learning and gamification

Symposium 2D: Sunday, 7 April 2019

Cell biology / Histology Interest Group:

13:30 – 15:30

Hippo Room

TIME	FACILITATOR	TOPIC
13:30 – 15:30	Prof M Bester	Round-table discussion

----------FREE TIME----------

Thomson-Stibbe lecture: Sunday, 7 April 2019

18:30 – 19:30

Tau room

PRESENTER	TOPIC
Prof Hohmann	Translational research: from the lab into the operating room and back

Chairperson: Dr N Keough (UP)

----------END OF DAY----------

Session 1: Monday, 8 April 2019
08:00 – 10:00 in Tau room

Anthropology Oral Presentations

Time:	Topic / title:	Presenter:
08:00 - 08:30	Welcome lecture	M Steyn (HVIRU, WITS)
08:35 - 08:48	The Face Mask Collection: The face forms of the living and the dead	TK Ramphaleng (UFS)
08:49 - 09:00	Four Iron Age skeletons from KwaZulu-Natal revisited	M Steyn (WITS)
09:01- 09:12	Facial age mapping in black and coloured South African children	JP Meyer (WITS)
09:13 - 09:24	Nose approximation in South Africans from Cone-Beam Computed Tomography (CBCT) using a new computer-assisted method based on automatic landmarking.	AF Ridel (UP)
09:25 - 09:36	Human evolution in South Africa: from bone collections to human origins	A Beaudet (WITS)
09:36 - 09:47	Accuracy and reliability of three-dimensional (3D) macroscopic and microscopic measurements performed on Cone-Beam Computed-Tomography (CBCT) and Micro-Focus X-Ray Computed-Tomography (micro-CT) -based reconstructions of the mandible	CEG Theye (UP)
09:48 - 10:00	Quantifying the variation of sulcal patterns in extant human endocasts: a probabilistic approach	EJ de Jager (UP)

Chairperson: Prof M Steyn (WITS)

Session 2: Monday, 8 April 2019
10:30 – 12:30 in Tau room

Clinical Anatomy Oral presentations

Time:	Topic / title:	Presenter:
10:30 - 10:41	Revisiting theories about the reabsorption of cerebrospinal fluid into the venous system.	GJ Louw (UCT)
10:42 - 10:53	Anatomy of the sacral canal relevant to caudal epidural blocks in low birth-weight neonates	A van Schoor (UP)
10:54 - 11:04	Branching pattern variation of the anterior circumflex humeral artery (ACHA) in relation to the long head of biceps tendon: clinical implications for biceps tenotomy/tenodesis	N Keough (UP)
11:05 - 11:15	An anatomical study of the facial artery	K Niemann (UKZN)
11.16 - 11:25	Biomechanical properties of the tendinous and capsular layers of the rotator cuff complex: a comparative study	JY Cronje (UP)
11:26 - 11:36	The anatomical analysis of the femoral and great saphenous veins for gaining vascular access in a South African neonatal sample.	DJ van Tonder (UP)
11:37 - 11:48	A biomechanical study of the long head of biceps on supraspinatus load and humeral head position during glenohumeral abduction	S Govender (UP)
11:49 - 12:00	An osteometric evaluation of the intracranial anatomical parameters of the jugular foramen	J Naidoo (UKZN)
12:01 - 12:12	Parietal foramen: incidence and topography	J Naidoo (UKZN)
12:13 - 12:24	Variation in the sciatic nerve with respect to site of division, length and relationship to piriformis muscle.	GD Gunston (UCT)
12:25 - 12:36	Scoping review of the morphology and anthropometry of Tessier craniofacial clefts numbers 3 and 4	AO Omodan (UKZN)

Chairperson:Prof MC Bosman (UP)

Session 3: Monday, 8 April 2019
13:30 – 15:30
Tau room

Cell biology, histology and veterinary science Oral presentations

Time:	Topic / title:	Presenter:
13:30 - 13:42	Adult neurogenesis in the paleognathous birds: the common ostrich (Struthio camelus) and emu (Dromaius novaehollandiae).	P Mazengenya (WITS)
13:43 - 13:55	In vitro effects of Moringa oleifera leaf extracts on human sperm functions	CS Opuwari (UL)
13:56 - 14:08	In vitro effects of Aspalathus linearis on human sperm cells	CS Opuwari(UL)
14:09 - 14:21	Methanolic extract of Portulaca oleracea (MEPO) shows no ameliorative potential in ovariectomy-induced reproductive toxicity in normal cyclic adult Wistar rats.	IA Okafor (UNIZIK)
14:22 - 14:34	In vitro effects of Moringa oleifera leaf extracts on TM3 Leydig cell structure testosterone production	CS Opuwari (UL)
14:35 - 14:47	Is information obtained from a single testicular biopsy in boars representative of the whole organ?	NK Xhakaza (SMU)
14:48 – 15:00	Gross morphology of the African lion (Panthera leo) heart	CA Marais (UP)
15:01 - 15:13	Antifungal activity and mode of action of tick derived peptide analogues against *Candida albicans*	MJ Bester (UP)

Chairperson: Prof N Oberholzer (UP)

Game-Drive
16:00 – 19:00

----------END OF DAY----------

Session 4: Tuesday, 9 April 2019
08:00 – 10:00
Tau room

Translational Clinical Anatomy Oral Presentations

Time:	Topic / title:	Presenter:
08:00 - 08:20	How to get published: tips from an Editor	E Hohmann (DUB)
08:22 - 09:00	Pelvis fracture exposure (8:22-8:40) Biology of the Masquelet Induced Membrane (8:45-9:00)	K Tetsworth (AUS)
09:02 - 09:14	A morphometric study of tibial pes anserinus and its importance in reconstructive knee surgeries	M Virupakshamurthy (KMC)
09:16 - 09:28	Parameters of Kambin's triangle and the position of the dorsal nerve root in the lumbar spine in a South African population	A Konig (UP)
09:30 - 09:42	Variations in the subpubic angle in South Africans considering possible clinical implications	S van der Walt (SMU)
09:43 - 09:55	Accuracy with which modalities suitable to image live CI users can represent cochlear anatomy	R Baron (UP)

Chairperson: Prof E Hohmann (DUB)

Session 5A: Tuesday, 9 April 2019
10:30 – 12:30
Tau room

Anthropology Oral presentations

Time:	Topic / title:	Presenter:
10:30 - 10:42	Metric assessment of ancestry and sex variation in the zygoma	S Muller (UP)
10:43 - 10:55	Midline cranial base growth and its relationship with vault shape	J Fredericks (WITS)
10:56 - 11:08	Geometric morphometric analysis of senescent changes in South African adult male faces	EJ Schmidlin (WITS)
11:09 - 11:21	Estimating ancestry among South African ethnic groups	O Sapo (UP)
11.22 - 11:34	Discriminant function analysis to distinguish populations: a study using humeri of South African and American samples	R Ndou (WITS)
11:36 - 11:48	Population variation of dry bone histological variables used for age-at-death estimation.	D Botha (WITS)
11:49 - 12:01	Evaluating sexual dimorphism among South African groups using the dentition	GP Shakoane (UP)
12:02 - 12:15	Performance of component- versus stage-based methods of age-at-death estimation	N Jooste (UJ)
12:16 - 12:30	Validation of metric and morphological assessment of sex and ancestry estimation on the calcaneus	T Mkhuzangwe (UP)

Chairperson: Dr D Brits (WITS)

Session 5B: Tuesday, 9 April 2019
10:30 – 12:30
Rhino Room

Poster presentations

Time:	Topic / title:	Presenter:
10:30 - 10:38	Review on trace element changes in brain tumours	K Cilliers (SUN)
10:38- 10:46	The gastrointestinal tract morphology and mucin histochemistry of four insectivorous bat species captured in Saudi Arabia	SH Kotze (SUN)
10:46 - 10:54	Oral exposure to cadmium and mercury alone and in combination causes damage to the lung tissue of Sprague-Dawley rats	HM Oberholzer (UP)
10:54 - 11:02	Histomorphological and biochemical changes in the liver following adjuvant treatment with Hypoxis hemerocallidea in an animal model of diabetic antiretroviral therapy	OO Azu (UKZN)
11:02 - 11:10	The use of peptide (alanine) scanning to understand the structure/activity relationship of SQSPA in terms of multiple antidiabetic targets	JC Serem (UP)
11:18 - 11:26	A scanning electron microscopic description of changes induced by a low-carbohydrate high-fat diet.	P Soma (UP)
11:26 - 11:34	Oleanolic acid attenuates high fructose- induced impairment of adult hippocampal neurogenesis in Sprague Dawley rats	P Nkomozepi (UJ)
11:34 - 11:42	Morphology of the Manus of Temminck's ground pangolin (Smutsia temminckii).	C Steyn (UP)

Session 5B (continued)

Time:	Topic / title:	Presenter:
11:42 - 11:50	Gross morphology of the Southern Ground-Hornbill (Bucorvus Leadbeateri) gastro-intestinal tract.	AD Naude (UP)
11:50 - 11:58	Anatomical variations of the sciatic nerve and it's bifurcation level in a South African Population	BJ Bergsteedt (SUN)
11:58 - 12:06	Engaging Section 8 of the National Health Act 61 of 2003 in relation to the African traditional belief systems and their impact on body donation	BZ De Gama (UKZN)
12:06 - 12:14	From cranium to coccyx: Can interprofessional education (IPE) work for anatomy?	B Scrooby (NWU)
12:15 - 12:21	The effects of the green rooibos extract on the liver of rats fed a high-fat diet: a histomorphometric study	SH Kotze (SUN)

Chairperson: Prof SH Kotze (SUN)

Session 6A: Tuesday, 9 April 2019
13:30 – 15:00
Tau room

Cell biology and histology Oral presentations

Time:	Topic / title:	Presenter:
13:30 - 13:42	Jobelyn prevents alcohol induced reduction of cell proliferation in the SGZ of dentate gyrus	CA Oyinbo (NDU)
13:43 - 13:55	Investigations on orally digested honey as a potential therapeutic agent against Candida albicans: An antioxidant study.	AW Nekhumbe (UP)
13:56 - 14:08	The effects of the trapping of methylglyoxal by flavonoids on antioxidant and antibacterial activity.	RJ Ndalane (UP)
14:09 - 14:21	The dual functionality of antimicrobial peptides Os and Os-C in human leukocytes	H Taute (UP)
14:22 - 14:34	Radioprotective effects of fermented rooibos tea in developing Wistar rat brains	OE Ekpo (UWC)
14:35 - 14:47	Therapeutic activities of naringenin on efavirenz-induced sleep disorder on the midbrain of white albino mice	EN Akang (BUI)

Chairperson: Dr H Taute (UP)

Session 6B: Tuesday, 9 April 2019
13:30 – 15:00
Rhino room

Poster presentations

Time:	Topic / title:	Presenter:
13:30 - 13:38	Prevalence of third molar agenesis and impaction in the Kirsten Skeletal Collection	MJ Bredenkamp (SUN)
13:38- 13:46	An evaluation of the discriminatory power of recently added measurements described in Data Collection Procedures for Forensic Skeletal Material 2.0	L Liebenberg (UP)
13:46 - 13:54	ComboMetrix: A combined cranial-postcranial database for metric ancestry estimation	GC Kruger (UP)
13:54 - 14:02	The Arcuate Foramen in Chalcolithic and Present Human subjects	S Nalla (UJ)
14:02 - 14:10	Differences in gonial angle values between Chalcolithic and present subjects	S Nalla (UJ)

Session 6B (continued)

Time:	Topic / title:	Presenter:
14:10- 14:18	A morphometric and morphological study of the acetabulum within the Black South African population of KwaZulu-Natal, South Africa	S Ishwarkumar (UJ)
14:18 - 14:26	Examining the osseous moustache	D Brits (WITS)
14:26 - 14:34	A morphometric investigation into soft and hard-tissue relationships of the mouth in a southern African population	TMR Houlton (WITS)
14:34 - 14:42	Anatomical variation of the left vertebral artery; a case report	BR Omotoso (UKZN)
14:42 - 14:50	The Vermian fossa: an overlooked entity	JS Luckrajh (UKZN)
14:50 - 14:58	The incidence and topographical anatomy of the zygomatic foramina	JS Luckrajh (UKZN)

Chairperson: Dr N Keough (UP)

Session 7: Tuesday, 9 April 2019
15:30 - 17:00
Tau room
Miscellaneous Oral presentations

Time:	Topic / title:	Presenter:
15:30 - 15:38	The shifting profile of a cadaver population	D Brits (WITS)
15:39 - 15:46	The potential harmful effects of exposure to embalmed cadavers on first year medical students at the University of the Free State.	C Vorster (UFS)
15:47 - 15:54	Scavenging trauma on bone	CA Keyes (WITS)
15:55 - 16:02	Maceration of burnt remains	D Brits (Wits)
16:03 - 16:10	The Implications of Burned Bone on the Biological Profile: A Pilot Study	M Liebenberg (UP)
16:11 - 16:18	Case report: Supernumerary thoracic vertebra	AM Du Plessis (SUN)
16:19 - 16:26	A South African perspective to a global problem - The Johannesburg Identification Unit a pilot study	CA Keyes (Wits)
16:27 - 16:34	3D printed models of imaging data: an exciting tool for surgical planning and anatomical education	KA Keet (SUN)
16:35 - 16:42	Anatomical study on the suprazygomatic approach for the maxillary nerve block in pediatric patients	L Prigge (SMU)
16:43 - 16:50	Pitfalls in the interpretation of gunshot wounds - an anatomical perspective	IS Ferreira (UFS)
16:51 - 16:58	The importance of imaging modalities in research	S Govender (UP, SMU)
16:59 - 17:11	Microarchitecture and tensile strength of the rat femur (Sprague Dawley) at 12 weeks postnatally following maternal gestational alcohol treatment	D Pillay (WITS)

Chairperson: Ms L Liebenberg (UP)

----------END OF DAY----------

Session 8: Wednesday, 10 April 2019
08:00 – 10:00
Tau room

Medical education and technical Oral presentations

Time:	Topic / title:	Presenter:
08:00 - 08:12	The curious mind: A millennial student's perception of the anatomy laboratory experience	EF Hutchinson (WITS)
08:13 - 08:25	Assessment of university policies regarding ethics in teaching in a South African context	E Bruwer (UJ)
08:26 - 08:38	Knowledge and perceptions of undergraduate health sciences students towards organ donation	KA Keet (UCT)
08:39 - 08:51	An inductive approach to gauging student acceptance and understanding of evolution	C Sutherland (UP)
08:52 - 09:04	A bone of contention	HL Matthews (SPCNM)
09:05 - 09:17	Inter-university collaboration as an effective way to promote and support learning, using human material to supplement theoretical anatomy teaching	KS Mpolokeng (UCT)
09:18 - 09:30	Towards innovative teaching of Neuro-anatomy: Dural venous sinuses and cross-sections	A Konig (UP)
09:31 - 09:42	Cognitive load: what you should know for effective teaching and learning	M Loots (UP)
09:42 - 09:54	Implementation of the Anatomical Ethics and Law module at UKZN	P Pillay (UKZN)

Chairperson: Mrs G Venter (UP)

AGM: Wednesday, 10 April 2019

10:30 – 12:30
Tau room

National affiliations:

SMU: Sefako Makgatho Health Science University
SUN: Stellenbosch University
UCT: University of Cape Town
UFS: University of the Free State
UJ: University of Johannesburg
UWC: University of Western Cape
UKZN: University of KwaZulu-Natal
UP: University of Pretoria
WITS: University of the Witwatersrand
WSU: Walter Sisulu University
UL: University of Limpopo
NWU: North West University

International affiliations:
DUB: Dubai (Valient Clinic, Houston Methodist Group)
AUS: University of Queensland, Australia
UNAM: University of Namibia
SPCNM: South Pacific College of Natural Medicine, New Zealand

BUI: Bowen University, Nigeria
KMC: Kasturba Medical College, India
UNIZIK: Nnamdi Azikiwe University, Nigeria
NDU: Niger Delta University, Nigeria

EDIDIONG N. AKANG[1, 2], OLUWATOMISIN O. FANIYAN[2], OLUFUNKE O. DOSUMU[2], ALANI S. AKANMU[3]. [1]Department of Anatomy, College of Health Sciences, Bowen University, Iwo, Osun State, Nigeria. [2]Department of Anatomy, College of Medicine, University of Lagos, Idi-Araba, Lagos, Nigeria. [3]Department of Haematology and Blood Transfusion, College of Medicine, University of Lagos, Idi-Araba, Lagos, Nigeria. **Therapeutic activities of naringenin on efavirenz-induced sleep disorder on the midbrain of white albino mice.** edidiong.akang@bowenuniversity.edu.ng.

Incident of different neuropsychiatric cases especially reduction in sleep quality has been reported in most patients subjected to the combination antiretroviral therapy (cART). This study was designed to investigate therapeutic potentials of naringenin on efavirenz-induced sleep disorder in midbrain of white albino mice. Sixty adult albino mice were divided into six groups: control, efavirenz, cART, naringenin, naringenin/efavirenz and naringenin/cART groups. Efavirenz, cART, and naringenin were administered orally and daily at 15mg/kg, 24mg/kg and 50mg/kg respectively for 28 days. Result of this study showed both efavirenz and cART significantly increased immobility period during open field test, escape latency in Morris water maze (MWM) test as well as head twitch response (HTR) compared to naringenin treated groups. The decreased superoxide dismutase, catalase, reduced glutathione and the increased malondialdehyde levels explained that efavirenz and cART has the potency of increasing oxidative stress whereas naringenin treated groups potentiated the antioxidant function reducing oxidative stress. Histological evaluation demonstrated severe neuro-degeneration, vacuolization and pyknosis in efavirenz and cART treated groups compared with groups treated with naringenin. Astrocytic function was examined using glial fibrillary acidic protein immunohistochemical stain. efavirenz and cART groups showed poor immunopositivity reaction between dopaminergic neurons and immunohistochemical antibody in contrast to naringenin treated groups with improved immunopositivity reaction. This infers that both efavirenz and cART has the potential of depleting dopamine level. In conclusion, efavirenz and cART has the potential of inducing sleep disorders which could be due to their capability to stimulate inflammation as well as deplete dopamine.

AZU OO,[1,2] MANYAKA T[1], KOFFI K[1], AKANG EN[1], NAIDU ECS[1], PETER AI[1,2], MBARJIOGU FE[3].[1]Discipline of Clinical Anatomy, Nelson R. Mandela School of Medicine, University of Kwazulu-Natal, Durban, South Africa, [2]Department of Anatomy, School of Medicine, University of Namibia, Windhoek, Namibia,[3]Histology Division, School of Anatomical Sciences, Faculty of Health Sciences, University of Witwatersrand, Johannesburg, South Africa. **Histomorphological and biochemical changes in the liver following adjuvant treatment with *Hypoxis hemerocallidea* in an animal model of diabetic antiretroviral therapy**· azu@ukzn.ac.za; oazu@unam.na

Improvement in morbidity and mortality in people living with HIV/AIDS following antiretroviral therapy has come with a direct consequence of organ toxicities. This study focuses on investigating the effect of Hypoxis hemerocallidea in an animal model of antiretroviral therapy.

Sprague-Dawley rats were appropriately grouped according to protocol and treated following approval from the University of KwaZulu-Natal Animal Ethics Committee (056/15/Animals). Normal and diabetic control groups received normal saline, whilst rats in groups C, D, E and F were orally treated with Odimune, Odimune + vitamin C and Odimune + Hypoxis extract respectively. Experimental period lasted for 2 months and animals were humanely euthanized and liver tissue harvested and processed for light microscopy and special staining. Biochemical markers were also investigated.

Groups B and E demonstrated maximal weight loss, with weight gain in group C compared to control group A. Blood glucose levels was significantly elevated in all diabetic groups compared with normal control. Biochemical perturbations were marked with significantly lower ALT levels in group B compared to group A while the values for other groups were essentially within normal. AST levels were significantly reduced in diabetic groups compared to diabetic control. Markers of lipid peroxidation was elevated in diabetic groups B, C and D with significant reduction in groups E and F compared to normal controls. These results closely mirrored histological derangements as seen in the H&E and special stains. The results portray deleterious consequences on hepatic histological and biochemical parameters that Hypoxis hemerocallidea extracts do not completely mitigate.

R BARON[1], T HANEKOM[1], JJ HANEKOM[1], A UYS[1]. University of Pretoria. **Accuracy with which modalities suitable to image live CI users can represent cochlear anatomy.** Rene.baron@up.ac.za.

User-specific computational modelling of cochlear implants (CIs) has much translational potential to create a clinical basis for management and maintenance of these devices. This includes pre- and post-operative prediction of performance which could support objective mapping of a user's device as well as investigation and diagnosis of, and intervention in complications associated with cochlear implantation. At the core of user-specific computational models is a three-dimensional description of a user's cochlea, the surrounding tissue and the implanted components of the device. The primary challenge is the relatively low-resolution image data that are currently obtainable from live users. The image resolution limits the accuracy with which the cochlear landmarks, which are required to describe the 3D anatomical geometry, may be obtained. This study aimed to investigate the accuracy with which modalities suitable to image live CI users can represent the anatomy. The approach was to subject two cadaver heads to various imaging technologies (computed tomography (CT), cone-beam computed tomography (CBCT) and micro-computed tomography(**μμ**CT) and to compare the landmark measurements obtained from the various modalities. The cochleae of both heads were also implanted with CI electrode arrays after which they were again imaged using CBCT. The results of the comparison among the different imaging modalities will be presented and the implications for computational modelling of cochlear implants will be discussed.

BEAUDET A[1,2], A.C. OETTLÉ[2,3], EN L'ABBÉ[2], D STRATFORD[1], A VAN SCHOOR[2], E DE JAGER[2], GC KRÜGER[2]. [1]School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand, Johannesburg, South Africa, [2]Department of Anatomy, University of Pretoria, South Africa, [3]Department of Anatomy and Histology, Sefako Makgatho Health Sciences University. **Human evolution in South Africa: from bone collections to human origins.** **beaudet.amelie@gmail.com.**

Because of the high density and remarkable degree of preservation of fossil remains from the "Cradle of Humankind", South Africa plays a pivotal role in the search for human origins. The comparative study of extant human and fossil hominin skeletons is a prerequisite for the accurate identification and interpretation of evolutionary processes in palaeontological assemblages. The Pretoria Bone Collection (University of Pretoria) has formed the comparative platform of our research in palaeoanthropology. Through imaging techniques, we have explored the endocranial and cranial anatomy of extant humans in addition to fossil remains from South African palaeontological sites documenting the biology and the diversity of the extinct genus *Australopithecus* and early representatives of *Homo*. Here we discuss more specifically some results of our recent/ongoing studies of (i) the endocast (i.e., the replica of the inner surface of the braincase) and of (ii) the cranial vault thickness and composition. Besides constructing an atlas of extant human virtual endocasts, our analyses of fossil endocasts have revealed substantial differences in the shape of the brain between *Australopithecus* and extant humans particularly in the parietal lobes. Additionally, we identified two new cranial fragments from Sterkfontein that can be tentatively attributed to *Homo* but differ from extant humans by displaying potentially unique traits in the proportion of the diploë. Besides cranial remains, the analysis of skeletal elements involved in locomotor behaviour will be crucial in the future for learning more about the biology and evolution of our ancestors and their relatives in South Africa.

BERGSTEEDT, B.J.,[1] GREYLING, L.M.[1] [1]Division of Clinical Anatomy, Faculty of Medicine and Health Sciences, Stellenbosch University, Tygerberg, Western Cape, South Africa. **Anatomical variation of the sciatic nerve and its terminal bifurcation in a South African Population**. bryan@sun.ac.za.

The sciatic nerve is repeatedly involved in the daily medical practices of anaesthesia, neurology, orthopaedics and rehabilitative medicine. The sciatic nerve, and its branches, are also some of the most frequently injured nerves within the human body. A possible reason for injury could be related to an inadequate knowledge of the anatomical variation of this nerve. The cadaver is the best means to study anatomy at this level, even with advances in medical technology. Therefore, the aim of the present study is to describe and document the anatomical variation of the sciatic nerve bifurcation level within the South African population.

For the purpose of this study, lower limbs (N=340) were selected for dissection, and comprised of three South African subpopulation groups, namely, White/Caucasian (n=232), Mixed race (n=78) and South African Black (n=30). The sciatic nerve bifurcation into the tibial and common fibular nerves was described, categorised into six separate classifications, and statistically analysed.

It is possible to distinguish several types of anatomical variation of the sciatic nerve course within the deep gluteal region and lower limbs. Rare variation (7.1%) of the sciatic nerve did occur within the gluteal region, and influence piriformis muscle anatomy. However, the bifurcation of the sciatic nerve occurred mainly in the popliteal fossa proper (79.6%).

There is a need for an increase in sciatic nerve literature for the South African population. Additionally, future studies should include larger numbers of Mixed Race and South African Black specimens, as these subpopulation groups make up a significant majority in South Africa.

MBUAYAMA KR[1], BESTER MJ[1]. [1]University of Pretoria. **Antifungal activity and mode of action of tick derived peptide analogues against *Candida albicans*.** Megan.bester@up.ac.za.

Candida albicans is the principal opportunistic fungal pathogen in nosocomial settings reported to be resistant to all four available antifungal classes. Antimicrobial peptides from natural sources are promising novel therapeutics against *C. albicans*. The aim of this study was to investigate the antifungal activity and the mode of action of peptide analogues derived from a tick defensin isoform, OsDef2. Os, Os-C and amidated Os(11-22)NH2 , were found to have a minimum fungicidal concentration (MFC) of 6.0, 28 and 22 µM, respectively. Killing kinetics studies performed at each respective MFC revealed both Os and Os-C killed *C. albicans* within 30 min and Os(11-22)NH2 within 60 min. Mode of action studies showed that the peptides interact with cell wall polysaccharides. The SYTOX Green uptake assay indicated that Os and Os(11- 22)NH2 induced greater membrane permeabilization than Os-C and fungal liposome leakage studies confirmed these findings. Os, Os-C and Os(11-22)NH2 induced the production of reactive oxygen species (ROS), while co-incubation with ascorbic acid revealed that only OsC and to a lesser extent Os(11-22)NH2 generated ROS caused cell death. Fluorescence studies with labelled peptide, showed that all peptides translocated into the cytosol. ATP inhibition identified that translocation to the cytosol was energy-dependent in contrast to the cell penetrating effects of penetratin. Overall, Os, Os-C and Os(11-22)NH2 are efficient antifungal peptides with Os and Os(11- 22)NH2 having similar modes of action different from that of Os-C.

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Histological age estimation standards using traditional two-dimensional techniques are well established, but often take into consideration only one specific population. This study aimed at determining if significant differences exist between three diverse populations and if there is a need to create population-specific standards in terms of a number of variables assessed. The total sample included 223 bone sections from black South Africans (n = 99), white South Africans (n = 94) and Danish individuals (n = 30). Sections were analysed using a stereological protocol (optical fractionator in conjunction with the nucleator probe) instead of the traditional two-dimensional methods. MBF Bioscience's StereoInvestigator software were used. The average number of osteons per area (OPD), osteon size and Haversian canal size (length, surface area and volume) were assessed. ANCOVA was used for the assessment of differences between samples. It was found that osteon and Haversian canal size were similar for all groups investigated, but that OPD differed significantly between the groups with SA black individuals showing the least and Danish individuals the most osteons per area. The highest variation was seen within the younger age cohorts, with similarity of variables increasing as age advances. This study provides additional insight into the use of specific variables for age-at-death estimation, and its application for population-specific and generalized standards.

BREDENKAMP, M.J., [1] A. ALBLAS,[1] L. GREYLING,[1] [1]Division of Clinical Anatomy, Department of Biomedical Sciences, Faculty of Medicine and Health Science, Stellenbosch University. **Prevalence of third molar agenesis and impaction in the Kirsten Skeletal Collection**. 19301987@sun.ac.za.

Third molars frequently present with complications such as the failure to erupt properly (impaction) or not erupting at all (agenesis). Different factors contribute to variations in third molar eruption, such as sex or ancestry. The current study aimed to determine the prevalence of third molar agenesis and impaction within the South African Coloured (SAC) and South African Black (SAB) population groups represented in the Kirsten Skeletal Collection. Specimens (n = 200) with both dental arches present and over 21 years-of-age were included. The sample consisted of 64.5% SACs (males = 58%, females = 42%) and 35.5% SABs (males = 79%, females = 21%). The anomalies were investigated by both a visual and radiographic examination, followed by a statistical analysis of the results. From the sample, 4.5% presented with third molar agenesis and 29% with impaction. Although no results proved significant, a higher prevalence of both anomalies were present in the SACs than SABs, which can be attributed to the SACs extended tooth eruption periods and smaller palatal dimensions. Additionally, a higher prevalence of both anomalies were present in males than females, maxilla than mandible, and left than right, which contradicts findings reviewed in literature. The lower representation of females and SABs in the sample, however, could have contributed to the non-significant nature of the results. Although the SAB results corresponded to previous findings, the SACs presented with a unique prevalence and distribution of both anomalies. This can be attributed to their characteristic genetic profile, and physical and biological traits.

A. TRIACA[1], T. MAHON[1], J. MYBURGH[2], BRITS, D[3]. [1]Department of Forensic Medicine and Pathology, School of Clinical Medicine, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. [2]Department of Anatomy, School of Medicine, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa.[3] School of Anatomical Sciences, Faculty of Health Science, University of the Witwatersrand, Gauteng, South Africa. **Maceration of burnt remains.** Trisha-jean.Mahon@wits.ac.za.

In South Africa, during the cold and dry winter months, a high number of human remains which are burnt beyond recognition are admitted into the various Forensic Pathology Services. Often due to the extent of burning these remains are sent to a forensic anthropologist to aid in their identification. In order for a profile to be developed all remaining soft tissue needs to be removed. Burnt skeletal remains are often damaged during this process due to their delicate and fragile nature. Currently there are no established laboratory protocols on the optimal maceration technique to employ when removing the remaining soft tissue without causing further fragmentation of the remains. This research thus aimed to determine the best method of maceration for burnt remains. A total of 24 pigs trotters were burnt and then macerated at various temperatures (80°C, 30°C and 15°C) using three different maceration techniques namely: bacterial (plain water), enzymatic (OMO Auto), and chemical (bleach/dishwashing liquid) maceration. After maceration the remains were scored on a macroscopic scoring system to assess the damage caused by the maceration process. The maceration technique that caused the least amount of damage to the remains, removed the most amount of soft tissue and had the shortest duration was bacterial maceration at a temperature of 80°C. The results of this study indicated that the addition of chemical or enzymatic agents and the length of maceration had a deleterious effect on the burnt skeletal remains.

BRITS, D., E.F. HUTCHINSON. Human Variation and Identification Research Unit (HVIRU) School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa. **Examining the osseous moustache.** desire.brits@wits.ac.za

During the cataloguing of the Teaching Human Bone Collection, School of Anatomical Sciences, University of the Witwatersrand, a cranium with a peculiar osseous moustache was discovered. The aim of this study was to investigate the nature and composition of this osseous moustache.

As no associated demographic information was available, standard forensic anthropological methods were used to establish a biological profile. A macroscopic assessment of the osseous moustache was made. Micro-CT scans were also collected to investigate the internal configuration thereof along with its relationship to the underlying bone. The cranium was scanned at the Micro-focus X-ray Radiography and Tomography facility at the South African Nuclear Energy Corporation, using a Nikon XTH 225L micro-CT X-ray unit. Nikon CTPro software was utilised to reconstruct the scans after which the scans were imported into VGStudio Max.

The edentulous cranium represented an old White male and shows signs of severe bone resorption in the midfacial region. The osseous moustache was located on the anterior surface of the maxillae, just inferior to the nasal aperture. It had a granulated appearance with clearly defined borders.

The osseous moustached conform to an incomplete bovine bone graft which is regularly used in the preparation of maxillary dental implants. The bovine crystals, give a granulated appearance and encourage blood vessels to infiltrate the bone medium so as to knit the artificial bone to the existing bone. Identifying and understanding the presentation of such surgical procedures are important to distinguish it from other osseous pathologies or anomalies.

BRITS, D., B.K. BILLINGS, B. KRAMER, E.F. HUTCHINSON. School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa. **The shifting profile of a cadaver population.** desire.brits@wits.ac.za

Historically the cadaver population in the School of Anatomical Sciences, University of the Witwatersrand, consisted of unclaimed cadavers. However, with recent efforts to conform to ethical guidelines established by professional organizations, a transition to a bequeathed population has occurred. Concurrent with this are changes in cadaver demographics which have raised concerns regarding teaching and research. The aim of this study was therefore to explore the effects of bequeathal on cadaver demographics and the nature of the morphology of the School's cadaver population. The provenance, ancestry, sex and age of 89 dissected cadavers were investigated. Cadavers were examined to ascertain the general condition of the tissues and organs, and overt pathologies were highlighted.

Only White South Africans were represented in the 2017 cadaver population with slightly more females (54%) than males. Donors accounted for 83.1% of the cadaver population and were aged between 71 and 90 years. The majority (60%) of donors presented with adhering fascia, while the fat distribution varied almost equally between lean, normal and excessive. A high incidence of muscle tearing and atrophy was noted. No obvious neurovascular variations were observed. However, variations in visceral anatomy, surgical interventions and pathologies were detected.

Bequeathed cadavers in the School comprised older White donors with numerous anatomical variations, pathologies and surgical interventions. While presenting challenges to teaching and to the research collections of the School, the surgical interventions and pathologies offer anatomists an opportunity to engage with teaching more clinically-oriented anatomy as well as introducing students to gerontology.

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Higher Education contributes to forging critical, responsible and sensitive citizens. In order to achieve these outcomes, students need to be motivated to succeed in self-directed learning and lifelong learning in an environment where traditional teaching is enhanced with highly developed technology. This blended learning approach signifies the progress of the fourth industrial evolution in the post-modern era and requires a special code of ethics in teaching to ensure trust, motivation and a positive approach to learning among students. The aim of this study was therefore to assess whether universities provide documentation to staff and students on the ethics of teaching. Therefore, social ethos and citizenship was assessed by analyzing several South African Universities' policy documents, specifically for elements of ethics of CARE unique to South African context. Normative framework analysis using the Five-E approach was performed and documented. Results indicated that only one university provides a teaching and learning document in which the roles and values of both staff and students are clearly stipulated. Most policies where either general policies that focused on staff and student behavior with regards to disciplinary action or research ethics. Topics that were often omitted from policies were attentiveness, trust, social justice and citizenship. Of particular concern is that all documents assessed pre-dates 2010 and would explain why ethics in teaching has been neglected. In conclusion, university policies are not in keeping with the current human capacity approach where well-being, opportunities and success are the desirable outcomes.

CILLIERS, K.,[1] C.J.F. MULLER,[2,3] B.J. PAGE.[1] [1]Division of Clinical Anatomy, Faculty of Medicine and Health Sciences, Stellenbosch University, Tygerberg, Western Cape, South Africa, [2]Division of Medical Physiology, Faculty of Medicine and Health Sciences, Stellenbosch University, Tygerberg, Western Cape, South Africa, [3]Biomedical Research and Innovation Platform, South African Medical Research Council, Tygerberg, Western Cape, South Africa, **Review on trace element changes in brain tumours.** karencilliers1@gmail.com.

Trace elements have been implicated in the progression of cancer, since their levels differ between cancerous and non-cancerous tissue, different malignancy grades, and different cancer types. Nevertheless, limited research have been published on trace element concentration changes in brain tumours. Therefore, this study aimed to review the available literature on trace element concentration changes related to brain tumours and to identify gaps in the literature.

Google Scholar and PubMed was searched for terms relating to trace element concentration and brain tumours up to January 2018. The articles could be published in any year and all brain tumour types were included. From this search, 11 published articles could be included.

Compared to control brain samples, tumours had significantly higher concentrations of arsenic, cerium, gadolinium, lanthanum, lutetium and thorium. Tumours also had increased amounts of magnesium, decreased copper and contradicting results for zinc when compared to healthy adjacent tissue. With increasing malignancy grade, calcium, cadmium, iron, phosphorus and sulphur concentrations were decreased, and mercury, manganese, lead, and zinc concentrations were increased.

In conclusion, trace element concentrations differ amongst various tumour types, as well as malignancy grades. Consequently, it is challenging to compare data from these studies, and available data is still inconclusive. Ideally, future studies should include sufficient sample sizes, compare different tumour types, and compare tumours with adjacent healthy tissue as well as with samples from unaffected matched brains.

CRONJÉ, JY[1], MOGALE, N[1], GOVENDER, S[1], MCDULING, C[2], OBERHOLSTER, AJ[3], VERBEEK, R[4], DE BEER, MA[5], NKWENIKA, T[6], KEOUGH, N[1] [1]Department of Anatomy, Faculty of Health Sciences, University of Pretoria, Pretoria, South Africa, [2]Materials Science and Manufacturing, Council for Scientific and Industrial Research, Pretoria, South Africa, [3]Department of Mechanical and Aeronautical Engineering, Faculty of Engineering, University of Pretoria, Pretoria, South Africa, [4]Technical Director, Elite Surgical Supplies, Gauteng, South Africa, [5]Orthopaedic Surgeon, Life Groenkloof Hospital, Gauteng, South Africa, [6]Biostatistics Unit, South African Medical Research Council, Pretoria, South Africa. **Biomechanical properties of the tendinous and capsular layers of the rotator cuff complex: A comparative study**. jessicaycronje@gmail.com.

Rotator cuff (RC) muscle insertion was previously thought to consist of individual tendons, in a single layer, inserting onto predefined areas on the greater and lesser tubercles. However, more recent publications describe the RC muscle tendons as forming a singular insertion across the tubercles, consisting of a tendinous and capsular portion. Surgeons are now considering these two layers in their surgical approach and therefore this study aimed to test and compare maximum load to failure for both tendinous and capsular layer taken from supraspinatus (SSP), infraspinatus (ISP) and subscapularis (SSC). Fourteen (n=14) fresh/frozen arms were used in this study (Ethical clearance 384/2018). Each RC muscle was reverse dissected and trimmed to a 1cm x 2cm strip, which was separated into the 2 layers, still attached to the humerus. An MTS machine with a 1kN load cell was used to place the samples under tensile testing till failure (Newtons/N). The tendinous layers for SSP, ISP and SSC all showed higher average loads to failure (252.7N, 356.3N and 385.9N, respectively) when compared to the capsular layer (211.2N, 168.5N and 281.7N, respectively). These differences need to be taken into account during surgical repair owing to the fact that, should these layers be repaired as one singular structure, it may place the weaker capsular layer under more pressure, possibly leading to either retear complications or reduced postoperative functionality. Thus, based on the results, it is recommended that surgeons consider and repair each layer independently for better postoperative biomechanical integrity.

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Engaging Section 8 of the National Health Act 61 of 2003 in relation to the African traditional belief systems and their impact on body donation

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One of the areas included in Chapter 8 of the National Health Act (NHA) 2003 of South Africa is the allocation and disposal of human bodies and tissues. In this way, it has played a significant role in assisting anatomy departments of Higher Education Institutes (HEIs) to obtain human bodies for the purposes of anatomical education through cadaver dissection. Further to this, it also regulates the donation of human bodies to the HEIs. This Act seems to lack guidelines pertaining to respecting, protecting and promoting the belief system of the dead, irrespective of whether family is known or not. This paper aimed to critically review section 8 of the NHA in how it incorporates the cultural and religious beliefs of the Black African population on the treatment of the dead. The key issues that are highlighted as findings are i) the Constitution as the guiding law of South Africa, ii) the Bill of rights in relation to religio-cultural beliefs and iii) the rituals involved in the treatment of the dead. In conclusion, the lack of guidelines on the treatment of the dead and the respect of the belief systems thereof are highlighted and pleaded for in special relation to cultural rituals undertaken on the dead body by the Black Africa population group of South Africa. It is hoped that highlighting these issues will contribute to providing for the cultural beliefs that are currently impacting negatively on willingness to donate the body among a community in the KwaZulu-Natal province.

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Our knowledge of human brain evolution primarily relies on the interpretation of palaeoneurological evidence. Endocasts (i.e., replica of the internal table of the bony brain case) constitute a proxy for reconstructing a timeline and mode of cerebral changes in the fossil record. The identification of cerebral imprints is critical for assessing the topographic extension and structural organisation of cortical areas. Describing these crucial landmarks in fossil endocasts is challenging due to the fragmentary nature of fossil specimens. Recent introduction of high-resolution imaging techniques in (palaeo)neurology offers new opportunities for tracking detailed endocranial neural characteristics. In this context, this study aims to provide an atlas that documents variation in the extant human endocranial sulcal patterns for subsequent use as a comparative platform for the study of the fossil record. Dry human crania from the Pretoria Bone Collection were scanned using micro-CT at Necsa, Pelindaba (South Africa). Endocasts were virtually extracted using Endex software. Sulci were automatically detected and manually labelled using a programme created with MATLAB. Finally, a probability map was created by projecting all the labelled sulci on an average endocast and calculating the average displacement of each identified sulcus. In providing an innovative, non-invasive, observer-independent method to investigate human endocranial structural organisation, our analytical protocol introduces a promising perspective for discussing long-standing questions in palaeoneurology.

DU PLESSIS, A.M.[1], B.J. PAGE[1] [1]Division of Clinical Anatomy, Department of Biomedical Sciences, Faculty of Medicine and Health Sciences, Stellenbosch University, Western Cape, South Africa. **Case Report: supernumerary thoracic vertebra**. mduplessis@unam.na.

When normal development is disrupted, it results in abnormal skeletal formation and may affect the typical numeracy of bones. Numeric variation in the vertebral column may result from meristic or homeotic transformations. The presence of a supernumerary thoracic vertebra at the thoracolumbar junction is rare. The prevalence of this anomaly remains unknown. Other congenital defects that may arise from disrupted development are neural tube defects (NTD) that result from defective closure of the posterior neural tube. The aim of this article is to report a case of meristic transformation associated with congenital defects and pathology in the vertebral column. The case was observed in the skeletal remains of a deceased individual from the Kirsten Collection at Stellenbosch University. Post-mortem evaluation of the skeletal remains revealed a thirteenth thoracic vertebra associated with neural tube defects in the vertebral column of an individual. In addition, severe degenerative joint disease in the vertebral column resulted in the fusion of vertebrae in both the cervical and the lumbar regions. The vertebral column protects the spinal cord, thus any structural malformations and bio-mechanical disruptions can lead to severe neural and musculoskeletal damage. Ultimately, this can decrease the quality of life in patients. All clinical procedures that consider the thoracolumbar junction will be complicated. In addition, the biomechanics of the vertebral column may be affected resulting in chronic pain and decreased quality of life in patients.

EKPO O.E.[1], ALRTEMI M.M.A[1], OMORUYI S.I.[1], ENOGIERU A.B[1]. [1]University of the Western Cape. **Radioprotective effects of fermented rooibos tea in developing Wistar rat brains.** oekpo@uwc.ac.za.

Early postnatal radiation exposure from environmental, diagnostic or therapeutic sources is potentially deleterious to the developing nervous system resulting in a number of structural and functional impairments during adult life. The radioprotective effects of some medicinal plants have been previously reported, but no such studies on the popular rooibos plant exist in literature despite its many acclaimed health benefits. This study investigated the potential radioprotective effects of fermented rooibos herbal tea (FRHT) in offspring Wistar rats exposed to a once-off 6 Grays dose of gamma irradiation (X) on postnatal day 3 (PND3) following ad libitum maternal consumption of FRHT.

Twenty four adult female Wistar rats (dams) were assigned to four groups of 6 dams each: Group 1 - Control; Group 2 – X only; Group 3 - FRHT only; Group 4 - FRHT+X. On PND 30, offspring rats were assessed for neurobehavioural parameters in an open field apparatus before sacrifice; brain samples later removed and processed for histological, immunohistochemical and oxidative stress analyses. FRHT appeared to offer overall significant protection against radiation-induced changes in offspring rats particularly by attenuating the observed alterations in neurobehavioural and oxidative stress parameters; apoptotic cell death, astrogliosis as well as hippocampal and cerebellar morphometry.

Taken together, our findings suggest that FRHT has multimodal radioprotective effects possibly due to its high polyphenol content. Thus, continuous consumption of this tea could be beneficial to persons living in radiation-prone or industrial facilities as well as patients requiring extensive irradiation-based diagnostic and therapeutic procedures.

FERREIRA I.S[1]. [1]University of the Free State. **Pitfalls in the interpretation of gunshot wounds - an anatomical perspective.** ferreirais@icloud.com.

A 32-year old woman was admitted to hospital, after being shot. She was paralyzed from the T10 level downwards, and had a right sided hemopneumothorax. Her abdomen became progressively more distended and she died two weeks later. A medico-legal investigation, consisting of an autopsy and evaluation of the medical records, was done. The request for an autopsy by the physician stated the following; “Gunshot right hypochondrium and exit right side of the back.” At autopsy it became clear that the woman was shot twice. A gunshot wound of the right side of the back, the projectile lodged in the T9-T10 intervertebral space. The second tract consisted of the following injuries: superficial entrance and exit wounds of the medial aspect of the left thigh, laceration of the right lateral vaginal fornix, contusion of the ilium (without perforation), laceration of the right lobe of the liver, laceration of the right diaphragm, laceration of the inferior margin of the lower lobe of the right lung, fracture of the 6th rib, superficial wound of the 5th intercostal space, in the midclavicular line. A vital observation got “lost” as the patient was transferred from one discipline to the next. In relation to superficial anatomy, there were different interpretations of the injuries by physicians involved. Interpretations of gunshot wounds have many pitfalls. The projectile does not follow anatomical planes, neither does the body, in most cases, remain in the same position between successive gunshots. Obscure anatomical sites must always be considered.

FREDERICKS, J.[1] HEMINGWAY, J.[1] [1]Human Variation and Identification Research Unit, School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Midline Cranial Base Growth and Its Relationship with Vault Shape** Jesse.Fredericks1@students.wits.ac.za.

The cranium is used for multiple applications in palaeoanthropological, bio-archeological, and forensic contexts. However, seemingly isolated cranial features often form part of an integrated complex, and while the presence of genetic, developmental and functional associations have been explained by the long-established spatial packing, part-counterpart and functional matrix hypotheses as well as developmental theories, it is often overlooked. Bio-anthropological studies may prove problematic if integrated features are not appropriately accounted for, skewing results involving non-metric bio-distances and phylogenetics. Thus, this study aimed to assess the potential associations between growth of the midline basicranium and cranial vault shape using geometric morphometrics. The sample included 139 crania of black southern African individuals from birth to 30 years-of-age. The midline basicranial synchondroses were scored based on their fusion, and 21 cranial landmarks were digitised. The significance of the associations were tested, and illustrated via regression and partial least squares. An overall increase in globularity was, in part, due to its developmental association with the increased length of the anterior cranial fossa and clivus, and a greater angulation of the anterior cranial fossa, relative to the clivus. The onset of fusion of the spheno-occipital synchondrosis appeared to be significant in determining the shape of the vault. The high covariation between cranial vault shape and basicranial shape indicates many of these traits should not be considered separate characters. Overlooking integration likely biases results involving bio-distances and phylogenetics, and highly integrated cranial traits should thus be considered as a single character complex to account for its effects.

GOVENDER, S.,[1,2] A.N. VAN SCHOOR[1], D. MOHR[1,3] [1]Department of Anatomy, Section of Clinical Anatomy, School of Medicine, Faculty of Health Sciences, University of Pretoria. [2]Department of Anatomy, School of Medicine, Sefako Makgatho Health Sciences University. [3]Specialist Anaesthesiologist, Private Practice, Pretoria, South Africa. **The importance of imaging modalities in research.** g.sabashnee@yahoo.com.

With the advancement of technology in recent years, the integration of imaging modalities in academia has become increasingly popular. Modalities such as ultrasound guidance, can be used as a comparative learning tool for both research and teaching. The anatomy from volunteers can be contrasted to embalmed specimens or used in conjunction for both purposes. This tool represents an alternative route to obtaining quantitative structural and functional information.

The aim of this report is to share my experience of using ultrasound-guidance in research. It will include techniques related to the anatomy of brachial plexus blocks and the erector spinae fascial plane block. In both studies, ultrasound was used to investigate and compare normal anatomical structures seen in embalmed cadavers versus the expected anatomy as seen on the ultrasound screen. In both cases, it was used to illustrate the placement of the probe for the ideal visualisation of the anatomy necessary to perform the various nerve blocks. Finally, both studies identified the difficulties faced when dealing with ultrasound guidance in anatomical research.

Ultrasound guidance can be used to enhance the conceptualization of the normal gross anatomy while including the relevant clinical aspects. Integrating ultrasound-guidance into research helps the researcher to develop skills such as communication, critical thinking and adaptability. Furthermore, it can be used as a teaching aid to help alleviate the difficulties that students experience when learning anatomy and subsequently help students contextualise anatomy in a clinical setting.

In conclusion, ultrasound guidance is a versatile imaging technology that has vast current and potential application in research.

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The long head of biceps brachii tendon (LHBBT) stabilizes the glenohumeral joint (GHJ) during abduction. However, its biomechanical role is not yet understood and certain procedures (biceps tenodesis/tenotomies), fail to address GHJ instability. Therefore, this study biomechanically investigated the role of the LHBBT during initial shoulder abduction regarding supraspinatus (SSP) load and humeral head position. Twelve (n=12) fresh/frozen upper limbs were used (Ethical clearance 383/2018). The scapula was secured in a fixture, a static loading force was applied manually by pulling SSP in line with the fibre direction until the arm was abducted. The load during abduction was recorded for two conditions: (1) LHBBT intact, (2) LHBBT cut. The mean angle and load with LHBBT present and absent were 7.510, 70.96N and 9.900, 79.01N, respectively. No difference between the means for average load between the two conditions were noted (p=0.5437). However, when the results were plotted in a generalized linear model (load vs angle), the graph for LHBBT intact displayed a smooth, positive slope (r= 6.7182); LHBBT cut, indicated an erratic, negative slope (r= -8.8389). Based on the graphs, LHBBT clearly provides stability during abduction as the angle increases. With LHBBT cut, instability is noted and SSP required more force to initiate abduction, but as the angle increased, load reduced, possibly due to exaggerated medial rotation noted with LHBBT cut. Surgeons should be aware of the possible changes in biomechanical integrity of the GHJ with the absence of LHBBT.

T ASMALL[1], G GUNSTON[1], K KEET[2]. [1] Division of Clinical Anatomy and Biological Anthropology, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, [2]Division of Clinical Anatomy, Department of Biomedical Sciences, Faculty of Medicine and Health Sciences, Stellenbosch University. **Variation in the sciatic nerve with respect to site of division, length and relationship to piriformis muscle.** **geneystevenson@icloud.com.**

Variation in the location and course of the sciatic nerve may increase the risk of iatrogenic injury during total hip arthroscopy, decrease the success of nerve blocks or be associated with piriformis syndrome. The aim was to document the types of relationships between the sciatic nerve and piriformis, the bifurcation level and the length of the nerve in a South African sample.

Forty-two cadavers (84 limbs) were dissected. The relationships between the sciatic nerve and piriformis were classified according to the patterns described by Beaton and Anson (1937). The region of sciatic nerve bifurcation was documented, and the length of the nerve was measured in individuals with bifurcation in the thigh. Significant differences in variations between sexes and sides were also determined.

The usual relationship between the sciatic nerve and piriformis was present in 64 limbs (76.2%). Bifurcation of the nerve was present in a region other than the thigh in more than one-half of the sample. There were no significant differences in the variant patterns or bifurcation regions between sides, however variants were more prevalent in females than in males. The average length of the sciatic nerve was 133.30 ±19.33mm.

Variant anatomy of the sciatic nerve was present in up to half of the sample and was more common in females. Females may have an increased risk of iatrogenic injury in total hip arthroscopy, block failure or piriformis syndrome than males.

HOULTON T.M.R.[1], JOOSTE N[1,2], HEMINGWAY J[1], UYS A[3], STEYN M[1]. [1]Human Variation and Identification Research Unit, School of Anatomical Sciences, University of the Witwatersrand, [2]Department of Human Anatomy and Physiology, University of Johannesburg, [3]Oral and Dental Hospital, School of Dentistry, University of Pretoria. **A morphometric investigation into soft and hard-tissue relationships of the mouth in a southern African population.** tobias.houlton@wits.ac.za.

The South African Police Service frequently relies on forensic facial approximation to assist in identifying unknown individuals. Standards for mouth reconstruction are however limited. This study investigated linear craniofacial dimensions and incorporated geometric morphometrics (GM) to assess mouth shape, size and position. Cone-beam computerised tomography (CBCT) scans comprising 154 black (89 male, 65 female; mean age 34.9 years), and 39 white (19 males, 20 females; mean age 36.1 years) South African adults were accessed. Scans were viewed and comparative hard/soft-tissue dimensions recorded using OsiriX. This evaluated relationships of maxillary, mandibular and total central incisor height with lip height dimensions; Cupid's bow width with distances between the maxillary central-lateral incisor junctions and inter-superior prominences of maxillary central incisors; inter-chelion width with canine-first premolar junction widths; maxillary and mandibular alveolar and dental projection with tissue depth and lip height. Dimensions underwent Wilcoxon Signed Rank, Mann Whitney U, Kruskal Wallis, Spearman's correlation tests, and regression analysis. Factoring in ancestry, sex and approximate age (20-39 and 40+ years) improved regression performance. Utilising anterior CBCT images of the skull/face in Frankfurt position, a series of dental and soft-tissue oral landmarks were placed in ImageJ for GM analysis using MorphoJ and Morphologika. Black southern Africans typically presented thicker lips, as did females to their male counterparts. The stomion was roughly two-thirds down the maxillary central incisors in white individuals, but positioned close to the occlusal line in black individuals. Detailed GM analysis further elucidates possible relationships between features.

HUTCHINSON, E.F. [1], HARTMANN, C. [2], KRAMER, B. [1]. [1]School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand. [2]Unit for Undergraduate Medical Education, Faculty of Health Sciences, University of the Witwatersrand. **The curious mind: A millennial student's perception of the anatomy laboratory experience.** Erin.hutchinson@wits.ac.za.

Human dissection remains the "gold standard" for teaching human anatomy at Health Sciences Institutions globally. The act of cutting up, disarticulating and depersonalizing the individual is said to have an emotional impact, particularly on students undertaking dissection for the first time. In the South African context, little is known about the complexities of these emotions or the potential mechanisms employed in coping with the experience. This study aimed to explore the nature of the emotional impact of human dissection and prosection on undergraduate Health Sciences students at the University of the Witwatersrand. Students from the 2016/17 cohorts completed two online surveys. The first survey was administered within two weeks of the first anatomy laboratory experience. The second survey was administered seven months later, towards the end of the academic year. The survey included questions investigating the emotional state of students in relation to their anatomy laboratory experience. Positive (excitement, interest, curiosity) and negative (fear, anxiety, disgust, apprehension) emotional experiences were rated by means of a Likert scale of 1 to 5 (1 = not experienced and 5 = strongly experienced). Quantitative data was assessed using descriptive statistics, contingency tables and tests of significance. Strong feelings of curiosity, excitement and interest were expressed by the students far more frequently than negative or neutral emotions and students predominantly expressed a positive emotional response to the experience. Discussions with peers and family members were the most prevalent coping mechanisms. The anatomy laboratory acts as a catalyst for a positive and exciting learning experience.

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The acetabulum is the large cup-shaped cavity on the lateral aspect of the hip bone. The morphometry and morphology of the acetabulum is imperative in the diagnosis and treatment of acetabular fractures, hip joint injuries and pathologies. Population-specific differences exist regarding the acetabulum, therefore, this study aimed to document the morphometry and morphology of the acetabulum within a Black South African population of Kwa-Zulu Natal.

This study examined 100 dry hip bones of Black African population (R= 44; L= 56) from the University of KwaZulu-Natal (Westville and NRMSOM campuses). A sliding digital caliper was utilized to measure all morphometric parameter, *viz*. acetabular diameter, depth and acetabular notch width. The Govsa et al. (2005) classification scheme was used to document the morphology of the anterior acetabular rim. Statistical analysis was conducted using SPSS software (Version 24) and a p-value of less than 0.05 was considered statistically significant.

The overall mean and standard deviation of all morphometric measurements were: (a) acetabular diameter of 54.84 ± 4.18 mm, (b) acetabular depth of 31.30 ± 3.18 mm and (c) acetabular notch width of 21.72 ± 2.98 mm. The observed shapes of the anterior acetabular rim were angular (41%), curved (22%), irregular (23%) and straight (14%), respectively. This study documented population-specific differences with regard to the morphometry and morphology of the acetabulum when compared to other population groups in literature.

This anatomical knowledge of the acetabulum may be useful to surgeons, prosthetists and forensic anthropologists.

JOOSTE, N [1,2] , STEYN M [1]. [1]Human Variation and Identification Research Unit (HVIRU), School of Anatomical Sciences, University of the Witwatersrand, South Africa, [2] Department of Human Anatomy and Physiology, University of Johannesburg, South Africa. **Performance of component- versus stage-based methods of age-at-death estimation.** **njooste@uj.ac.za.**

Age-at-death estimation methods assume that age-indicative skeletal traits, or their components, change in the same order for all individuals. The changes are subjective, making it necessary to select reliable traits to minimise error. Anthropologists find stage-based methods (entire trait) less complicated, more repeatable and less influenced by surrounding components. Component-based methods (subdivided trait) account for more trait variability. The study aimed to compare the performance and reliability between a component- and stage-based method for age-at-death estimation using the pubic symphysis. Unilateral pubic symphyses from ±300 individuals (equally distributed for sex and age) were used to construct both a component- and stage- based method, using existing descriptions, to estimate age-at-death. A hold-out sample of 30 individuals was used to validate the results and analyse observer agreement. The two methods were compared using Spearman's correlation, linear regression and Cohen's kappa. Individual components of the pubic symphysis displayed a weaker relationship with age compared to categories considering the entire area. Additionally, many individual components were interrelated. A similar proportion of variation was achieved by the regression model that considered individual components in combination (r^2 = 0,347) and the entire area (r^2 = 0,339). However, some individual components did not contribute statistically significantly to the overall regression model. Although intra-observer agreement was comparable for both methods, interobserver agreement favoured the stage-based method. Overall, both methods achieved similar results, but the component-based method displayed intercorrelation and poor observer agreement.

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The use of 3D printers in hospitals and universities is becoming a reality as printers and materials become affordable. 3D printed models allow surgeons to perceive patient anatomy in more depth, as opposed to two-dimensional images. Surgical simulation on models increases surgeon confidence and potentially decreases complication rates and operating time.

3D printing has applications in education. Considering a global trend to digitise anatomy specimens, models can be made of specimens housed in museums from across the globe, essentially bringing these specimens to any university.

Aims: to highlight the practicality of 3D printing in health sciences by presenting a patient case and exhibiting a museum specimen model.

A patient with achondroplasia required total hip arthroplasty. Anticipating problems with fitting conventional arthroplasty components, the femur and pelvis were 3D printed from pre-operative CT scan, on which available implants were trialed to determine a size match.

A famous museum specimen in the USA was printed after retrieval of the scan from the National Institute of Health (NIH) 3D Print Exchange.

Models of the patient's scan allowed surgeons a deeper understanding, as rehearsal of the procedure was possible prior to the patient entering the operating room. South African students studied the model of the famous specimen, of whom many may not have otherwise had this opportunity.

Using 3D printed models, normal and pathological anatomy, as well as museum specimens, can be used as surgical planning and teaching tools for both undergraduate students, registrars and consultants.

K KEET[1], D THOMSON[2]. [1]Division of Clinical Anatomy and Biological Anthropology, Department of Human Biology, [2]Faculty of Health Sciences, University of Cape Town Department of Surgery and Critical Care, Groote Schuur Hospital. **Knowledge and perceptions of undergraduate health sciences students towards organ donation.** **kkeet@sun.ac.za.**

The organ donation model in South Africa is based on consent by the next of kin, even when the individual is a registered organ donor with the Organ Donor Foundation. Consent rates are lower in state than in private hospitals and are currently around 33% at Groote Schuur Hospital (state hospital). Consent rate has been linked with education, religious beliefs, cultural traditions and language. In addition, the donor's wishes may not be known to the family, which may also lower the donation rate.
The aim was to determine the perceptions and knowledge around organ donation in the 2018 second year Health and Rehabilitation Sciences class at the University of Cape Town. A questionnaire was provided before and after a lecture about transplantation, to determine whether there were any changes in responses after the lecture.

An anonymous questionnaire comprising a three-point Likert scale with "yes, no, unsure" components was completed prior to the lecture (n=96) and on the subsequent day (n=53). Before and after responses were captured onto Excel spreadsheets. The changes in responses were determined and expressed as percentages.

The responses to all the questions changed after the lecture, with the largest differences concerning the concept of brain death and consent for donation. The amount of registered organ donors in the class increased by 2% after the lecture.

Education about the concept of brain death and informed consent may increase the number of registered donors and consent rates by next of kin in South Africa.

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Avascular necrosis (AVN) following arthroscopic rotator cuff repair using anchors is increasing (17 reported cases). Bone ischaemia/AVN when performing biceps tenotomy/tenodesis or placing suture anchors, may be linked to the ACHA and its anterolateral ascending (AA) branch's close proximity to biceps (BT). Therefore, this study aimed to investigate branching patterns of the ACHA in relation to BT. Fifty three, formalin fixed cadavers (total of 87 shoulders) were used (Ethical Clearance: 70/2017). The ACHA, AA and descending (D) branches were exposed. Origin, course and branching pattern were recorded. The ACHA originated independently from the axillary artery in 76% (n=66/87) of the sample. Seven (I-VII) variation patterns in ACHA course were identified in 50 shoulders. Pattern I was most common (18/50; 36%), followed by II (14/50; 28%) and VII (9/50; 18%). Four patterns were identified as potential risks for damage. Normally, the ACHA courses posterior to BT, towards lateral edge of the bicipital groove, then it splits into AA and D branches. The AA branch runs superiorly, lateral to BT, and enters greater tubercle. However, in patterns III & VII, the AA branch courses either anterior or posterior surface to the BT in an oblique fashion, potentially placing this branch in danger during tenodesis/tenotomy. With pattern III & VI, the ACHA or AA branch is positioned anterior to the BT, making them potential exposure risks. Thus, surgeons should be aware of variations during surgery to reduce the risk of damage that could potentially lead to blood flow insufficiency/AVN.

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The study of bone trauma caused by carnivores has an ongoing interest in forensic and paleo-biological fields. Carnivore tooth marks are a common feature in forensic and paleo-archaeological remains. There are ongoing efforts by taphonomists to develop criteria to identify the tooth marks of different species found in surviving bone and fossils and to differentiate between trauma, scavenging trauma and post-mortem pseudo-trauma. This study aimed to describe the bone trauma caused by scavenging animals of forensic interest in South Africa.

Wild dog, spotted hyena, lion, leopard, jackal, caracal, and porcupine; housed at the National Zoological Gardens (NZG) of South Africa; were selected for this study. Lightly fleshed and articulated bovine limbs and ribs were placed in each animal enclosure and collected again after two days, for cleaning and analysis.

Ribs recovered from the jackal, wild dog, leopard, and caracal exhibited scoring and pitting while distinct parallel furrows in the epiphyseal ends of long bones were common to all cats (lion, leopard, and caracal). The hyena caused the most damage with very few remaining skeletal elements. Jackals exhibited the least trauma which were isolated to a very few superficial pits and scores. Tarsals and carpals exhibited the least trauma. Caracals caused the most varied types of trauma whereas porcupines caused distinct fan-like scores and oval depressions with an eroded, polished appearance.

These descriptions can be used to isolate trauma caused by animal scavenging and possibly suggest the type of animal which caused the trauma.

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[3]International Committee of the Red Cross (ICRC), Pretoria Delegation, South Africa. **A South African perspective to a global problem – The Johannesburg Identification Unit a pilot study.** Trisha-jean.Mahon@wits.ac.za.

Establishing a positive identification of a deceased individual is paramount for numerous humanitarian, legal and financial reasons. Approximately 1000 decedents per year, whose deaths are classified as unnatural, are buried as “unidentified” within the Gauteng province. At a single Southern Cluster Forensic Pathology Service (FPS) Facility, the number of unidentified decedents can be as high as 10.0% of the total number of annual unnatural death-related admissions. In 2016 through a collaborative effort between the International Committee of the Red Cross, the Gauteng Southern Cluster Forensic Pathology Services, the University of the Witwatersrand and the Victim Identification Center of the South African Police Services – The “Johannesburg Identification Unit” was pioneered. This Unit performs secondary examinations for identification purposes on decedents who remain unidentified for more than seven days after admission to the Johannesburg Forensic Pathology Services Facility. These secondary examinations entail collecting DNA samples, taking fingerprints, documenting and photographing any secondary identifiers. A total of 127 unidentified decedents were examined over an 18-month period. Positive identification of 50 (39.4%) of these individuals was subsequently determined, with fingerprints being the leading successful method of identification. Currently the “Johannesburg Identification Unit” is a pilot study programme; however the results from this Unit are promising and should inspire future developments of similar projects nationally.

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Due to the raised incidence of spinal surgery utilising arthroscopic techniques, investigations into population and sex specific trends of neuro-anatomical surgical considerations have become increasingly important. Therefore, this study investigated the neuro-anatomical morphometry of South African lumbar spines using cadaver dissection and Magnetic Resonance Imaging (MRI) analysis. Twenty white adult cadavers (9 male; 11 female) were obtained from the University of Pretoria (n = 12) and the University of the Witwatersrand (n = 8). The lumbar spines were dissected to record the position of the dorsal root ganglion (DRG) and measure Kambin's triangle (used during arthroscopies to avoid the DRG). Twenty-six MRI scans of black individuals (17 male; 9 female) from Steve Biko Academic Hospital were used to measure dimensions of the neural foramen and the DRG within. DRG's were mainly located at the midline of the caudal pedicle but were more lateral at L4 in females than males. The L1 right DRG was more medial than the left for both sexes. The right vertical border of Kambin's triangle at L2 was smaller in females than in males. The L4 left diagonal border was smaller than the right for both sexes. The neural foramen height increased when moving caudally in the spine. The foramina were inverse teardrop shaped. The DRG was located more inferior to the disc when moving caudally. Significant differences were observed between population groups and sexes, which will aid in pre-operative planning. However, the observed trends warrant further investigation to determine the extent of the variation.

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The human brain consists of an intricate, compact system of structures which are optimally arranged to be housed in the confined space of the cranium. As a result, the brain takes on a complex 3-Dimensional structure, often proving a comprehensive challenge for undergraduates. This study aimed to assist students in visualisation of specific neuro-anatomy concepts using inexpensive teaching methods. 40 third-year Radiography students from the University of Pretoria received a lecture on the structure of the basal ganglia (BG), medullary centres (MC), and dural venous sinuses (DVS) with the drainage patterns. 3 days after the lecture, students completed a 5-point Likert-scale questionnaire to obtain reference of embedded understanding of the topics. To demonstrate the structure and flow of blood through the DVS, students were supplied with 'pipe-cleaners' and guided in construction of the sinuses. To demonstrate the structures of the BG and MC, students received 5 colours of salt-based clay and were guided in constructing the various structures. Upon completion, students were asked to create transverse-, coronal-, and sagittal sections to view the cross-sectional anatomy. Constructions were filmed to ensure repeatability, and to provide students with future reference/study material. Students subsequently completed a second questionnaire to assess any change in understanding of the relevant topics. Results indicated an improved understanding of the 3-Dimensional structure of the BG and MC, cross-sectional anatomy, the DVS and drainage patterns. Educators should attempt to accommodate the diverse learning needs of students. This study emphasises the efficacy of alternative, practical teaching methods.

Aylward, M., [1] L. Beselaar[1], A.N. Alagaili, [2] N.M.S. Amor,[2] O.B. Mohammed,[2] S.H. Kotzé[1]
[1]Division of Clinical Anatomy, Department of Biomedical Sciences, Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, 8000, South Africa [2]King Saud University (KSU) Mammals Research Chair, Department of Zoology, College of Science, King Saud, University, Riyadh, 11451, Saudi Arabia. **The gastrointestinal tract morphology and mucin histochemistry of four insectivorous bat species captured in Saudi Arabia.** shk@sun.ac.za

While studies of the gastrointestinal tract (GIT) morphology of various bat species are available, studies on the intestinal mucin glycoprotein distribution are lacking. Mucins contribute an important component of the intestinal biofilm and therefore, the intestinal microbiome. The aim was to describe the macroscopic GIT anatomy and to histochemically quantify the GIT mucin-secreting cell distribution of insectivorous bat species captured in Saudi Arabia. The macroscopic morphology of four bat species, *Asellia tridens*, *Chaerephon pumilus*, *Nycteris thebaica* and *Rhinopoma hardwickii* (N=24; n=6) was studied followed by mucin histochemical analysis. Acid and neutral mucin-secreting cells were distinguished using Alcian blue/Periodic acid Schiff's stain while Aldehyde fuchsin/Alcian blue stain differentiated between sialo- and sulphomucins. The number of cells per μm^2 was quantified by using ImageJ software and analysed statistically. All species had GITs represented by simple stomachs and the absence of a caecum. However, in *R. hardwickii*, a small cecum-like structure was present which had short villi and lymphoid aggregations on histology. In all species, neutral mucin-secreting Brunner's glands were present in the gastric pylorus and proximal intestinal regions. The total mucin secreting cells increased towards the distal intestine. Mixed (acid and neutral) mucin secreting cells dominated in all species while sulphomucin-secreting cells increased toward the distal intestine. Exclusively acid mucin-secreting cells were present in the distal regions of all species except *N. thebaica*. Differences observed between species may be attributed to phylogeny as all four species represent different families in the Order Chiroptera.

Layman, J.,[1] D. Pereira,[1] N. Chellan,[3] B. Huisamen,[2,3] S.H. Kotzé[1]. [1]Division of Clinical Anatomy, Department of Biomedical Sciences, Faculty of Medicine and Health Sciences, Stellenbosch University. [2]Division of Medical Physiology, Department of Biomedical Sciences, Faculty of Medicine and Health Sciences, Stellenbosch University. [3]Biomedical Research and Innovation Platform, South African Medical Research Council, Tygerberg, South Africa. **The effects of a green rooibos extract on the liver of rats fed a high-fat diet: a histomorphometric study.** shk@sun.ac.za

The consumption of high-fat diets is associated with metabolic syndrome, obesity and increased oxidative stress and inflammation. Rooibos (*Aspalathus linearis*) has been shown to have increased antioxidant and anti-inflammatory properties due to its high polyphenol content. The present study aimed to determine the potential ameliorative effects of a commercially produced aspalathin-rich green rooibos (GRT) extract (Afriplex GRT™) on liver tissue in a diet-induced obese rat model. Male Wistar rats (N=28) were randomly divided into four study groups (n=7): control (C), green rooibos (GRT), high-fat diet (HFD) and HFD-GRT. Body and liver mass of each animal were determined. The left lateral lobe of the liver was processed to wax and the following stains were used: haematoxylin and eosin (H&E), Masson's trichrome stain, Gordons and Sweet's reticulin impregnation and periodic acid-Schiff stain. Oil red O staining was carried out on frozen liver tissue sections. Morphometric quantification of steatosis, semi-quantitative pathology grading and scoring were performed and verified by a histopathologist. Co-treatment with green rooibos significantly reduced high-fat diet induced increases in body and liver mass. Additionally, steatosis volume and area, were significantly increased in the HFD groups while the area of steatosis was significantly reduced with green rooibos co-treatment. The percentage and location of steatosis, presence of inflammatory foci and hepatocellular injury were reduced in the HFD GRT group compared to the HFD group. This study therefore illustrates that a green rooibos extract (Afriplex GRT^{TM}) shows anti-steatotic, anti-inflammatory and weight reducing properties in a rat model.

KRÜGER, G.C.[1], L. LIEBENBERG.[1], E.N. L'ABBÉ[1 1] Department of Anatomy, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa. **ComboMetrix: A combined cranial-postcranial database for metric ancestry estimation.** gabi.kruger@up.ac.za.

Despite high accuracies obtained in the estimation of ancestry using cranial and postcranial data independently, large amounts of overlap between the three major South African groups limit the predictive accuracy of the elements in providing a definitive ancestry estimate. The current research explored a combined cranial-postcranial approach (ComboMetrix) to metric ancestry estimation in a modern South African sample.

A total of 52 standard cranial and postcranial measurements were taken from 360 black, white and coloured South Africans from the Pretoria Bone Collection and the Kirsten Collection. Group differences were explored with ANOVA and Tukey's *post hoc* test. Multivariate models were assessed with linear discriminant analysis (LDA) incorporating the most discriminatory variables.

Consistent with previous studies, black and coloured South Africans displayed overlap for the majority of the variables; however, 15 cranial and 11 postcranial variables were found to be significantly different between the two groups ($p<0.05$). The multivariate subsets illustrate the potential of the ComboMetrix approach, as accuracies of 89% and 91% were achieved using LDA.

Substantial heterogeneity among the three South African groups decreases the positive predictive power of the cranial and postcranial methods separately, making them of limited reliability in a forensic setting. The current research shows the ComboMetrix database has the potential to outperform the current standard methods for estimating ancestry in South Africa. Using a computer program, such as Fordisc 3.1, that selects the most discriminatory variables on a case-specific basis, may be the best approach to estimating ancestry.

LIEBENBERG, M.,[1] L. LIEBENBERG,[1] G.C. KRÜGER,[1] [1]Department of Anatomy, Faculty of Health Sciences, University of Pretoria, Pretoria, South Africa. **The Implications of Burned Bone on the Biological Profile: A Pilot Study.** maritzaliebenberg@gmail.com

Skeletal measurements are essential for providing accurate results for most parameters of the biological profile; however, thermal destruction may limit the number of measurements that can be taken from skeletal elements. Few studies have addressed the analysis of biological parameters from burnt remains, with the greatest focus on cremated remains, which is rarely seen in a South African forensic context compared to other burn patterns.

The study evaluated burn patterns typically observed in a South African forensic context. A total of 44 thermally altered individuals were assessed to examine 1) the frequency of normal versus abnormal burn patterns; 2) which bones are more prone to survive thermal alteration; 3) the prevalence of typical colour changes; and 4) which standard measurements and methods are affected most often.

Overall, charring was observed most frequently, followed by heat-altered borders, whereas heat-lines were the least common thermal alteration. Altered bones generally presented with small areas of damage, while 75% of the surface area was unaffected.

The overall combination of burn characteristics recorded from the cases suggest minimal amounts of flesh present during the burning events paired with fires of short duration, i.e. typical of veld fires. Numerous standard cranial and postcranial measurements were affected in each case; however, many potential alternative areas for measurement have been identified. Further research is required to explore the degree of structural changes experienced by bone under different fire-related conditions.

LIEBENBERG M,[1] S MULLER,[1] T MKHUZANGWE,[1] R KHONYANE,[1] L LIEBENBERG,[1] GC KRÜGER.[1] [1]Department of Anatomy, Faculty of Health Sciences, University of Pretoria, Gauteng South Africa. **An evaluation of the discriminatory power of recently added measurements described in Data Collection Procedures for Forensic Skeletal Material 2.0.** leandi.liebenberg@up.ac.za.

New measurements were recently added to the Data Collection Procedures for Forensic Skeletal Material 2.0 manual (DCP) to provide alternative avenues for estimating sex and ancestry from skeletal remains. While the additional measurements may have demonstrated potential in other populations, their use in analysing South Africans has not been established.

The aim of the study was to assess the discriminatory power of eight measurements recently added to the DCP for the estimation of sex and ancestry among modern South Africans. A total of eight (three cranial and five postcranial) measurements were taken from 160 black and white South African males and females (equal sex and ancestry distribution) from the Pretoria Bone Collection.

Analysis of variance (ANOVA) was conducted to identify significant sex and ancestry differences among the groups. Where significant, the variables were added to the existing South African databases and discriminant analyses were conducted to observe whether the novel measurements were 1) selected and 2) improved classification accuracies when estimating sex and ancestry.

All eight variables were significantly different between the sexes, and seven were significantly different for ancestry ($p<0.05$). Of the significant variables, only zygo-orbital breadth and femur medial condyle length were selected for model creation for the estimation of ancestry from the cranium and postcrania, respectively. None of the novel measurements were selected for the estimation of sex.

While the accuracies did not greatly improve from previous studies, the new measurements provide additional options that can be used when creating a biological profile in forensic analyses.

M LOOTS[1]. [1]Department of Anatomy, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa. **Cognitive load: what you should know for effective teaching and learning.** marius.loots@up.ac.za.

How we learn is ultimately determined by our biology. The main system involved in processing acquired knowledge is our working memory. Cognitive load refers to the effort being used in working memory. Cognitive load are generally divided into three components: intrinsic, extraneous, and germane.

Working memory is limited in capacity and can get overloaded in our attempts to organise and transfer new knowledge into long term memory. This has design implications, not only for how we learn as novices and experts, but also how we design instructional material for beginners and advanced learners in a subject.

After processing in working memory, information is stored in long term memory. Due to limited capacity and duration, any disruption at this stage can impede learning. A heavy cognitive load can have negative effects on task completion. The experience of cognitive load is not the same for all learners. By taking the effect of cognitive load into consideration during instructional design, the quality of learning will be raised. Any extraneous cognitive load, for example cell phone use, increase cognitive load and reduce academic success.

Cognitive load is probably one of the most important things an educator should know and take into consideration in design of learning opportunities. The purpose of this presentation is to give an overview of working memory, cognitive load and the implications for learning design.

LOUW G.J[1]. [1]Department of Human Biology, Anatomy Building, Faculty of Health Sciences, University of Cape Town, South Africa. **Revisiting theories about the reabsorption of cerebrospinal fluid into the venous system.** Graham.Louw@uct.ac.za.

Traditionally, students are taught that cerebrospinal fluid (CSF) is produced by the arteries which form the choroid plexus, flows throughout the central nervous system (CNS), and is reabsorbed into the superior sagittal venous sinus via the arachnoid villi. Another fact that has been taught in the past is that CSF replaces lymph within the CNS. With increasing interest in and knowledge of the glymphatic system over the last decade or two, evidence has shown that a lymphatic system is indeed present in the CNS and that lymph flows in parallel to that of the CSF. The lymphatic fluid re-enters the venous system at a variety of different sites. Regarding the role of the arachnoid villi, there is a proposal, based on studies in animals, that this high to low pressure system functions only when there is an increase in the normal pressure of CSF, meaning that the villi are usually collapsed. This poses the question: What is the fate of CSF within the normal range of pressures when once it reaches the subarachnoid space? Furthermore, in the developing embryo and fetus, the choroid plexuses are producing CSF at a stage when the arachnoid villi have not yet formed or are not yet functioning, so there must be another mechanism to ensure the reabsorption of CSF. This presentation will describe the technique that was used to demonstrate how CSF is reabsorbed into a variety of veins in the head and neck.

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The Vermian fossa (VF), also known as the middle cerebellar fossa of Verga, is a shallow depression at the inferior end of the internal occipital crest which lodges the inferior part of the vermis. A description of this structure is absent from most standard anatomical texts; however, published literature describes the VF as having a highly variable incidence and morphology. The present study aimed to investigate the incidence, morphology and morphometry of the VF. A total of 100 dry, adult skulls were analysed and the VF was found to be present in 62% of cases. The shape of the VF was classified as Triangular (27%), Quadrangular (8%) and Atypical (27%). The average length of the VF was 13.78mm and the average width was 11.62mm. The morphometric findings of this study correlates with that of previous studies; however, the incidence of Atypical shaped VF is higher in comparison to previous studies. The detailed anatomical description of the VF may aid in the study of diseases which cause alterations in the size and morphology of the vermis of the cerebellum, as it has been reported that certain cases of cerebellar cortical dysplasia are associated with VF variations. Furthermore, due to the paucity of anatomical descriptions of the VF, a reappraisal of this structure is warranted as it is of prime importance to clinicians operating in or interpreting radiological images of the posterior cranial fossa.

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The zygomatic foramina (ZF) namely zygomaticoorbital (ZOF), zygomaticofacial (ZFF) and zygomaticotemporal foramina (ZTF) transmit the terminal branches of the zygomatic nerve. These foramina are encountered by surgeons during orbitomaxillary and maxillofacial procedures; however, recent studies have deemed the ZF to be an unreliable surgical landmark due to its variability in both incidence and topography. This study investigated the incidence of the ZF and its location in relation to anatomical landmarks. A total of 200 zygomatic bones were analysed and the incidence of the number of foramina was classified as Types 0-5 representing 0, 1, 2, 3, 4 or 5 foramina, respectively. The frequency in ZOF, ZTF and ZFF was: Type 0: 85.5%, 96%, 21%; Type 1: 13.5%, 1.5%, 39%; Type 2: 1%, 0%, 29.5%; Types 3, 4 and 5- found only in ZFF in 7.5%, 2.5% and 0.5% of cases, respectively. The average distance of the ZOF, ZTF and ZFF from the inferolateral orbital rim was 18.01mm, 26.17mm and 8.19mm, respectively. The average distance of the ZFF from the frontozygomatic, zygomaticomaxillary and zygomaticotemporal sutures was 27.64mm, 12.96mm and 23.67mm, respectively. The findings of the present study concur with the literature that ZF is an unreliable surgical landmark. However, variation in the incidence and topography of the ZF is useful to surgeons performing osteotomies across the zygoma and in transmaxillary approaches to the orbit to preserve the branches of the zygomatic nerve and prevent morbidity stemming from iatrogenic injury.

MARAIS, C.A.[1], M.R. CROLE[1]. [1]Department of Anatomy and Physiology, Faculty of Veterinary Science, University of Pretoria, Pretoria, Gauteng, South Africa. **Gross morphology of the African lion (*Panthera leo*) heart**. maraiscarmen15@gmail.com.

The anatomy of the African lion heart is not well-documented, and assumptions are made that the anatomy is comparable to the domestic cat. Obvious differences may make such assumptions invalid. The increasing demand for veterinary intervention in the African lion warrants sound anatomical knowledge of the heart.

Five ±3-year-old captive bred lions were dissected. The thoracic limbs and thoracic muscles were removed, and thoracic topography noted. The heart was removed from the thorax and dissected to expose the external and internal structures.

The heart of the African lion is situated caudal to the thoracic limbs between ribs 4-6. It is covered by the left cranial lung lobe, and cranial and middle lobe of the right lung, respectively, with a prominent cardiac incisure present on the right. The sternopericardial and pericardiodiaphragmatic ligaments hold the heart firmly in position. The right coronary artery is dominant, and the right atrium and auricle possess a vast network of *Mm. pectinati*.

The massive thoracic limbs, adapted to bring down prey, appear to restrict the cranial thoracic cavity, and as a trade-off, the thoracic viscera are situated more caudally. During intense activity, the heart and lungs compete against each other for space, thus limiting physical activity to short, intense periods. Capacity for sudden increase of cardiac output is facilitated by the extensive pectinate muscles of the right atrium. The sight for intracardiac injections is recommended on the right, ventrally in intercostal space 5. The two pericardial ligaments may help to stabilise the heart during intense activity.

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The use of human skeletons to teach anatomy is seemingly entrenched, a sterile, necessary component of teaching practice. It appears that educational institutions have the means to procure these valued and valuable teaching materials. The origins of skeletal material may precipitate dilemmas of health professional education and may necessitate pause for thought about our educational practice. In more than 20 years of tertiary teaching experience, access to human skeletons enabled students to better understand the bones, their anatomical features, and see first hand the minutiae thereof, while comparisons could be made among diverse skeletons to appreciate anatomical variances. It was reassuring to find a skeleton at an overseas teaching institution, and teaching could continue in much the same way. However, with greater knowledge of the culture of Aotearoa New Zealand, questions arose about the continued use of human skeletons in teaching. Reflection and intense debate regarding educational, cultural and human considerations highlighted the changes in values and educational practice over a period of three decades. This presentation explores that journey and the personal insights gleaned from it.

P MAZENGENYA.,[1] A BHAGWANDIN.,[1] AO IHUNWO.[1] [1]School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg 2193, South Africa. **Adult neurogenesis in the paleognathous birds: the common ostrich (*struthio camelus*) and emu (*dromaius novaehollandiae*).** **Pedzisai.mazengenya@wits.ac.za.**

Adult neurogenesis is a well-known process occurring in varying magnitudes in different species ranging from invertebrates to vertebrates including humans. We examined adult neurogenesis for the first time throughout the brain of the common ostrich (*Struthio camelus*) and emu (*Dromaius novaehollandiae*) using immunohistochemistry for the endogenous markers proliferating cell nuclear antigen (PCNA), which labels proliferating cells, and doublecortin (DCX), which stains immature and migrating neurons. The distribution of PCNA and DCX labelled cells was widespread throughout the brain of both species. The highest density of cells immunoreactive to both markers was observed in the olfactory bulbs and the telencephalon, especially the subventricular zone of the lateral ventricle. The density of PCNA immunoreactive cells was less exuberant in the telencephalon of the emu compared to the common ostrich. Substantial numbers of PCNA immunoreactive cells were observed in the diencephalon and brainstem, but DCX immunoreactivity was weaker in these regions. PCNA and DCX immunoreactive cells were observed in moderate density in the cortical layers of the cerebellum of both species. Columns of migrating cells were observed at three distinct points extending from the lateral wall of the lateral ventricle into parenchyma of the telencephalon at rostral levels in both species. The distribution of putative proliferating cells and immature neurons in the brain of the common ostrich and the emu is widespread, far more so than in mammals, and compares with the neognathous birds, and suggests that brain plasticity and neuronal turnover is an important aspect of cognitive brain functions in these birds.

MEYER, J.P.[1], SMALL, C.[1], HEMINGWAY, J.[1], AND BRIERS, N.[1] [1]Human Variation and Identification Research Unit, School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa. **Facial Age Mapping in Black and Coloured South African Children.** jpmeyer1280@gmail.com.

Forensic experts are becoming more involved with investigations regarding trafficked children, child-prostitution, and missing children. These cases are often complicated due to photographic material being the only available evidence. This highlights the importance of developing methods that will aid in the accurate identification of children from 2D images. Therefore, this study investigated differences in anterior craniofacial shape among 6, 10, and 13-year-old South African children of different sex and ancestry using geometric morphometrics (GM). Additionally, visual representations of the average face-shape of each group were constructed using FantaMorph, which could serve as reference models to assist in forensic cases where facial depictions are required. The sample consisted of 360 anterior facial photographs of Black and Coloured South African children in the age groups 6, 10, and 13-years. Twenty-one facial landmarks were digitised on each image using tpsDig. Principal component analysis, canonical variate analysis (CVA), and discriminant function analysis (DFA) were conducted on the landmark data. CV1 accounted for 80.2% of the shape variation in terms of age, sex and ancestry in the Black sample, but only 73.9% in the Coloured sample. The differences in variation were primarily due to differences in the mandibular and midfacial regions. DFA performed on the landmark data achieved age estimation accuracies of 95.6% in the Black sample and 74.2% in the Coloured sample. The results of this study showed that GM and DFA of face shape can be used as a method for age estimation in living children from 2D images.

MKHUZANGWE, T[1]; L'ABBE, EN[1]; DUSSAULT, MC[1]. [1]Department of Anatomy, School of Medicine, Faculty of Health Science, University of Pretoria, Gauteng, South Africa, **Validation of metric and morphological assessment of sex and ancestry estimation on the calcaneus.** mkhuzangwethembi@yahoo.com.

Osteometric and morphological features from calcanei have been used to estimate sex and ancestry for black and white South Africans, yet, these studies have not been validated for repeatability and accuracy. A total of 120 calcanei of black (31 males and 30 females) and white (31 males and 28 females) South Africans were sampled from the Pretoria Bone Collection. Ten standard calcaneal measurements were taken and entered into the discriminant function formulae of Bidmos and Asala (2003 and 2004) and Bidmos (2006) for sex and ancestry, respectively. The superior articular facets were visually assessed and classified into one of three facet types for ancestry estimation. Inter- and intra-observer error was calculated using TEM and Cohen's Kappa. Three calcaneal measurements (MAXL, LAL, MIDB) were within the acceptable error range (TEM<2mm). Assessment of the facets presented with moderate (inter-observer = 0.571) and substantial (intra-observer = 0.615) agreement. ANOVA demonstrated statistical significance among all calcaneal variables, and a chi-squared test showed a relationship between facet morphology and the ancestral groups. Percent correct obtained for sex and ancestry in the original study ranged between 69.8%-92.1% and 81.7%-88.9%, respectively. In this study, males (68%-100%) classified better than females (0%-100) for sex; whereas black South Africans (37%-100%) classified better than white South Africans (26%-96%) for ancestry. The discriminant function formulae and morphological method proved less accurate than the original study. Current sex and ancestry estimations from calcanei are not robust enough for application in forensic case work.

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The use of human anatomical specimens in the health sciences makes a valuable supplement to theoretical classroom teaching and helps students to visualise the relationship of structures in their location within the human body. Previous studies have shown that having an opportunity to feel, touch and compare structures enhances students' logic and problem solving abilities needed for future practice.
This project aimed to expose optical dispensing first-year students to anatomical specimens.

A total of 80 optical dispensing first-year students from the Cape Peninsula University of Technology (CPUT) visited the Department of Human Biology, University of Cape Town (UCT) over two years for practical demonstrations. These sessions included: watching video clips on ocular anatomy, a talk by a senior anatomist, demonstration of human anatomical specimens and ox eye dissection and viewing of microscopic slides. A short task was devised to guide students' learning for each station to ensure that they were fully engaged with the material covered and not merely observing. Students were given an opportunity to evaluate the session.

Students engaged well with the material and interacted with demonstrators at each station. A total of 94% were either satisfied or very satisfied with the session, and a low 6% were dissatisfied. On follow up with the educators from CPUT, there was a drastic improvement in students' academic performance after the excursions.

Inter-university collaboration is an effective way to support learning, as it gives an opportunity for students to be exposed to material that may not be available within their university.

MULLER, S.[1], G.C. KRÜGER[1], L. LIEBENBERG[1], [1]Department of Anatomy, Faculty of Health Sciences, University of Pretoria, South Africa. **Metric Assessment of Ancestry and Sex Variation in the Zygoma.** samanthamuller023@gmail.com.

Skeletal remains exposed to an outdoor context are prone to post mortem damage and fragmentation, making the analysis of remains more difficult. Physical anthropologists are frequently faced with fragmentary remains; therefore, research on ancestry and sex from isolated cranial fragments has become more important. Previous studies assessing the variation of the zygoma have used non-metric and geometric morphometric techniques, but the use of standard linear measurements and their potential forensic application have been overlooked.

The sample included 120 crania of black and white South Africans from the Pretoria Bone Collection with equal sex and ancestry distribution. Sixteen measurements (four existing and 12 novel) were taken from ten landmarks previously described in the literature. All of the measurements were repeatable except one (superior orbital length). Significant differences were noted between the sexes and between ancestry groups for the majority of the measurements (twelve and thirteen measurements respectively). Linear discriminant functions employing the most discriminatory variables were created for both sex and ancestry, and yielded accuracies of 89.2% and 88.7% respectively. The function accuracies demonstrate the potential of the zygoma for classification according to sex and ancestry in anthropological analyses.

While the results demonstrate sex and ancestry variation in the size of the zygoma, further research on possible shape variation using geometric morphometrics is needed to further improve the estimation of sex and ancestry in anthropological analyses using the zygoma.

NAIDOO, J.,[1] RENNIE, C.O.,[1] SATYAPAL, K.S.,[1] LAZARUS, L.[1] [1]Department of Clinical Anatomy, School of Laboratory Medicine and Medical Science, College of Health Science, University of KwaZulu-Natal, KwaZulu-Natal, South Africa. **An osteometric evaluation of the intracranial anatomical parameters of the jugular foramen.**

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The jugular foramen (JF) is a complex cranial foramen between the temporal and occipital bones. Neurovascular structures passing through the JF include the glossopharyngeal (CNIX), vagus (CNX) and accessory (CNXI) cranial nerves, as well as the internal jugular vein (IJV). This study aimed to investigate the morphologic and morphometric parameters of the JF and was conducted by dissecting the cranial fossae of 30 cadavers (n=60) and sixty dry skulls (n=120). A total of six morphological shapes were identified, with the 'triangular' shaped JF having highest occurrence (73/180 – 40.56%; right 40/90 – 44.44%; left 33/90 – 36.67%). The right JF was larger than the left in 71.67% of dry skulls and 80% of cadaveric specimens. The length of the right JF was 14.26 ±2.74mm and the width was 8.88 ±2.19mm in the dry skulls, whereas cadaveric specimens had a right JF with a length of 7.68 ±1.50mm and a width of 4.75 ±1.22mm. This study reports two classification systems for the septation of the JF, viz.- the six-type bony septation classification and the four-type dural septation classification. Information pertaining to the JF is imperative to clinicians in determining approaches to the JF to combat cases such as Vernet's syndrome (caused by compression of the cranial nerves within the JF).

NAIDOO, J.,[1] LUCKRAJH, J.S.,[1] LAZARUS, L.[1] [1]Department of Clinical Anatomy, School of Laboratory Medicine and Medical Science, College of Health Science, University of KwaZulu-Natal, KwaZulu-Natal, South Africa. **Parietal Foramen: Incidence and Topography.** naidoojoastin@gmail.com

The parietal foramen (PF) is a small inconsistent aperture located at the border of the middle 1/3 and posterior 1/3 of the parietal bone near the sagittal suture, and is considered an emissary foramen. Cranial emissary foramina are of utmost importance due to the structures that traverse the foramen. Variations in these foramina are common. Knowledge of the PF is important when performing neurosurgical procedures as the emissary vessels are at risk. The present study used 100 dry calvaria to determine the frequency of PF, the diameter of the PF, as well as topography of the PF (using the sagittal suture as an anatomical landmark). A total of 32% of calvaria had PF present bilaterally; whilst 35% of calvaria had unilateral PF. The study also reports 5% calvaria in which PF were present on the sagittal suture. The mean diameter recorded was 1.55mm [0.74 - 3.08mm], and the mean distance between the lateral margin of the PF and the sagittal suture was 9.02mm [4.44 - 18.20mm]. Knowledge of the incidence and topography of the PF may aid neurosurgeons in creating and adjusting techniques and procedures in order to mitigate the risk of injury to emissary veins and other structures emerging from the PF.

SUSANNA LLIDO-TORRENT[1], AZUCENA AVILES[2], MARÍA HABER-URIARTE[2], JOAQUÍN LOMBA-MAURANDI[2], CARLOS A. PALANCAR[3], JUAN A. SANCHIS-GIMENO[1], SHAHED NALLA[1,4]. [1]GIAVAL Research Group. Department of Anatomy and Human Embryology. University of Valencia. Faculty of Medicine. Avda. Blasco Ibanez 15, E46010 - Valencia, Spain, [2]Departamento de Prehistoria, Arqueología, Historia Antigua, Historia Medieval y Ciencias y Técnicas Historiográficas. University of Murcia, Spain, [3]Paleoanthropology Group, Department of Paleobiology, Museo Nacional de Ciencias Naturales, CSIC, José Gutierrez Abascal 2, 28006 Madrid, Spain, [4]Department of Human Anatomy and Physiology, Faculty of Health Sciences, University of Johannesburg, Auckland Park, 2006, South Africa. **The Cervical Arcuate Foramen in Chalcolithic and Present Human subjects.** **Shahedn@uj.ac.za.**

The arcuate foramen (AF) is an anatomical variant of the atlas that consists of a complete, or sometimes a partial, osseous bridge over the groove for the vertebral artery. AF is estimated to be present in approximately 16% of the current human population but to date there is no information about its prevalence in a Chalcolithic population.

We studied 49 adult atlas vertebrae from the burial cave of Camino del Molino (Caravaca, Murcia, Spain) dated to the second half of the third millennium B.C. (Chalcolithic sample) in order to detect the presence/absence of a complete AF. In addition, we analyzed the presence of complete AF in 91 20th – 21st century (present) atlas vertebrae from the Raymond Dart Collection, School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg.

The AF was found in five (10.2%) atlas vertebrae from a total amount of 49 (100%) Chalcolithic vertebrae. It was bilateral in three (6.1%) vertebrae and unilateral in another two atlases (4.1%). The AF was found in 12 (13.2%) vertebrae from a total amount of 91 (100%) 20th – 21st century atlas vertebrae. It was bilateral in seven (7.7%) vertebrae and unilateral in another five atlases (5.5%). No significant differences in the prevalence of the AF were found between the Chalcolithic and the 20th – 21st century samples ($p = 0.603$).

There are no differences in AF prevalence between the Chalcolithic and the present population.

BORJA FAUS-VALERO [1], SUSANNA LLIDO-TORRENT [1], JOAQUÍN LOMBA-MAURANDI [2], JUAN A. SANCHIS-GIMENO [1], SHAHED NALLA [1,3]. [1]GIAVAL Research Group. Department of Anatomy and Human Embryology. University of Valencia, [2]Departamento de Prehistoria, Arqueología, Historia Antigua, Historia Medieval y Ciencias y Técnicas Historiográficas. University of Murcia, Spain, [3]Department of Human Anatomy and Physiology, Faculty of Health Sciences, University of Johannesburg, Auckland Park, 2006, South Africa. **Differences in gonial angle values between Chalcolithic and present subjects.** **shahedn@uj.ac.za.**

We aimed to ascertain the gonial angle values of Chalcolithic and present subjects to detect possible differences as there are only few studies which have evaluated whether the gonial angle values have changed over the past millennia in the modern human population.

We measured the gonial angle values of 33 complete mandibles of adult skeletons from the burial cave of Camino del Molino (Caravaca, Murcia, Spain) dated back to the second half of the third millennium B.C. (Chalcolithic sample). In addition, we also measured the gonial angle values of 103 pre-selected complete mandibles from skeletons of the 20th and 21st century of the Raymond A Dart Collection of the School of Anatomical Sciences, Faculty of Heath Sciences, University of the Witwatersrand, Johannesburg.

The left angle value was 132.8 ± 3.4 degrees and the right value was 132.5 ± 4.2 degrees in the Chalcolithic sample ($p=0.777$). The left angle value was 126.7 ± 4.4 degrees while the right value was 126.1 ± 4.2 degrees in the 20th and 21st century sample ($p=0.747$). The left ($p < 0.001$) and the right ($p < 0.001$) angle values were statistically higher in the Chalcolithic sample when compared with the 20th – 21st century sample.

The gonial angle values indicated a decrease in gonial angle over the past millennia as Chalcolithic subjects presented a bilateral higher angle value than the present subjects.

CROLE, M.R.,[1] K.N. KOEPPEL,[2] A.D. NAUDE.[1] [1]Department of Anatomy and Physiology and Department of Production Animal Studies, Faculty of Veterinary Science, University of Pretoria, Pretoria, Gauteng, South Africa. **Gross morphology of the southern ground hornbill (*Bucorvus leadbeateri*) gastro-intestinal tract.** anelnaude.naude5@gmail.com.

The southern ground-hornbill (SGH) (*Bucorvus leadbeateri*) is the largest bird species that breeds cooperatively and the only entirely carnivorous hornbill. Currently, there are only an estimated 417 free-ranging breeding groups in the whole of South Africa. As the bird is an obligatory carnivore the gastrointestinal tract (GIT) may display specific adaptations which may be of significance in the husbandry of this endangered species as many SGH's in captivity suffer from GIT pathology.

Two adult birds were studied that died of natural causes and euthanized, respectively. The GIT's were immersion-fixed in 10% neutral-buffered formalin. Topography of the GIT was noted, measurements of the various lengths of the digestive tract were obtained and the morphology described and digitally recorded. Standard anatomical techniques were followed.

The most notable organ from ventral view was the gizzard situated between the liver lobes, with the small intestine caudally. The proventriculus was small and the gizzard large. The gizzard was distensible and thin-walled in the distended state. The pancreas was large, the small intestine relatively short and cecae vestigial. The large intestine was of similar length to the small intestine.

The thin-walled gizzard, large pancreas and simple, short intestine support enzymatic digestion over the grinding of ingesta. Additionally, the presence of vestigial cecae is expected for a diet where fermentation is not needed and where little water is consumed. The heavy reliance on enzymatic digestion is important in the husbandry of these birds as stress may lead to a breakdown in the gizzard lining leading to ulcers.

NDALANE R.J.[1], SEREM J.C.[1], BESTER M.J.[1] [1]Department of Anatomy, Cell biology and Histology Division, Faculty of Health Sciences University of Pretoria. **The effects of the trapping of methylglyoxal by flavonoids on antioxidant and antibacterial activity.** **Joy.ndalane@up.ac.za.**

Methylglyoxal (MGO) is a highly reactive dicarbonyl compound, formed as a metabolite from nonenzymatic/ enzymatic reactions. MGO is a precursor of advanced glycation end products, contributing to ageing, diabetes, and diabetes-related complications. A positive effect of MGO is its antibacterial activity. Polyphenols can trap MGO and prevent glycation. In this study, flavonoids: catechin (CAT), chrysin (CHRY) and naringenin (NAR), combined with MGO, were investigated to determine the antioxidant, antibacterial and cellular effects caused by the MGO:flavonoid adducts. Chemical antioxidant activity was done using total polyphenolic content, trolox equivalent antioxidant capacity, oxygen radical absorbance capacity and anti-glycation assays whereas cellular antioxidant activity (CAA) was done using 2',7'- dichlorofluorescin diacetate assay with mouse fibroblast (L929) cells. Cytotoxicity was investigated using crystal violet and (3-[4,5-dimethylthiazol-2-yl]-2,5 diphenyl tetrazolium bromide) assay. In addition, antibacterial activity against *Escherichia coli* (*E. coli*) and *Bacillus subtilis* (*B. subtilis*) was evaluated using the microbroth dilution assay and morphological analysis was conducted using scanning electron microscopy. All MGO:flavonoid adducts predominantly retained antioxidant activity. The glycating ability of MGO was significantly reduced in all MGO:flavonoid adducts. With CAA, MGO and MGO:flavonoid adducts showed insignificant oxidative damage. In the presence of radicals only MGO:CAT showed significant protection against oxidative damage compared to MGO. No cytotoxicity was observed against L929 cells. The antibacterial activity of MGO:flavonoid adducts was significantly reduced in both bacteria compared to MGO. In conclusion at low concentrations, although MGO:flavonoid adducts loose some antibacterial activity, these adducts are non-toxic, effective antioxidant and anti-glycation compounds.

NDOU, R.,[1] D.S PILLAY[1]. [1]School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, 7 York Road, Parktown, 2193, South Africa. **Discriminant function analysis to distinguish populations: A study using humeri of South African and North American samples.** Robert.Ndou@wits.ac.za

Skeletal variation is population specific whereas sexual dimorphism is a worldwide phenomenon. Considering this, we sought to determine the metric features of the humerus that can distinguish populations in a study of South African and North American black and white samples using maximum length, head circumference, epicondylar breadth and shaft circumferences (25^{th}, 50^{th} and 75^{th} percentile levels). We then conducted a discriminant function analysis to reveal the parameters that best estimate population variation in both sexes. Among males, head circumference, and all three shaft circumferences (bilaterally) contributed the most to population variability. Overall 46.1% of males were correctly classified; 69.2% of black North Americans, 20% of white North Americans, 40% of white South Africans, 33.3% of black South Africans and 57.7% of coloured South Africans. In females, head circumference and bone length were the most discriminatory parameters when estimating population affinity. Overall 54.7% of females were correctly classified; 33.3% of black North Americans, 40.9% of white North Americans, 60.9% of white South Africans, 57.7% of black South Africans and 76% of coloured South Africans. Among males, the black North Americans could be reliably distinguished from the other groups whereas in females, it was the coloured South African group, indicating that these two populations differed the most from all other groups. That males required more parameters than females to reliably distinguish between populations may be due to sexual dimorphism.

NEKHUMBE, A.W.,[1] J.C. SEREM.[1] M.J. BESTER.[1] [1]Department of Anatomy, Faculty of Health Sciences, University of Pretoria, Gauteng South Africa. **Investigations on orally digested honey as a potential therapeutic agent against *Candida albicans*: An antioxidant study.** u13170742@tuks.co.za.

Candida albicans (C. albicans) is a common fungus found in the oral cavity of humans that can result in an oral infection known as Candidiasis; especially in immune-compromised patients. Honey is a potential antifungal therapy that could reduce oxidative damage and *C. albicans* infection in the oral cavity. This study investigated the ability of four Fynbos honeys to retain chemical (ChAA) and cellular antioxidant activities (CAA) after oral *in vitro* digestion in comparison with a medical-grade Manuka (MAN) UMF10+ honey. ChAA was determined using: total polyphenolic content (TPC), trolox equivalents antioxidant capacity (TEAC), oxygen radical absorbance capacity (ORAC) and anti-glycation (AGEs) assays. CAA was determined using the dichlorofluorescein diacetate (DCFH-DA) assay. Cytotoxicity was determined using the crystal violet and the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-2H tetrazolium bromide assays. Cellular assays were done on both the mouse fibroblast (L929) and the human colon adenocarcinoma (Caco-2) cell lines. A dose-dependent increase in antioxidant content/activity of honeys was observed for the TPC, TEAC and ORAC assays, which were maintained post oral digestion. With the AGE assay it was observed that the both honey types do not significantly form AGEs and with digestion there in no increase in formed AGE's. With CAA, results show that the honey samples were able to protect the cells from oxidative damage by as much as 80%. Honey samples, undigested and digested, did not show any cytotoxicity. Fynbos and MAN UMF10+ honeys both had bioactivity post digestion. Therefore, these honeys are potential therapies in targeting *C. albicans* oral infections.

K NIEMANN[1], C RENNIE[1], L LAZARUS[1]. [1]Discipline of Clinical Anatomy, School of Laboratory Medicine and Medical Science, College of Health Sciences, University of KwaZulu-Natal, Westville Campus, Private Bag X54001, Durban, South Africa, 4000. **An anatomical study of the Facial Artery.** rennie@ukzn.ac.za.

The facial artery (a branch of the external carotid artery) is the main artery of the face. It gives rise to seven branches viz. inferior & superior labial, inferior & superior alar, lateral nasal and angular arteries, which are variable. This study includ ed a dissection of twenty embalmed adult cadaveric head and neck specimens. The parameters of origin, branching patterns, termination and variations were analysed and compared with sex and laterality. The facial artery followed the standard anatomical description of origin in 84.62% of the sample. Variations: (i) origin as a linguofacial trunk (12.82%) and (ii) high origin (2.56%) was observed. Male specimens displayed a higher number of linguofacial trunk origins (7.69%). The branching patterns of the facial artery were classified into six types, with subtypes for Types 1 and 2. Subtype 1-A (standard anatomical description with early termination) was the most prevalent (46.15%). Males were found to have more variations in branching patterns than women (48.72% and 41.03%) respectively. Termination of the facial artery was: inferior labial artery (5.13%), superior labial artery (10.26%), inferior alar artery (10.26%), superior alar artery (46.15%), lateral nasal artery (5.13%), and angular artery (20.51%). A single case (2.56%) of an abortive artery was noted. Statistical analysis showed that sex was independent of each parameter observed in this study. Anatomical knowledge of the facial artery is of importance to clinicians and surgeons during procedures such as musculomucosal, island flaps and aesthetic dermatology.

NKOMOZEPI P[1]. [1]University of Johannesburg. **Oleanolic acid attenuates high fructose-induced impairment of adult hippocampal neurogenesis in Sprague Dawley rats.** pilanin@uj.ac.za.

Metabolic syndrome has been shown to be associated with a decline in cognitive capacity. High fructose (HF) administration is commonly used to induce metabolic syndrome in rodents. In addition, HF is believed to exert its deleterious effects on the brain and cognitive function through oxidative stress. Conventional medicines such as metformin are currently used for the treatment of metabolic syndrome. However, the high cost and the undesirable side effects associated with these drugs have led to a search for alternative treatments. Several natural products have been shown to have potential pharmacological actions that can be harnessed for the treatment of metabolic syndrome. The efficacy of these natural products in the treatment of most disease conditions has been attributed to the presence of biologically active phytochemicals. One such phytochemical that has been proven to exhibit a wide range of beneficial effects is oleanolic acid. Oleanolic acid has been reported to have several medicinal properties including antioxidant, hepatoprotective, renoprotective and neuroprotective effects. The current study evaluated the effects of orally administered oleanolic acid on hippocampal neurogenesis in a HF induced adult Sprague Dawley rat model of metabolic syndrome. HF consumption led to elevations in terminal blood glucose levels, terminal body weights and apoptosis in the dentate gyrus granule layer. In addition, HF led to reductions in volume, cell density and neurogenic activity in the dentate gyrus of the hippocampus. However, oral administration of OA attenuated these deleterious effects of high fructose on terminal blood glucose levels, hippocampal structure and neurogenic activity.

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Environmental presence and human exposure to heavy metals in air and cigarette smoke has led to a worldwide increase in respiratory disease. The effects of oral exposure to heavy metals in liver and kidney structure and function have been widely investigated and the respiratory system as a target is often overlooked. The aim of the study was to investigate the structural changes in the lung tissue of Sprague-Dawley rats after oral exposure to cadmium (Cd) and mercury (Hg), alone and in combination at 1000 times the World Health Organization's limit in drinking water. Following exposure, the general morphology of the bronchiole and lungs as well as collagen and elastin distribution was evaluated using histological techniques and transmission electron microscopy. In the lungs, structural changes to the alveoli included collapsed alveolar spaces, presence of inflammatory cells and thickening of the alveolar walls. In addition, exposure to Cd and Hg caused degeneration of the alveolar structures resulting in confluent alveoli. Changes in bronchiole morphology included an increase in smooth muscle mass with luminal epithelium degeneration and detachment. Prominent bronchiole-associated lymphoid tissue was present in the group exposed to Cd and Hg. Ultrastructural examination confirmed the presence of fibrosis where in the Cd exposed group, collagen fibril arrangement was dense, while in the Hg exposed group, additional prominent elastin was present. This study identified the lungs as a target of heavy metal toxicity following oral exposure resulting in cellular damage, inflammation and fibrosis and increased risk of respiratory disease.

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Purslane (*Portulaca oleracea L.*) is one of the most widely used medicinal plant in the world and is considered the richest plant source in omega-3 fatty acids. There is an increasing trend in the search for potential power food and supplements from natural herbs especially in resource-poor countries. This study investigated the effect of the methanolic extract of Portulaca oleracea (MEPO) on the reproductive cycle of normal cyclic ovariectomized Wistar rats. Twenty (20) normal cyclic rats (150 - 200 g) were divided into four group (n=4); control group received no treatment, OVX group was ovariectomized and received no treatment, OVX 400 and OVX 800 groups were ovariectomized and received 400 mg/kg and 800mg/kg MEPO respectively. All the ovariectomy procedures followed the approved standardized anaesthetic and surgical procedures. All MEPO daily administrations were done orally for 14 days before the sacrifice of the animals by cervical dislocation on the 15th day. Our results showed a significant decrease in the serum testosterone and estradiol (E2) levels in OVX, OVX 400 and OVX 800 groups when compared to the control. The serum progesterone levels were only significantly increased in OVX 400 and OVX 800 groups when compared to the control while FSH and LH serum levels showed no significant change across all groups. Cytological examinations showed significant alterations in the oestrus cycle of OVX, 0VX 400 and OVX 800 groups compared to the control group. MEPO showed no ameliorative ability in ovariectomy-induced reproductive toxicity in normal cyclic rats.

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Tessier craniofacial clefts numbers 3 and 4 are congenital abnormalities that result in a partial or total defect of craniofacial tissues thereby seriously influencing the patient's appearance and impair normal functioning. Therefore, understanding these defects is paramount to relieving the burden caused by this disability. The objective of this review was to examine the literature on the understanding of the knowledge of morphology and anthropometry of Tessier craniofacial clefts numbers 3 and 4 so that areas yet to be fully understood by research can be identified for future research.

Relevant studies from 1976 to the present were identified. The following databases were searched for peer-reviewed literature viz., PubMed, MEDLINE, EBSCOhost, Google Scholar, and the Cochrane library. The study selection was guided by the eligibility criteria. Majority of the studies included were conducted in middle-income countries (54.5%) and some in high-income countries (45.5%); none was recorded from low-income countries. In all the studies 120 cases were examined of which 67 were male and 53 were female. The majority (97%) of the studies reported on the morphology while 12.1% of the included studies reported on anthropometry.

Findings showed evidence of the knowledge of morphology and anthropometry of Tessier craniofacial clefts numbers 3 and 4. However, this has not translated to universally recognized ways of repairing these clefts due to the sparse amount of studies on Tessier craniofacial clefts numbers 3 and 4. Hence the need for future research that will focus more on anthropometry of these clefts.

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The vertebral arteries (VA) traditionally arise from the superoposterior aspect of the first part of subclavian artery. Rare variations of the VA origin include left VA arising from the aortic arch distal to the left subclavian artery, dual origin of VA and aberrant right VA. Other variant origins include the thyrocervical trunk, the brachiocephalic trunk, the common carotid artery, and the external carotid artery. We report a case of a 39-year-old male who presented with a left VA originating directly from the arch of aorta. The left VA was hypoplastic with a diameter of 1.58mm compared with 3.17mm on the right at the first segment. The first segment of the left VA was 67.11mm in length. At the point of joining the contralateral VA to form the basilar artery, the lumen of the left VA became very thin and barely contributed to the vertebrobasilar system. The right VA solely formed the basilar artery. The right VA took its origin from the supero-posterior aspect of the subclavian artery with a lumen diameter of 3.17mm. Both VAs entered the transverse foramen of the sixth cervical vertebrae. Because variation in the origin and anomalous proximal course of the VA are dangerous during surgery of the aortic arch or lower neck region, surgeons should be aware of these variations. Recognition of variation is important in angiography to minimize patient discomfort by reducing examination time, assist in accurate identification of the artery to promote safety and help in interpretation of preoperative images.

F.T., MOICHELA[1], G.A., ADEFOLAJU[2], R., HENKEL[3,4], C.S., OPUWARI[2]. [1] Department of Medical Sciences, Faculty of Health Sciences, University of Limpopo, Private Bag X1106, Sovenga, 0727, [2]Department of Pre-Clinical sciences, Faculty of Health Sciences, University of Limpopo, Private Bag X1106, Sovenga, 0727, [3]Department of Medical Biosciences, Faculty of Natural Sciences, University of the Western Cape, [4]American Center for Reproductive Medicine, Cleveland, Clinic, Cleveland, OH. ***In vitro*** **effects of** ***Moringa oleifera*** **leaf extracts on human sperm functions.** **chinyerum.opuwari@ul.ac.za.**

Moringa oleifera (MO) has been shown to possess numerous phytochemical constituents, most of which are potent antioxidants with free-radical scavenging activities. The cause of infertility in males is strongly correlated with poor semen quality while the aetiology remains elusive at large. However, oxidative stress due to high levels of reactive oxygen species (ROS) has been recognized as a major factor causing male infertility. Therefore, this study aimed to evaluate the *in vitro* effects of MO on human sperm functions.

Semen samples were obtained from 25 healthy donors, washed with Human Tubular Fluid-BSA medium and treated with aqueous leaf extract of MO at final concentrations of 0, 0.625, 6.25, 62.5 and 625 µg/ml for 1 hour. Following incubation, sperm motility, vitality, mitochondrial membrane potential (MMP), ROS production, capacitation and acrosome reaction were determined.

Leaf extract of MO resulted in a significant ($p < 0.001$) decrease in intracellular ROS production at the highest concentration used (625 µg/ml) and a significant ($p < 0.05$) increase in the percentage of uncapacitated, acrosome-intact spermatozoa. However, no effect on motility, vitality, MMP, and the percentage of capacitated, acrosome-reacted sperm was observed.

These preliminary results have shown a potent anti-oxidative capacity of the extract against endogenous ROS production, providing novel insights of the effect of the plant extract on the fertilizing potential of human spermatozoa.

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Aspalathus linearis is an indigenous therapeutic plant in South Africa that is commonly known as herbal tea (rooibos tea). The plant grows naturally in the Cederberg region, Western Cape of South Africa. It is rich in polyphenols including diverse flavonoids and is therefore recommended for its anti-oxidative activities including effects combating human infertility. This *in vitro* study aimed at investigating the effects of *A. linearis* on human sperm cells.

Semen samples from 25 healthy donors were washed with Human Tubular Fluid-BSA medium and incubated in medium containing the aqueous extract of fermented rooibos (0, 0.10, 1, 10 and 100 µg/ml) for 1 hour at 37ºC. Thereafter, sperm motility, vitality, mitochondrial membrane potential (MMP), sperm ROS production, and the percentage of capacitated, acrosome-reacted sperm were determined.

Results showed no effect of the extract on sperm kinematic parameters, sperm vitality, sperm ROS production, capacitation and acrosome reaction. However, exposure of sperm with fermented rooibos at 1 µg/ml caused a significant decrease in sperm MMP ($p < 0.05$).

In conclusion, fermented rooibos maintained the functionality of human sperm. However, a decrease in the mitochondrial membrane potential was observed.

C.S., OPUWARI[1], M.K., PHAAHLA[2], M.A., SETUMO[2], M.N., MATSHIPI[2], S.S.R., CHOMA[2]. [1]Department of Pre-Clinical Sciences, Faculty of Health Sciences, University of Limpopo, Private Bag X1106, Sovenga, 0727, [2]Department of Medical Sciences, Faculty of Health Sciences, University of Limpopo, Private Bag X1106, Sovenga, 0727. ***In vitro*** **effects of** ***Moringa oleifera*** **leaf extracts on TM3 Leydig cell structure and testosterone production.** **chinyerum.opuwari@ul.ac.za.**

Moringa oleifera (MO) is described as a powerful source of dietary antioxidant and might be beneficial in improving male fertility. Studies have demonstrated that oxidative stress reduces steroidogenic capacity on the Leydig cells. This study aimed to investigate the effects of aqueous leaf extract of MO on Leydig cell structure and function.

TM3 cells (25,000 cells/ml) were seeded for 24 hours and then exposed to aqueous leaf extract of MO (0, 10, 50, 100, 250, 500 and 1000µg/ml) in the presence or absence of human chorionic gonadotropin (hCG; 6mIU/200µl) for a further 24 hour. Cell viability was assessed using MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) assay and morphology using a phase contrast microscopy. The supernatant collected was used to determine the level of testosterone production (ELISA).

Results showed that aqueous MO leaf extract caused no change in the viability ($p > 0.05$) and morphology of the TM3 cells in the presence or absence of hCG. Testosterone production increased significantly at 1000µg/ml ($p < 0.05$) in the presence of hCG.

Aqueous leaf extract of MO maintained the structure and function of the Leydig cells under stimulated and non-stimulated conditions. Thereby improving spermatogenesis and fertility thereof and may be due to its beneficial antioxidant activities.

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Neurodegeneration in the hippocampus is a consequence of alcohol abuse which compromises the survival of the Central Nervous System (CNS) tissue and its self-renewal capacity. The subgranular zone (SGZ) dentate gyrus and the subventricular zone (SVZ) of the temporal lobe are two regions where adult neurogenesis occurs. Chronic alcohol use has been shown to cause neurodegeneration. So far, conventional drugs have not been clinically satisfactory in ameliorating neurodegeneration, therefore there has been a surge towards exploring the potential of nutraceuticals since they mediate their action in a multi-mechanism fashion and may have high therapeutic potentials in CNS diseases. Jobelyn is a nutraceutical that is certified by the Food and Drug Administration (FDA) of the USA. It is an herbal product prepared entirely from the intensely colored leaf sheaths of Sorghum bicolor, cultivated from the West African wild variety. This study, therefore, evaluated the effect of Jobelyn supplementation in ethanol-induced neurodegeneration of the hippocampus. Adult male rats received a regimen of ethanol or ethanol plus Jobelyn, three times daily over four days. Cytoarchitectural study of the dentate gyrus was done in slides stained with haematoxylin and eosin. Immunohistochemical analysis was performed with mice monoclonal anti-Ki67 antibody to detect proliferating neurons. Histological results showed that Jobelyn supplementation significantly lowered neurodegeneration in the dentate gyrus. Furthermore, IHC studies show that Jobelyn prevents alcohol-induced depletion of cell proliferation in the SGZ of the dentate gyrus. These findings suggest that Jobelyn may be able to help maintain the neuronal self-renewal capacity of the hippocampus.

PILLAY, D.S.,[1] R NDOU.[1] [1]School of Anatomical Sciences, Faculty of Health Sciences, University of Witwatersrand, Johannesburg, Parktown, 2193. **Microarchitecture and tensile strength of the rat femur (Sprague Dawley) at 12 weeks postnatally following maternal gestational alcohol treatment.** Diana.Pillay@wits.ac.za.

Gestational alcohol exposure impairs bone development both in fetal and postnatal life, increasing osteoporosis and fracture risk in adult life. We aimed to examine the impact of prenatal alcohol exposure on bone microarchitecture and strength in 12-week old rats. Time-mated (n=12) pregnant Sprague Dawley dams were assigned to either the ethanol (n=6) or saline control (n=6) group. The dams were treated with 0.015ml/g of 25.2% ethanol or 0.9% saline for the first 19 days of gestation respectively. Two pups from each dam were used, and terminated when aged 12-weeks, and twelve paired femora obtained per group. Each bone was wrapped in styrofoam and scanned using a 3D-µCT scanner (Nikon XTH 225L) at 15µm resolution. Trabecular thickness, number, and spacing were analysed. Then, 3-point bending tests were performed using a universal tensile tester to obtain the maximum force, displacement and time, as well as the breaking force. Bone volume to total volume ratio (BV/TV) was similar in the proximal region but smaller for the ethanol group in the distal region. The ethanol group showed fewer trabecular in both regions although trabecular thickness (TbTh) and spacing (TbSp) were similar among the groups in both regions. No significant differences between the groups were detected on any of the 3-point bending parameters. It appears that the effects of gestational alcohol exposure were not severe at 12 weeks of age supporting the theory that there is potential skeletal recovery in adult life following intrauterine alcohol exposure.

PILLAY P[1]. [1]University of Kwa-Zulu Natal. **Implementation of the Anatomical Ethics and Law module at UKZN.** soobramoneypa@ukzn.ac.za.

An integral component in a broad medical and scientific curriculum is anatomical education utilising cadavers. A major moral and ethical concern on the continent as well in our own country, is the use of unclaimed cadavers for anatomical teaching and research. In addition, there has been a drastic decline in the availability of cadaveric material for teaching and research in South Africa. Due to ethical ambiguities worldwide, cadaver procurement for teaching and research require regulations. In South Africa this is guided by the National Health Act 2003 and is regulated by statutory appointment of the provincial Inspectors of Anatomy. In order to address the restructuring of the undergraduate medical science (anatomy) programme, the Department of Anatomy at UKZN implemented a module directed at the appreciation of ethics related to the use of cadavers for teaching and research. The implementation of the anatomical ethics and law course has been critical for Medical Scientists. This course is a step in the right direction in educating the scholars at an undergraduate level of the value of the cadaver in education, fundamental debates and discussion on current trends in procurement practice; allows for discourses in establishing common ethical and legal frameworks at Universities in South Africa by addressing several cultural, religious and socio-economic concerns of all population groups.

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Maxillary nerve blocks are more commonly used for peri-operative analgesia in pediatric patients, during cleft lip and/or palate surgeries. Regional nerve blocks reduce the use of systemic analgesics, and provide safe and adequate pain relief. Following the determination of the best technique to block the maxillary nerve by Prigge and co-workers, additional measurements on the distance from the skin to foramen rotundum was required. The aim of this study was to formulate a standardized suprazygomatic approach to blocking the maxillary nerve, through the simulation on pediatric anatomical specimens.

The pterygopalatine fossa was dissected bilaterally in 50 pediatric cadavers (41 neonates and 9 infants). The distance a needle would travel from the frontozygomatic angle to the foramen rotundum, where the maxillary nerve emerges, was measured. The skin thickness at the frontozygomatic angle was also measured in order to define clinically applicable measurements for blocking the maxillary nerve within the pterygopalatine fossa, in pediatric patients.

The maxillary nerve can be located 21mm from the frontozygomatic angle in neonatal patients, and 25mm for patients younger than one year. The skin and subcutaneous tissue is on average 4.7mm and 6.3mm deep at the frontozygomatic angle in neonates and infants, respectively.

Through meticulous anatomical dissections and measurements, the study hopes to further assist health professionals to successfully perform the maxillary nerve block in pediatric patients.

RAMPHALENG, T. K.[1,2], BRIERS, N.[2], HEMINGWAY, J.[2], HOULTON, T.[2] [1]Department of Basic Medical Sciences, University of the Free State, Bloemfontein, [2]HVIRU, School of Anatomical Sciences, University of the Witwatersrand, Johannesburg. **The Face Mask Collection: The face forms of the living and the dead.** **ramphalengtk@ufs.ac.za.**

Numerous unidentified human remains are received and retained in South African forensic laboratories. Studies have widely explored the faces of living people, cadavers and crania to provide biological profiles for identification. However, research into the differences between a living and deceased person's face are currently lacking. To complicate matters further, facial morphology, which is significant to facial recognition, can differ between ancestry groups and sexes. The aim of the study was thus to investigate the degree of facial feature variation presenting in life masks and death masks using metric multivariate analysis. The Dart Collection of Life and Death Face Masks was used to collect information regarding the facial morphology of 142 life and 427 death masks. Fixed landmarks were placed on digital face mask scans (n=551) to extract the shape of the four main features of the face: the eyes, nose, mouth and chin. Between-group permutation tests were used to determine the statistical difference between the life and death face shapes. Subsequently, discriminant analysis of principal components was conducted in order to determine which facial features differ most between groups. In general, the death masks presented with significantly narrower faces, wider orbits, and smaller chins than the life masks. Additionally, the deceased had anterior-inferior pointed noses compared to the anterior-superior pointed noses of living individuals. Post-mortem faces are likely influenced by taphonomic loss in soft tissue elasticity, which can be more extensively altered by the process of casting. This must be considered when studying casts from cadaveric remains.

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In light of the great demand for the identification of unknown remains in South Africa, a need exists to establish reliable facial approximation techniques that will not only take into account sex and age, but most importantly be specific for the South African population. The aim of this study was to provide accurate statistical models for predicting nasal soft-tissue shape from information about the underlying skull substrate among a South African sample.

The database contained 200 cone beam computer tomography scans. 3D relevant anatomical structures were automatically extracted and densely landmarked using 3D template-to-mesh surface warping. An evaluation of shape differences attributed to known factors (ancestry, sex and age) was performed using geometric morphometrics. Statistical models of prediction were created using a Partial Least Squares Regression algorithm. The accuracy of the estimated soft-tissue nose shape was evaluated in terms of metric deviations on training and testing datasets.

Statistical models including additional information such as ancestry, sex and age were provided. When using the landmark-to-landmark distances, the prediction errors ranged between 1.8 mm and 2.2 mm for black South Africans at the tip of the nose and the alae, while they ranged from 2.1 mm to 2.2 mm for the white subsample.

This research demonstrates the utilisation of an automated 3D method based on an automatic landmarking method as a convenient prerequisite for providing a valid and reliable nose prediction model meeting population specific standard for South Africans.

O SAPO[1], EN L'ABBE[1], KE STULL[1,2]. [1] Department of Anatomy, Faculty of Health Sciences, University of Pretoria, [2] Department of Anthropology, University of Reno, Nevada, USA. **Estimating ancestry among South African ethnic groups.** **Okuhle.sapo@up.ac.za.**

Law enforcement and forensic pathologists often inquire from a forensic anthropologist as to whether it is possible to use skeletal remains to distinguish among South African ethnic groups. Historically, the crania of many South African groups were shown to be homogeneous, but in 2010, Franklin and colleagues, using 298 male crania, presented heterogeneity among certain groups, such as Swazi and Zulu. The purpose of this study was to evaluate craniometric variation among the eight socially designated groups, namely Venda, Tswana, Zulu, Xhosa, Ndebele, Swazi, Sotho, Pedi and Tsonga. Three hundred and fifty-seven male crania were obtained from the Pretoria Bone and Raymond Dart Collections. Eighty-five standard cranial landmarks were collected using a MicroScribe G2 digitizer and 3Skull. Data were assessed for inter and intra-observer error, descriptive statistics and discriminant function analysis. Thirty-six variables were deemed repeatable and were used in further statistical analyses, specifically Tukey's HSD test, ANOVA and Corrplots, to identify significant variables and understand correlation relationships between variables.

Low posterior probabilities were noted for each of the groups with the highest being Sotho at 0.1479(14.79%) and the LD1 only accounting 0.4998 (49.98 %) of the variation observed from the data. The OCF was the variable that had the most intergroup differences (six) of the twenty-one statistically significant variables. Currently, South African ethnic groups cannot be separated using traditional craniometrics or ILDs.

EJ SCHMIDLIN[1], M STEYN[1], TMR HOULTON[1], N BRIERS[1]. [1]Human Variation and Identification Research Unit (HVIRU), School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand. **Geometric morphometric analysis of senescent changes in South African adult male faces.** esthaschmidlin@gmail.com.

Age related changes in the facial shape of South Africans have hardly been studied. Since geometric morphometrics (GM) analyse shape using advanced statistical comparative models it is ideal for assessing complex shapes such as the face. This study provides a GM analysis of facial ageing in South African adults, addressing the lack of research on facial senescence shape changes. The sample comprised of standardized anterior 2D facial images (n=189) of individuals aged 20 years and older. Images were digitized using tpsUtil and tpsDig software. Relative warp frames, based on Procrustes superimposition, were obtained using tpsRelw. GM analysis was conducted using MorphoJ software, to account for facial bilateral symmetry. Deformation wire frames and scatterplots were generated to determine the extent of overlap in facial shape for each age decade. Principle component analysis (PCA), discriminant function analysis and canonical variate analysis (CVA) were performed to assess the relative contribution of areas of the face to overall senescence. Results indicate large areas of overlap for age related shape changes, with pronounced variations observed in the ear and nose regions. The first five principle components account for more than 80% of within-group shape variance. Discriminant function crossvalidation indicated that most age groups were differentiated. The first three canonical variates account for more than 82% of among-group variance, indicating differences between age groups. This study provides a novel analysis of facial changes in South Africans with increasing age that will increase the accuracy of facial depictions and facial image ageing in a forensic context.

SCROOBY, B., [1], WAGGIE, F, [2], REITSMA, G. [3] [1]School of Nursing Science, Faculty of Health Sciences, North-West University. [2]Interdisciplinary Teaching and Learning Unit, Faculty of Community and Health Sciences, University of the Western Cape. [3]Centre for Health Professions Education, Faculty of Health Sciences, North-West University. **From cranium to coccyx: Can interprofessional education (IPE) work for anatomy?** Belinda.Scrooby@nwu.ac.za.

Interprofessional Education (IPE) is an educational approach that provides students with an opportunity to work as a collaborative team of health practitioners in different contexts.
A mixed method approach with a multi-phase design was applied. The following data gathering methods were used: focus groups with students (n = 23) and lecturers/facilitators (n = 7), reflective journals from students and facilitators (n = 18) and also an end-of-process questionnaire (n = 14) completed by the students.

Although the facilitators experienced the process as valuable and enriching for them from a professional perspective, it was evident that it took a lot more time and effort than was anticipated. The students also experienced their lack of knowledge and experience of anatomy and its application to clinical practice as challenging, especially if they have not been exposed to a specific relevant section of work before. Apart from timetabling, formal IPE can also be restrained by factors such as space and lack of management support.

IPE facilitators need to be committed, open for collegial learning, advocates for transformation and support new working relationships. Resources that need to be considered for future IPE will be time, finances, logistical support and human resources. Reflection forms a significant part of the learning process within IPE. This study has confirmed that IPE can be implemented from the first year of study as it can create awareness of health professions' scope of practice and the application of theory to clinical practice.

IBRAHIM, M.A.,[1,3] J.C. SEREM.[2] M.J. BESTER.[2] A.W. NEITZ.[1] A.R.M. GASPAR.[1] [1]Department of Biochemistry, Genetics and Microbiology, Faculty of Natural and Agricultural Sciences, University of Pretoria, Gauteng South Africa, [2]Department of Anatomy, Faculty of Health Sciences, University of Pretoria, Gauteng South Africa, [3] Department of Biochemistry, Ahmadu Bello University, Zaria, Nigeria. **The use of peptide (alanine) scanning to understand the structure/activity relationship of SQSPA in terms of multiple antidiabetic targets**. june.serem@up.ac.za

The major therapeutic goal in the management of diabetes mellitus is to maintain favourable glycemic control. An important therapeutic strategy to control hyperglycemia in diabetic patients is through the inhibition of carbohydrate hydrolysing enzymes such as dipeptidyl peptidase-IV (DPP-IV). The peptide, SQSPA (derived from silkworm pupae) has been reported to be a potent and gastrointestinally stable alpha-glucosidase inhibitory peptide. Peptide scanning technique (alanine) was used as an experimental strategy to provide information on the structure/activity relationship of SQSPA on biological activity. This yielded 4 additional peptides AQSPA, SASPA, SQAPA and SQSAA, which were compared to diprotin A (a known DPP-IV inhibitor) all at 100 uM. *In vitro* DPP-IV inhibitory activity was assessed and all peptides had inhibitory activity (highest, SQSPA and SQSAA). Anti-glycation activity using the methylglyoxal/bovine serum albumin assay, was present with all peptides. Antioxidant activity using the oxygen radical absorbance capacity showed all peptides had activity (highest, SASPA). Nitric oxide scavenging activity showed that all the peptides had activity. Using mouse fibroblasts (3T3-L1) differentiated into adipocytes, all the peptides did not show significant ability to reduce/prevent lipid accumulation. Cytotoxicity using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay revealed that the peptides were not cytotoxic to both differentiated and undifferentiated 3T3-L1 cells with the exception of AQSPA. In conclusion, the study indicated that alanine scanning did not profoundly affect the investigated bioactivities of SQSPA suggesting that all the amino acid residues are vital for the multiple antidiabetic effects of the peptide.

SHAKOANE. G.P[1]., DUSSAULT. M.C[1]., L'ABBÉ. E.N[1] [1]Division of Physical Anthropology, Department of Anatomy, Faculty of Health Sciences, University of Pretoria, 09 Bophelo road, Gezina, South Africa, 0084. **Evaluating sexual dimorphism among South African groups using the dentition.** g.p.shakoane@gmail.com.

In archaeological and forensic investigations, a biological profile is created in order to identify an unknown individual. Sex estimation is important in this process as other aspects of the biological profile such as age-at-death, ancestry and stature depend on accurate sex estimates. Teeth are a probable source of information on sex and are often recovered in archaeological and forensic context owing to their post-mortem longevity. The purpose of this study was to examine sexual dimorphism among the dentition of modern South African populations and to assess whether the observed dental variations were useful for developing population-specific sex estimation formulae for black, coloured and white South Africans. All available teeth (excluding third molars) were used from 906 adult crania with a known demographic profile. The study used four permanent tooth crown dimensions: maximum mesiodistal, maximum buccolingual and molar diagonal diameters (mesiobuccal - distolingual and mesiolingual - distobuccal). Technical error of measurement, analysis of variance, sympercents, and discriminant function analysis were used to analyze the data. The results showed that dental dimensions are highly repeatable with low inter and intra-observer errors. ANOVA results show significant statistical differences between males and females, with males possessing larger dental dimensions than their female counterparts. All dental dimensions were found to exhibit sexual dimorphism. Discriminant functions using these dimensions provided correct classification rates of up to 87.50%. Therefore, sex estimation using dental dimensions is a reliable method and may be used to estimate sex in forensic or archaeological investigation.

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Obesity is associated with male infertility due to endocrine and testicular morphological disturbances. These disturbances are linked to visceral adipose tissue accumulation and oxidative stress. *Brachylaena elliptica (hlungu hlungu)* is one plant that is widely prescribed by traditional healers in the Eastern Cape for the treatment of infertility. We sought to investigate the effects of hydro-ethanolic extract of *B. elliptica* on obese male reproductive parameters. Obesity was developed in male rats by feeding them with high energy diet (HED) for 10 weeks. After 10 weeks, animals were divided into four groups (n=5/group): untreated normal diet, untreated HED and HED treated with 75 mg/kg and 150 mg/kg body weight *B. elliptica* extract. Testes, epididymi and visceral fat were weighed. Testes and epididymi were collected for sperm count, histology, morphometric analysis and homogenates were used for antioxidant measurements. Results showed no changes in organ weights, testosterone levels and lipid peroxidation in testes. However, treatment with *B. elliptica* resulted in restoration of testicular superoxide dismutase activity and reduced lipid peroxidation in epididymis. Seminiferous tubule histology showed detachment from basement membrane, germ cell separation and architectural disorganisation and increased seminiferous tubule lumen size in untreated obese rats. These parameters improved in a dose dependant manner with treatment. This study demonstrated that *B. elliptica* leaves have protective effects against obesity induced reproductive dysfunction and oxidative stress in obese rats.

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[1]Department of Physiology, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa, [2]Department of Anatomy, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa. **A scanning electron microscopic description of changes induced by a low-carbohydrate high-fat diet.** prashilla.soma@up.ac.za.

The contribution of unhealthy diets to the emergence of chronic diseases has greatly increased over the last decades. The aim of the study is to demonstrate the ultrastructural differences in RBCs, fibrin, and platelets in participants on a low-carbohydrate high-fat (LCHF) diet compared to controls on an unrestricted diet. 32 individuals on a LCHF diet and 32 controls were recruited. Once informed consent was obtained, blood was drawn from each participant and prepared for scanning electron microscopy. Analysis of samples revealed that the red blood cells of LCHF participants showed greater number of poikilocytes than controls. Poikilocytes identified in LCHF group included echinocytes, stomatocytes, leptocytes and dacrocytes. The platelets in some of the controls showed slightly projected pseudopodia with minimally spread lamellipodia. In most other individuals in the control group, larger platelet aggregates with extensively spread pseudopodia were detected. In contrast, platelets in the LCHF group showed minimally projected filopodia and minimally spread lamellipodia. Investigation of fibrin fibres morphology indicated the presence of thick and thin fibres for both LCHF and control groups. However, in the majority of individuals in the LCHF group, some long thin discontinuous fibres, masses of thin and thick fibres forming a net like structure and some dense matted regions were detected. Evidence from this study suggests that LCHF diet may increase poikilocytosis, the formation of dense matted clots and discontinuous fibrin fibres and reduced platelet aggregation. Morphological findings are suggestive that a LCHF diet induces inflammatory changes which have the potential to alter coagulation.

STEYN, M.[1], WHITELAW, G.[2], BOTHA, D.[1], VICENTE, M.[3], SCHLEBUSCH C.[3,4,5], LOMBARD, M.[5] [1]Human Variation & Identification Research Unit, School of Anatomical Sciences, University of the Witwatersrand, Parktown. [2]KwaZulu-Natal Museum, Pietermaritzburg, & School of Social Sciences, University of KwaZulu-Natal, Durban. [3]Human Evolution, Department of Organismal Biology, Uppsala University, Norbyvägen, Uppsala, Sweden. [4]SciLifeLab, Uppsala, Sweden. [5]Centre for Anthropological Research, University of Johannesburg. **Four Iron Age skeletons from KwaZulu-Natal revisited.** maryna.steyn@wits.ac.za.

Human skeletons are valuable sources of information on past populations. Here we report on four Iron Age skeletons discovered in the now KwaZulu-Natal Province of South Africa. This analysis includes their bio-archaeological context, general assessment, health and traumatic changes, as well craniometric analysis. aDNA data for these four individuals were reported in the literature, but here we provide a complete analysis and synthesis of findings regarding these individuals. Unfortunately some of the skeletons were fragmentary. All individuals were female, and the results include data from gene regions relating to resistance to malaria, African sleeping sickness, and lactose intolerance. It was found that strong malaria protective variants existed, and two individuals had genes that provide resistance to African sleeping sickness. None of the women exhibited lactase persistence. Both the genetic and craniometric analyses suggest West African roots. This study brings together information from a variety of sources, including biological anthropology, aDNA, isotope values and archaeological interpretation and provides a rich context for these individuals. Such an approach offers considerable opportunities for an in depth understanding of the past and the individuals who inhabited these regions long ago.

STEYN, C.,[1] M.R. CROLE,[1] J.T. SOLEY[1] [1]Department of Anatomy and Physiology, Faculty of Veterinary Science, University of Pretoria, Pretoria, Gauteng, South Africa. **Morphology of the *Manus* of Temminck's ground pangolin (*Smutsia temminckii*)**. christine.steyn@up.ac.za.

The endangered Temminck's ground pangolin is the only pangolin in South Africa. The strong manus is important for obtaining food via scratch-digging and may display some unique features.

Thoracic limbs from four Temminck's ground pangolins (3.2 – 8.3 kg), which succumbed from various causes, were removed and immersion-fixed in 10% neutral-buffered formalin. The osteology and myology of the manus was radiographed, dissected and described.

The seven carpal bones all possessed a unique shape. Each Facies articularis of the short, wide metacarpal bones reflected the undulating distal surface of the distal carpal bones. The proximal phalanges were short. The middle phalanges presented the Tuberositas flexoria while the long distal phalanges possessed the Processus extensorius and the prominent bifid Processus unguicularis. The muscles of the Manus included those that act on the carpal and digital joints simultaneously, those that act on the metacarpophalangeal joints and those that act specifically on digits I and V. The first group functioned mainly as extensors and flexors and all possessed notable tendons of insertion. The second group acted as flexors and were arranged palmarly. The individual muscles of the third group will either flex, abduct of adduct the individual digits.

The bones of the Manus possessed a similar arrangement and number to the domestic dog. The morphology of the Manus indicates the animal's adaptation to scratch-digging by shortening of the digging lever. Each digit is activated by well-developed muscles, increasing dexterity during digging. Radiological views may assist clinicians when treating an injured pangolin.

SUTHERLAND, C.[1], L'ABBÉ, E.N.[1], DU TOIT, P.H.[2], 1Physical Anthropology Section, Department of Anatomy, Faculty of Health Sciences, University of Pretoria, 2Department of Humanities Education, Faculty of Education, University of Pretoria. **An inductive approach to gauging student acceptance and understanding of evolution.** clarisa.sutherland@up.ac.za

This study explores the usefulness of an open-ended hand-written approach to gauging student understanding of and perceptions about evolution. Writing about evolution – at all levels of understanding - functions as an efficient learning exercise. The act of writing allows students to conceptualise their understanding and reflect on new learning. Formal assessments in evolution courses are often in the form of written answers, and the exercise of writing in class followed by feedback, further aligns the method of facilitation with the method of assessment.

Text data from a learning task in an undergraduate physical anthropology module were gathered over two consecutive years. The data were analysed qualitatively and inductively, first by codes and then by themes. In accordance with the action research design of the study, results from the first iteration of the learning task informed the design of the following iteration. Analyses exposed commonly held misconceptions about evolution, which aligns with common misconceptions found in other studies. The anonymous submission of written pieces allowed the opportunity for students to disclose their opinions honestly and without fear of judgement. Interestingly, many respondents disclosed a change of opinion, either implicitly or as self-contradictions in their writing. It is hypothesised that the act of writing can assist students who struggle with border-crossings between opposing worldviews.

With many iterations of this activity, facilitators can begin to develop deductive tools, which they can use to address specific problems in understanding and to design future learning opportunities.

TAUTE, H.[1], BESTER, M.J.[1], GASPAR, A.R.M.[2] [1]Department of Anatomy, Faculty of Health Sciences, University of Pretoria, Gauteng South Africa, [2]Department of Biochemistry, Genetics and Microbiology, Faculty of Natural and Agricultural Sciences, University of Pretoria, Gauteng South Africa. **The dual functionality of antimicrobial peptides Os and Os-C in human leukocytes.** **helena.taute@up.ac.za.**

Antimicrobial peptides (AMPs), Os and Os-C, have been identified as multifunctional peptides with antibacterial, anti-endotoxin, and anti-inflammatory properties. For further development of Os and Os-C as therapeutic peptides, it is essential to evaluate these effects in human mononuclear (MN) and polymorphonuclear (PMN) leukocytes. The cytotoxicity and effects of both peptides on MN and PMN morphology, the ability to induce reactive oxygen species (ROS) and to protect against oxidative damage and to cross cell membranes in both cell populations was evaluated. At the minimum bactericidal concentrations of Os and Os-C, neither peptide was cytotoxic. Os caused morphological features of toxicity at 100 µM, entered MN cells, and also protected these cells against oxidative damage. Os-C caused MN and PMN leukocyte activation associated with ROS formation and was unable to penetrate cell membranes, indicating extracellular membrane interactions. This study confirms that both Os and Os-C at less than 100 µM are not cytotoxic. The MN-specific uptake of Os identifies it as a cell specific cargo-carrier peptide, with additional anti-inflammatory properties. In contrast, the ability of Os-C to activate MN and PMN cells implies that this peptide should be further evaluated as an AMP, which, in addition to its ability to eradicate infection, can further enhance host immunity. These novel characteristics of Os and Os-C indicate that these AMPs can be further developed for specific applications.

THEYE C.E.G.,[1] M. STEYN,[2] A.C. OETTLE.[1,3] [1]Department of Anatomy, Faculty of Health Sciences, University of Pretoria, Gauteng, South Africa, [2]School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Gauteng, South Africa, [3]Department of Anatomy and Histology, School of Medicine, Sefako Makgatho Health Sciences University, Gauteng, South Africa. **Accuracy and reliability of three-dimensional (3D) macroscopic and microscopic measurements performed on Cone-Beam Computed-Tomography (CBCT) and Micro-Focus X-Ray Computed-Tomography (micro-CT) - based reconstructions of the mandible.** charlotte.theye@gmail.com.

CBCT is widely employed in dentistry, as it provides easy, safe and quick information on patients' dental tissues and maxillo-facial skeleton. The accuracy of CBCT-based 3D reconstructions and measurements on dental samples has been extensively studied. However, the reliability of using CBCT in assessing microstructural parameters, has not been fully ascertained yet. We aim here to evaluate the accuracy and reliability of CBCT-based linear and volumetric measurements in comparison to micro-CT, considered as the gold standard.

The sample, comprising 24 dried mandibles from the Pretoria Bone Collection (UP), was scanned by both micro-CT (68-78 microns) and CBCT (200 microns). Following 3D reconstruction, alignment and registration (using the micro-CT-volume as reference), external measurements, cortical thicknesses and histomorphometric parameters were collected. Colour- coded deviation maps were generated to visualise the general volumetric discrepancies between the two scanning modalities.

Statistical tests showed no significant differences between CBCT and micro-CT for the external measurements or the cortical thicknesses. However, regarding the histomorphometric parameters, cortical bone densities were statistically different between the two modalities, even if in strong agreement according to Bland-Altman plots. The maps showed that the maximum discrepancies were mainly localised at the ramus, and more particularly at the upper parts (condylar and coronoid processes).

A good correlation was demonstrated for the linear measurements between micro-CT and CBCT, confirming the versatility of CBCT, even with a relatively low resolution of 200 microns. However, the uncertainty still associated with the histomorphometric parameters must be taken into account if used in a clinical setting.

S VAN DER WALT[1], AY WIID[2] AND AC OETTLÉ[1,2]. [1]Department of Anatomy and Histology, Sefako Makgatho Health Sciences University, South Africa, [2]Department of Anatomy, Faculty of Health Sciences, University of Pretoria. **Variations in the subpubic angle in South Africans considering possible clinical implications.** Sone.vanderwalt@smu.ac.za

Variations in the subpubic angle need to be considered when planning childbirth, as well as for procedures involving the perineum. Although variations have been described, studies considering the extent of these differences when procedures are planned are limited. The aim of this study was to document the size of the subpubic angle by means of four modalities in South Africans (European (SAE) versus African ancestry (SAA)).

The subpubic angle was measured by a protractor and also derived from 3D digitised points on a total of 121 intact cadaver pelves at the University of Pretoria and Sefako Makgatho Health Sciences University. The subpubic angle was also measured on 77 magnetic resonance images (MRI's) and 92 computed tomography (CT) scans. Basic descriptive statistics and ANOVA analyses were performed.

Females of both population groups presented with a significantly larger subpubic angle than the male population group. SAE females presented with the widest subpubic angles, while SAA females corresponded to other African groups reported in the literature and were larger than in SAA males. Correspondence with cadaver measurements were inferior in MRI compared to CT.

The modality and technique used should be considered when comparing results. The values of the subpubic angle reported in this study could serve as a reference when interpreting the extent of deformation caused by the healing of a fractured inferior pubic ramus. Pre-operative pelvimetry by means of MRI or CT scanning for comparison with population specific reference values could be useful when considering childbirth options or other urogynaecological procedures.

VAN SCHOOR, A.[1], BOSMAN, M.C.[1], VENTER, G.[1], BÖSENBERG, A.T.[2]. [1]Department of Anatomy, School of Medicine, Faculty of Health Sciences, University of Pretoria, Pretoria, South Africa. [2]Department Anesthesiology and Pain Management, Seattle Children's Hospital, Seattle, USA. **Anatomy of the sacral canal relevant to caudal epidural blocks in low birth-weight neonates.** albert.vanschoor@up.ac.za.

Information regarding the position and relationship of vital structures within the caudal canal is important for anesthesiologists who perform a caudal block. This information can be acquired by anatomical dissection, with ultrasound technology, or radiological studies (CT scan, MRI). The aim of this study was to determine the position of the dural sac in a sample of 31 formalin-fixed neonatal cadavers by measuring the distance of the termination of the dural sac from the apex of the sacral hiatus.

The sample included extremely low birthweight to low birthweight neonates (range: 0.7 – 2.4kg). In 31 neonatal cadavers, the mean distance from the apex of the sacral hiatus to the dural sac was 9.47mm. This distance ranged – with a 95% confidence interval – between 8.44mm and 10.50mm. Despite there being no statistical difference between the sexes ($p = 0.76573$), in the male cadavers ($n = 19$) the distance to the dural sac ranged between 8.09mm and 11.08mm; while in the females of the sample ($n = 12$) this measurement ranged between and 8.01mm and 10.56mm. Anesthesiologists should be aware of the short distance between the sacral hiatus and the dural sac when performing caudal blocks, the shortest distance was 4.94mm.

Armed with this knowledge caudal techniques should be modified to improve the safety and reduce the risk of complications, such as dural puncture.

D.J. VAN TONDER[1], A.N. VAN SCHOOR[1], M.L. VAN NIEKERK[2]. [1]Department of Anatomy, Basic Medical Sciences Building, Prinshof Campus, Faculty of Health Sciences, University of Pretoria, South Africa, [2]Department of Paediatric Surgery, Faculty of Health Sciences, University of Pretoria. **The anatomical analysis of the femoral and great saphenous veins for gaining vascular access in a South African neonatal sample.**
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In neonatal intensive care units, the need to provide paediatric patients with parenteral nutrition, medication, or monitoring patient's condition, is satisfied by making use of vascular catheters either inserted into veins, arteries or into the bone marrow. The aim of this study is to investigate the dimensions and location of the femoral (FV) and great saphenous veins (GSV) in a South African neonatal sample.

Both the FV and GSV in the proximal anterior thigh of 30 neonates were exposed by two transverse incision, at the trans-tuberous line and the mid-thigh. Another midline incision was made extending from the trans-tuberous to the incision made at the thigh. With blunt dissection, the FV, GSV, femoral artery, and nerve was cleaned and pinned. The GSV at the medial malleolus (MM) was exposed in 30 neonates by reflecting the skin and the removing superficial fascia.

The results indicate that the FV can be found two-fifths the distance from the pubic tubercle (PT) to the ASIS, it courses inferior to the inguinal ligament at an angle of 90.63 ±3.79 degrees, and had a diameter of 2.72mm ±0.14mm. The GSV in the proximal thigh can be found one-third the distance. At the MM the GSV diameter is 1.09mm ±0.09mm and from the MM the vein was found 2.18mm ±0.34mm anterior and 3.18mm ±0.38mm superior.

From these results it is possible to provide medical professionals with guidelines and sound knowledge of the anatomy of the area.

M VIRUPAKSHAMURTHY[1], M.D. PRAMEELA[1], R VADGAONKAR[1], M.M. PAI[1]. [1]Department of Anatomy, Kasturba Medical College, Mangalore-575004, A Unit of Manipal Academy of Higher Education, Manipal, Karnataka, India. **A morphometric study of tibial pes anserinus and its importance in reconstructive knee surgeries.** murali.manju@manipal.edu.

Pes anserinus tendons are utilized for the reconstructive surgeries and hence it is desirable that the operating surgeon should have understanding of the surface anatomy of pes anserinus. In this context, the present study was planned to determine the dimensions of pes anserinus, distance of its upper and lower ends from the tibial tuberosity and also the vertical distance to its lower limit from the tibial tuberosity.

The present study involved 53 formalin fixed adult human cadaveric lower limbs. The dimensions were measured by using the digital Vernier callipers. The data thus obtained were analysed using the SPSS and represented as mean ± SD.

According to our findings, the pes anserinus length, width, distance of its upper and lower ends from the tibial tuberosity, vertical distance of its lower limit from the tibial tuberosity were 46.7±14.4 mm, 38±8.5 mm, 43.8±10.8 mm, 52.3±9.9 mm and 37.9±13.5 mm respectively.

We believe that the present study has provided important morphometric data about the dimensions of pes anserinus related to the guy ropes. The preoperative knowledge about the dimensions will help the operating plastic and orthopaedic surgeon to plan an accurate skin incision, decrease the donor site morbidity and prevent the biomechanical instability of the pes anserinus grafts. The results can also be used as a morphological database for sample population considered in this study.

VORSTER, C.[1]; GOVENDER, S[1]. [1]Department of Basic Medical Sciences, Faculty of Health Sciences, University of the Free State, Bloemfontein, South Africa. **The potential harmful effects of exposure to embalmed cadavers on first year medical students at the University of the Free State.** VorsterC@ufs.ac.za

Dissection of embalmed cadavers form part of the fundamental teaching and learning practices of gross anatomy globally. However, emissions and direct contact with the noxious chemicals, used for embalming were observed to have a harmful effect on the physical and physiologic well-being of those involved.

The present study aimed to determine the potential harmful effects of exposure to embalmed cadavers on first year medical students during routine dissection.

First year medical students at the UFS were asked to voluntarily partake in this study. Twenty-nine students met the inclusion criteria. Students suffering from any pulmonary ailment or being a smoker at the time of the study were excluded.

Students were required to simultaneously partake in 3 pulmonary function tests, via spirometry, and complete 3 written questionnaires: prior to dissection, immediately post-dissection and 24 hours post-dissection. Analysis revealed an increase in the incidence of symptoms post-dissection, diminishing gradually over the next 24 hours. Symptoms included: burning eyes, dizziness, sneezing, shortness of breath and predominantly an irritation of the nose and throat, which was statistically significant (55.2%, $p \leq 0.01$ post-dissection). Pulmonary function tests pre- and post-dissection did not differ statistically ($p \geq 0.05$).

Exposure to embalmed cadavers may not play a direct role on cutaneous irritation, as students are well clad in protective gear. However, vapours released from the embalmed cadavers and inhaled may result in upper respiratory ailments. Alternate methods of cadaveric embalming should be considered, as this provides a safer working environment and overall improved student willingness to dissect.

XHAKAZA, N.K,[1] B. ROETS,[3] J. MTHOMBENI,[3] I. NGCAKAZA,[3] E.F. MBARGIORGU,[4] P. NKOMOZEPI.[2] [1]Department of Anatomy and Histology, Sefako Makgatho Health Sciences University, Ga-rankuwa, Pretoria, South Africa [2] Department of Human Anatomy and Physiology, [3]Department of Biomedical Technology, University of Johannesburg, Doornfontein, South Africa, [4] School of Anatomical Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa. **Is information obtained from a single testicular biopsy in boars representative of the whole organ?** nkosi.xhakaza@smu.ac.za.

Testicular biopsy is a technique used in veterinary medicine to investigate low fertility or suspected cancer. Tissue obtained through biopsy is often used to assess and quantify spermatic function in reproductive medicine. Occurrence of hematomas between the testicular tissue and tunicae, or between the scrotum and tunicae are common complications of testicular biopsy. Testicular biopsy in boars is made difficult by the high vascularisation of testis. Liepa et al., (2014) reported reduced possibilities of traumatising blood vessels in boar testicles by using ultrasound guided biopsy. This method is expensive and has limited application in commercial swine farming hence most biopsies are usually sampled from the centre of the testis to reduce vascular complications. Human testes show differences of structural elements in polar and equatorial zones of the testes. This study aimed to investigate topographical changes in structural elements of the boar testes to ascertain whether one biopsy can be representative of the whole testis.

Testicular tissue was sampled from the medial and lateral sides of the polar and equatorial zones of each testicle. Testes were obtained from three breeds of boars available in South Africa. Tissue from each sampling field was fixed in formalin, processed for paraffin, sectioned at 3µm and stained with haematoxylin and eosin . Images were captured using a microscope equipped with Leica imaging software. Quantification was done using Image J.

Seminiferous tubular parameters and structural elements were not significantly different in all the sampling fields. Our findings suggest that one biopsy is representative of the whole organ in boars.