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Do pancreatic islet cells originate in rhombencephalic neurectoderm? By ANN ANDREW and BEVERLEY KRAMER. *Department of Anatomy, University of the Witwatersrand Medical School, Johannesburg 2001, South Africa*

It has been proposed that pancreatic islet cells (which are APUD cells) arise from neurectoderm. This has already been disproved for trunk levels. To test the hypothesis for rhombencephalic levels, lengths of rhombencephalon containing neural crest were transplanted isotopically and isochronically from quail embryos to 6- to 9-somite chick embryos. The presence of the quail nuclear marker in cranial and enteric ganglia and pancreatic nerves provided evidence of successful neural crest migration from the grafts. Islet cells showing the features of APUD cells at 3½ days of incubation showed no quail marker; nor did islet cells demonstrated by histological methods or electron microscopy at 7 to 11 days. In these twelve embryos various levels (metencephalon, myelencephalon and the levels of somites 1 to 5) were represented in the grafts nine to twelve times each. It is concluded that the types of islet cell distinguished are not derived from rhombencephalic neurectoderm.

Differentiation and development of the pancreatic islet cells in the chick embryo. By DIANNE VAN DER MEULEN. *Department of Physiology, Faculty of Medicine, University of Natal, Durban*

The chick pancreas first appears on the third day of incubation, evaginating from the gut. Fusion between the single dorsal and paired ventral buds begins on the sixth day and is completed by the tenth. Glucagon and insulin are detectable in the dorsal bud at three and four days respectively, but not in the ventral tissue until the thirteenth day.

In the present study, pieces of dorsal and ventral pancreatic bud from 3–4 days white Leghorn embryos were cultured separately and in combination as chorio-allantoic grafts. After varying lengths of time the grafts were examined histologically for the presence of pancreatic islet cells.

As yet relatively few long term cultures have been achieved. However, no cultures of ventral bud only showed any islet cells. This suggests that the ventral bud may be dependent in some way on the dorsal for the differentiation of islet cells.

Preliminary report on experiments in connection with the development of the cartilaginous nasal capsule in *Gallus domesticus*. By R. J. ROSSOUW. *Department of Anatomy, University of the Orange Free State, Bloemfontein*

The extirpation of nasal placodes and parts thereof at Stage 19 (Hamburger & Hamilton, *J. Morph.* **88**, 1951) has focused attention on the differentiation potential of the nasal placode. The fusion of the trabeculae can be regarded as the beginning of the cartilaginous nasal capsule because the prenasal process, septum and interorbital septum originate in trabecular material. The parietotectal cartilage requires placodal as well as trabecular tissue. The antorbital plates do not develop from the placode, but have a multiple origin, *inter alia* neurectoderm (Toerien & Rossouw, *S.A. J.Sci.* **73**, 1977). The posterior part of the lateral wall of the placode is the active zone and contributes to the formation of the vestibular, primary and secondary conchae.

Preliminary report on the origin of the elements of the ear capsule. By L. DE JAGER. *Department of Anatomy, University of the Orange Free State, Bloemfontein*

The origin of the cartilaginous ear capsule is explained in terms of two theories, namely, that it originates from the ear placode cells or that the ear placode induces the surrounding mesento-

derm cells to produce the capsule. The cochlear part of the ear capsule presents another problem: in *Gallus domesticus* it occurs as a unit with the parachordal cartilage – there is no line of fusion between cochlear capsule and basal plate. From experimental data where transplants of radioactive ear placodes were utilized, the conclusion was reached that the cartilage which surrounds the anterior part of the cochlea did not originate in the ear placode – which can serve to reinforce the theory that the cochlear capsule originates in the parachordal cartilage.

Development of cervical vertebrae in mice. By E. N. KEEN. *Department of Anatomy, University of Cape Town Medical School*

It is widely held that the transverse processes of cervical mammalian vertebrae develop from true transverse and costal elements. The evidence includes comparative anatomy and evolutionary ideas, and has been supported by some embryological investigations. These have, however, been more concerned with the pattern of vertebral origin from somites, and the development of true ribs in relation to the vertebrae.

Examination of mouse embryos, from 11 days to term, by serial transverse sections of the cervical and upper thoracic column, using alcian blue to detect the earliest formation of cartilage, was undertaken. The earliest event is the formation of the vertebral artery, which precedes chondrification. The earliest vertebral cartilage appears behind the artery, and spreads into the vertebral arch and on each side of the artery as a single chondrification centre. The subsequent ossification centre starts and spreads similarly.

This investigation offers no embryological support for a double origin of cervical transverse processes.

X-inactivation patterns in X-autosome and X-Y translocations in humans. By RENÉE BERNSTEIN. *Cytogenetics Unit, Department of Human Genetics, South African Institute for Medical Research, Johannesburg*

Inactivation studies of X-autosome translocations show characteristic patterns determined by selection of the most viable genotype and phenotype, and the postulated existence of an intact X-inactivation centre on the X-long arm. In balanced translocations the normal – X is non-randomly inactivated, whereas in unbalanced translocations the translocation X is non-randomly inactivated. Studies of an unbalanced X;15 translocation in a phenotypically abnormal girl showed non-random inactivation of the translocation – X, without spreading to the attached autosome.

The phenotype of patients with an X;Y translocation depends on the presence or absence of male-determining genes, the extent of X-chromosome deletion, and the inactivation pattern, which has varied in the few cases reported.

Two phenotypic males investigated by us showed non-random inactivation of the normal X in one case and random inactivation in the other.

Thymidine substitution by 5-bromodeoxyuridine (BUDR) in metaphase chromosomes. By P. A. VENTER. *Department of Genetics, Tygerberg Hospital and Medical School, Tygerberg 7505, South Africa*

The DNA synthesis pattern of human chromosomes and chromosome segments is demonstrated with differential staining methods, using 5-bromodeoxyuridine (BUDR) as a substitute for thymidine during the S-phase of the cell cycle.

1. A similarity was observed between the bright Q-bands of untreated chromosomes and the late replicating segments of chromosomes substituted with BUDR. Exceptions were noted in the secondary constrictions of chromosomes 1, 9 and 16.

2. Chromosomes 13, 18 and 21 of the D, E and G groups respectively of the human karyotype are shown to be those that replicate late when compared to the other chromosomes in their respective groups.

3. The DNA synthesis patterns of the X and Y chromosomes in 46, XY females, 46, XX males and the 47, XX·Y Klinefelter syndrome, are similar to those found in normal 46, XX females and 46, XY males.

4. The abnormal X-chromosome in structural X-chromosome abnormalities Xr, Xiq, Xdelq. is shown to be the inactive, late replicating chromosome.

5. In balanced X /autosome translocations namely $X/7$ and $X/3$ of phenotypically normal individuals, the morphologically normal X -chromosome is found to be late replicating and thus the inactive chromosome.

The helicoidal occlusal plane. By P. V. TOBIAS. *Department of Anatomy, University of the Witwatersrand Medical School, Johannesburg*

The pitch of the occlusal plane may vary along the tooth-row. When anterior cheek-teeth show a plane sloping upward palatally, and posterior cheek-teeth are sloping upward buccally there results a twisted or helicoidal occlusal plane. The helicoid seems to result from differences in upper and lower alveolar arch widths.

In the sixties a moderate helicoid was observed in Olduvai *H. habilis* teeth. Subsequently, Wallace showed the helicoid to be absent from Australopithecines, but present in Swartkrans *Homo*, SK 45 and SK 80.

Recent studies on *H. habilis* confirm that all show the helicoid, including Stw 53 found at Sterkfontein in 1976. Hence, this trait distinguishes between *Australopithecus* and early *Homo*. In *A. africanus* arch widths increase to a maximum at M^3 ; in early *Homo* maxillary arch widths are greatest at M^2 and decline to M^3 .

The narrowed posterior maxillary arch is part of a general posterior reduction; even M^2 and M^3 are shortened. The onset of posterior arch reduction, with the consequence that a helicoid appears, marks the transition from *A. africanus* to *H. habilis*.

Some functional aspects of the Australopithecine metacarpus. By D. E. RICKLAN. *Department of Anatomy, University of the Witwatersrand Medical School, Johannesburg*

Six fossil hominid metacarpals were recently obtained from Sterkfontein, Transvaal, and are believed to be of *Australopithecus africanus*. Three are third metacarpals, two are fourth metacarpals, and one is a fifth metacarpal. They are analysed from a functional aspect.

They have no knuckle-walking shelves as in the African pongids, indicating that *A. africanus* was not adapted to knuckle-walking. The presence of shallow sesamoid grooves on the ventral aspect of the head, similar to those found in man (but differing from the deep grooves found in the baboon; and the absence of grooves in the pongids) indicates that the palmigrade and brachiating modes of locomotion were not used; but the palm may have been used in a similar way to that of modern man.

Grossly large tubercles for insertion of extensores carpi radialis and ulnaris indicate that these muscles were well developed. These muscles stabilize the wrist joint against such actions as chopping, hammering and striking.

These observations may indicate that *A. africanus* could have wielded tools habitually.

Normal dermatoglyphic variation in South Africans. By H. J. GRACE. *Natal Institute of Immunology, PO Box 820, 3600 Pinetown*

Palm and finger prints were obtained from 1550 volunteers representing the White, Indian, Zulu and Coloured ethnic groups in Durban. Digital and total ridge counts were made, finger pad pattern frequencies were recorded, and on the palm the a-b ridge count was made and the frequency and locations of patterns were noted.

Significant sex differences in ridge counts and pattern frequencies were found in each population, and each sample showed certain dermatoglyphic idiosyncrasies: the Indians had a very high frequency of whorls; the Whites had twice as many radial loops as did any other group; the Zulus had pattern frequencies reminiscent of those reported in Khoisan. Interestingly, the Natal Coloureds had dermatoglyphic features resembling those of the Indians. It is suggested that this does not reflect a large Indian contribution to the miscegenation that led to the Natal Coloureds, but rather that the Coloureds have retained the complex patterns which mask the simpler ones derived from White and Zulu ancestors.

Langerhans cells in the epithelium of the bovine forestomach: their role in the primary immune response. By W. H. GERNEKE. *Faculty of Veterinary Science, University of Pretoria*

Dendritic, migratory, lymphoid cells identical to the Langerhans cells of the epidermis have been found in the bovine forestomach. They also possess the characteristic Langerhans cell

granules. It can be assumed that these epithelial lymphocytes (or Langerhans cells) as has been reported for the epidermal Langerhans cells, are antigen detectors and therefore form the first line of defence in the general immunological response of the body. The author suggests that the Langerhans cells of the forestomach be named epithelial lymphocytes. The existence of Langerhans cell granules has not yet been reported in the epithelial lymphocytes of the true stomach, intestines and respiratory epithelium (*J. S. African Vet. Assoc.* **48**(3), 1977).

A preliminary report on the ontogeny of the columella auris of the loggerhead turtle, *Caretta caretta*. By G. H. FRANK. *Department of Zoology University of Durban-Westville*

Ontogenetic studies of recent archosaurs (Crocodylia and Aves) and published data concerning lepidosaurs have shown that the columella auris in these forms may be derived from the same basic pattern probably present in their common tetrapod ancestor which in turn is directly derivable from conditions in their rhipidistian ancestor. The earliest anlagen of the hyoid arch observed in *Caretta* are blastematous nodules representing the cerato- and epi-hyal with pharyngo-hyal material totally lacking. Thus initially the columella of *Caretta* is virtually identical with that of *Crocodylus*. Preliminary work on several later stages has, however, revealed a marked divergence in their further development. Except that the most distal tympanic process seems to have a separate origin, the columella of *Caretta* is a simple continuous rod entirely lacking in processes or evidence of other hyoid arch elements. Its columella thus appears to be more specialized than that of Aves. This observation is diametrically opposed to the primitive phylogenetic position usually accorded to chelonians.

Pancreatic polypeptide and somatostatin in chick pancreas: one cell type or two? By BENJAMIN RAWDON and ANN ANDREW. *Department of Anatomy, University of the Witwatersrand Medical School, Johannesburg 2001, South Africa*

Certain histochemical and histological features indicate that avian pancreatic polypeptide (APP) and somatostatin occur in different pancreatic endocrine cells. However, their apparent ultrastructural similarity (Larsson *et al. Histochem.* **42**, 1974) suggested to us that these hormones might be produced by a single cell type.

APP, somatostatin, glucagon and insulin were demonstrated in splenic and duodenal lobes of newly hatched chicks by an indirect immuno-enzyme technique.

APP cells are scattered in the exocrine parenchyma. A few are associated with insulin-containing B islets and occasional cells occur in glucagon-containing A islets. Somatostatin-immunoreactive cells are distributed peripherally in A and B islets and are dispersed in the exocrine tissue.

Several fields were compared in the splenic and duodenal lobes of three individuals. In no case were APP and somatostatin-immunoreactivity localized in the same cell. Therefore it is likely that the described differences between APP and somatostatin cells are valid (see Larsson *et al. op. cit.*; Andrew, *Proc. Electron Microsc. Soc. S. Afr.* **6**, 1976).

The indentation profile of the liver. By J. C. ALLAN. *Department of Anatomy, University of the Witwatersrand Medical School*

With radio-isotope imaging of the liver, the outline shape is one of the criteria used in the diagnosis of disease. The normal embalmed liver has indentations of varying degree on its superior, inferior and right lateral profiles and a knowledge of these is essential if accurate isotope diagnosis is to be made.

The superior indentation straddling the right and left lobes may be exaggerated by an enlarged heart or by upward protrusion of the right lobe. Moderate indentation of the right lateral profile is often present but the cause is seldom apparent, although occasionally it is due to compression by ribs. The 'gallbladder' notch may or may not be present and its presence does not always indicate the position of the gallbladder. The 'falciform ligament' notch is not always present but may vary in depth from zero to a deep cleft leaving only a narrow isthmus between right and left lobes.

Persistent sciatic artery. By P. M. DE BEER KAUFMAN. *Department of Anatomy, University of the Witwatersrand Medical School*

An unusual vascular anomaly of the lower limb is described in a South African Negro male cadaver. The anomaly is persistence of the sciatic or axial artery. The findings are discussed with reference to the embryological development of the arterial supply to the lower extremity.

The intermandibular cutaneous glandular area and infraorbital gland of the steenbok, *Raphicerus campestris*. By W. H. GERNEKE AND M. COHEN. *Faculty of Veterinary Science, University of Pretoria*

An intermandibular glandular area, never before described in any other ungulate, has been found in the steenbok (*Raphicerus campestris*). It consists of enlarged sebaceous and apocrine sweat glands situated in the upper two thirds of the dermis. They produce a dirty white almost flaky odoriferous substance which clings to the hairs of the area and is easily rubbed off for marking territorial areas as well as for marking females during mating.

The infraorbital gland produces a black secretion which is the combined secretion of melanaceous, branched alveolar, sebaceous and enlarged apocrine sweat glands. The function of this secretion is not known as it is not used for any obvious marking purposes (*Onderstepoort J. Vet. Res.* **45**, 1978).

Towards a rational method of student evaluation. By MARCUS FREDMAN. *Department of Anatomy, University of Cape Town Medical School, Cape Town*

A model of multiple choice testing is presented wherein the M.C.Q. examination is divided into two parts with different functions:

(a) *Certification* – in which the questions set are basic and a pass mark ensures the student a pass in the examination; and

(b) *Grading* – where the questions are far more difficult and the function of the examination is to grade those students who have passed the certification examination.

This part of the examination is marked by confidence coding and does not affect the pass already obtained by the student.

Results. Confidence-marked grading examinations have shown an extremely high coefficient of test reliability as measured by the RK20 reliability coefficient, which has resulted in a mean of 0.985 in 17 tests given to date, with the range of 0.958 to 0.998.

Increased validity of the M.C.Q. tests has also been shown when correlated with the other components of the final.